From:	Luke Moger
To:	<u>Jim Kuipers (jkuipers@kuipersassoc.com);</u> "Chris Carr" s.22
Cc:	Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons
Subject:	KCB Laboratory Reports
Date:	Wednesday, January 7, 2015 12:41:54 PM
Attachments:	image001.png 150105-RH14-10 SS01 33" 400 kPa - Static Simple Shear.pdf 150105-RH14-10 SS01 33" 800 kPa - Static Simple Shear.pdf 150105-RH14-22 SS02 30.5" 400 kPa - Static Simple Shear.pdf 150105-SH14-10A 06 400 kPa - Static Simple Shear.pdf 150105-UGLU Block Sample 400 kPa - Static Simple Shear.pdf 150105-UGLU Block Sample 800 kPa - Static Simple Shear.pdf 150105-RH14-03A SS03 400 kPa - Static Simple Shear.pdf

Dear Jim and Chris;

For your review, please find attached the latest set of data completed by KCB as part of the 2014 Geotechnical Investigation.

Kindest Regards,

Luke



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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com



Static Simple Shear Test (ASTM D6528)

Project No .:	M09954A02	Borehole D:	UGLU
Project:	MEM	Sample D:	Block Sample
Date:	7-Dec-14	Depth:	9.8'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from block sample

Initial Sample Information				
Specimen Height	mm	19.04		
Specimen Diameter	mm	70.06		
Area	cm ²	3855.05		
Volume	cm ³	73.40		
Wet Weight	g	136.12		
Water Content	%	36.48		
Dry Weight	g	99.74		
Wet Density	g/cm ³	1.854		
Dry Density	g/cm ³	1.359		
Specific Gravity (assumed)	-	2.75		
Void Ratio (e)	-	1.02		
Saturation Ratio (Sr)	%	97.98		

Static Shearing (Undrained)					
Initial Vertical Effective Stress	kPa	800.2			
Initial Shear Stress	kPa	0.2			
Shearing Rate (Shear Strain Rate)	% / hr	5			
Peak Shear Strength	kPa	157.22			
Ratio of Peak τ/ σ' _v	-	0.20			
Max. Excess Pore Pressure	kPa	679.50			
Max. Shear Strain	%	20.0			

FINAL SAMPLE INFORMATION					
Liquid Limit (shear plane)					
Plastic Limit (shear plane)					
Final Moisture Content	%	32.80			

CONSOLIDATION							
Vertical Effective Stress	kPa	50	100	200	400	800	
Max Load	kN	0.19	0.39	0.77	1.54	3.08	
Total Height Change	mm	0.43	0.60	0.83	1.26	2.04	
Consolidated Height	%	18.61	18.44	18.21	17.78	17.00	
Axial Strain	%	2.25	3.13	4.37	6.62	10.69	
Duration	min	480	480	480	499	541	

Photos:

Before Test

After Test







Static Simple Shear Test (ASTM D6528)

Project No.:	M09954A02	Borehole D:	UGLU
Project:	MEM	Sample D:	Block Sample
Date:	3-Dec-14	Depth:	9.8'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from block sample

Initial Sample Information				
Specimen Height	mm	19.05		
Specimen Diameter	mm	70.06		
Area	cm ²	3855.05		
Volume	cm ³	73.44		
Wet Weight	g	138.58		
Water Content	%	34.54		
Dry Weight	g	103.00		
Wet Density	g/cm ³	1.887		
Dry Density	g/cm ³	1.403		
Specific Gravity (assumed)	-	2.75		
Void Ratio (e)	-	0.96		
Saturation Ratio (Sr)	%	98.87		

Static Shearing (Undrained)		
Initial Vertical Effective Stress	kPa	400.2
Initial Shear Stress	kPa	0.2
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	102.77
Ratio of Peak τ/σ'_{ν}	-	0.26
Max. Excess Pore Pressure	kPa	336.03
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION					
Liquid Limit					
Plastic Limit					
Final Moisture Content	%	33.52			

CONSOLIDATION						
Vertical Effective Stress	kPa	50	100	200	400	
Max Load	kN	0.19	0.39	0.77	1.54	
Total Height Change	mm	0.37	0.51	0.70	1.04	
Consolidated Height	%	18.68	18.54	18.35	18.01	
Axial Strain	%	1.96	2.65	3.66	5.48	
Duration	min	600	600	600	719	

Photos:

Before Test

After Test



EMAILS_Part 6-1 Page 4 of 400





Static Simple Shear Test (ASTM D6528)

Project No.:	M09954A02	Borehole D:	SH14-10A
Project:	MEM	Sample D:	06
Date:	12-Nov-14	Depth:	34.3'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from sonic core sample

Initial Sample Information			
Specimen Height	mm	19.05	
Specimen Diameter	mm	70.06	
Area	cm ²	3855.05	
Volume	cm ³	73.44	
Wet Weight	g	137.08	
Water Content	%	34.92	
Dry Weight	g	101.60	
Wet Density	g/cm ³	1.867	
Dry Density	g/cm ³	1.383	
Specific Gravity (assumed)	-	2.75	
Void Ratio (e)	-	0.99	
Saturation Ratio (Sr)	%	97.22	

Static Shearing (Undrained)		
nitial Vertical Stress	kPa	400.2
nitial Shear Stress	kPa	0.1
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	103.95
Ratio of Peak τ/ σ' _v	-	0.26
Max. Excess Pore Pressure	kPa	346.19
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION		
Liquid Limit (shear plane)		
Plastic Limit (shear plane)		
Final Moisture Content	%	32.57

CONSOLIDATION						
Vertical Effective Stress	kPa	50	100	200	400	
Max Load	kN	0.19	0.39	0.77	1.54	
Total Height Change	mm	0.58	0.87	1.27	1.82	
Consolidated Height	%	18.47	18.18	17.78	17.23	
Axial Strain	%	3.05	4.55	6.65	9.55	
Duration	min	720	600	600	834	

Photos:

Before Test

After Test







Static Simple Shear Test (ASTM D6528)

Project No.:	M09954A02	Borehole D:	RH14-22
Project:	MEM	Sample D:	SS02
Date:	29-Nov-14	Depth:	30.5' - 32.5'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from thin-walled tube sample

Initial Sample Information			
Specimen Height	mm	19.04	
Specimen Diameter	mm	70.06	
Area	cm ²	3855.05	
Volume	cm ³	73.40	
Wet Weight	g	132.94	
Water Content	%	37.65	
Dry Weight	g	96.58	
Wet Density	g/cm ³	1.811	
Dry Density	g/cm ³	1.316	
Specific Gravity (assumed)	-	2.75	
Void Ratio (e)	-	1.09	
Saturation Ratio (Sr)	%	94.99	

Static Shearing (Undrained)		
Initial Vertical Effective Stress	kPa	400.2
Initial Shear Stress	kPa	0.2
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	100.65
Ratio of Peak τ/ σ'v	-	0.25
Max. Excess Pore Pressure	kPa	299.17
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION				
Liquid Limit				
Plastic Limit				
Final Moisture Content	%	36.10		

CONSOLIDATION						
Vertical Effective Stress	kPa	50	100	200	400	
Max Load	kN	0.19	0.39	0.77	1.54	
Total Height Change	mm	0.51	0.65	0.90	1.38	
Consolidated Height	%	18.53	18.39	18.14	17.66	
Axial Strain	%	2.68	3.42	4.73	7.26	
Duration	min	600	480	480	352	

Photos:

Before Test After Test 12/02/2014-011437





Static Simple Shear Test (ASTM D6528)

Project No.:	M09954A02	Borehole D:	RH14-10
Project:	MEM	Sample D:	SS01
Date:	26-Nov-14	Depth:	33'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from thin-walled tube sample

Initial Sample Information		
Specimen Height	mm	18.98
Specimen Diameter	mm	70.06
Area	cm ²	3855.05
Volume	cm ³	73.17
Wet Weight	g	132.72
Water Content	%	39.94
Dry Weight	g	94.84
Wet Density	g/cm ³	1.814
Dry Density	g/cm ³	1.296
Specific Gravity (assumed)	-	2.75
Void Ratio (e)	-	1.12
Saturation Ratio (Sr)	%	97.93

Static Shearing (Undrained)		
nitial Vertical Effective Stress	kPa	800.2
nitial Shear Stress	kPa	0.1
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	141.45
Ratio of Peak τ/ σ' _v	-	0.18
Max. Excess Pore Pressure	kPa	676.00
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION						
Liquid Limit (shear plane)						
Plastic Limit (shear plane)						
Final Moisture Content	%	32.78				

CONSOLIDATION							
Vertical Effective Stress	kPa	50	100	200	400	800	
Max Load	kN	0.19	0.39	0.77	1.54	3.08	
Total Height Change	mm	0.28	0.46	0.76	1.32	2.45	
Consolidated Height	%	18.70	18.52	18.22	17.66	16.53	
Axial Strain	%	1.47	2.40	4.01	6.97	12.91	
Duration	min	480	480	480	480	340	

Photos:

Before Test

After Test







Static Simple Shear Test (ASTM D6528)

Project No .:	M09954A02	Borehole D:	RH14-10
Project:	MEM	Sample D:	SS01
Date:	21-Nov-14	Depth:	33'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from thin-walled tube sample

Initial Sample Information					
Specimen Height	mm	19.05			
Specimen Diameter	mm	70.06			
Area	cm ²	3855.05			
Volume	cm ³	73.44			
Wet Weight	g	136.46			
Water Content	%	37.17			
Dry Weight	g	99.48			
Wet Density	g/cm ³	1.858			
Dry Density	g/cm ³	1.355			
Specific Gravity (assumed)	-	2.75			
Void Ratio (e)	-	1.03			
Saturation Ratio (Sr)	%	99.23			

Static Shearing (Undrained)		
Initial Vertical Effective Stress	kPa	400.2
Initial Shear Stress	kPa	0.2
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	92.58
Ratio of Peak τ/ σ' _v	-	0.23
Max. Excess Pore Pressure	kPa	343.52
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION						
Liquid Limit (shear plane)						
Plastic Limit (shear plane)						
Final Moisture Content	%	35.69				

CONSOLIDATION							
Vertical Effective Stress	kPa	50	100	200	400		
Max Load	kN	0.19	0.39	0.77	1.54		
Total Height Change	mm	0.42	0.55	0.73	1.15		
Consolidated Height	%	18.63	18.50	18.32	17.90		
Axial Strain	%	2.19	2.90	3.85	6.01		
Duration	min	600	600	480	825		

Photos:

Before Test



















Static Simple Shear Test (ASTM D6528)

Project No .:	M09954A02	Borehole D:	RH14-03A
Project:	MEM	Sample D:	SS03
Date:	17-Nov-14	Depth:	40'
Test by:	BY	Description:	Clay
Checked by:	AS	Preparation Method:	Trimmed from thin-walled tube sample

Initial Sample Information		
Specimen Height	mm	19.05
Specimen Diameter	mm	70.06
Area	cm ²	3855.05
Volume	cm ³	73.44
Wet Weight	g	134.78
Water Content	%	40.21
Dry Weight	g	96.13
Wet Density	g/cm ³	1.835
Dry Density	g/cm ³	1.309
Specific Gravity (assumed)	-	2.75
Void Ratio (e)	-	1.10
Saturation Ratio (Sr)	%	100.44

Static Shearing (Undrained)		
Initial Vertical Effective Stress	kPa	400.2
Initial Shear Stress	kPa	0.2
Shearing Rate (Shear Strain Rate)	% / hr	5
Peak Shear Strength	kPa	95.51
Ratio of Peak τ/ σ'ν	-	0.24
Max. Excess Pore Pressure	kPa	317.32
Max. Shear Strain	%	20.0

FINAL SAMPLE INFORMATION						
Liquid Limit (shear plane)						
Plastic Limit (shear plane)						
Final Moisture Content	%	38.50				

CONSOLIDATION						
Vertical Stress	kPa	50	100	200	400	
Max Load	kN	0.19	0.39	0.77	1.54	
Total Height Change	mm	0.93	1.08	1.33	1.75	
Consolidated Height	%	18.12	17.97	17.72	17.30	
Axial Strain	%	4.89	5.65	6.99	9.17	
Duration	min	1036	430	595	949	

Photos:

Before Test



EMAILS_Part 6-1 Page 14 of 400



From:	Rothman, Stephen MEM:EX
To:	Demchuk, Tania MEM:EX
Subject:	FW: Polley Lake channel design
Date:	Thursday, January 8, 2015 12:40:02 PM
Attachments:	Plan Profile Sht 1.pdf Plan Profile Sht 2.pdf Plan Profile Sht 3.pdf Plan Profile Sht 4.pdf Plan Profile Sht 5.pdf

Just received this from Ryan Brown. Steve

S. G. Rothman, P. Eng Senior Inspector - Health & Safety Ministry of Energy & Mines 441 Columbia Street, Kamloops B.C V2C 2T3 250-371-3780 Phone 250-82-4154 Fax 250-319-2054 Cell Stephen.Rothman@gov.bc.ca

From: Ryan Brown [mailto:rbrown@mountpolley.com] Sent: Thursday, January 8, 2015 12:36 PM To: Rothman, Stephen MEM:EX Subject: RE: Polley Lake channel design

Hi Steve,

I have attached creek alignment and gradient drawings. For now our Hazeltine Creek crews are working in the upper reaches to build the appropriate gradients into competent soils. Access to the middle reaches is being constructed as well. Further detail on reclamation and final bank designs I do not have, as I believe they are still being worked through.

Regards,

Ryan Brown, P.Eng Senior Mine Engineer Mount Polley Mining Corporation <u>rbrown@mountpolley.com</u> 250-790-2215 ext 2256

From: Rothman, Stephen MEM:EX [mailto:Stephen.Rothman@gov.bc.ca]
Sent: Thursday, January 08, 2015 11:22 AM
To: Ryan Brown
Subject: RE: Polley Lake channel design

Thanks Ryan,

Hope to see them today Steve

S. G. Rothman, P. Eng Senior Inspector - Health & Safety Ministry of Energy & Mines 441 Columbia Street, Kamloops B.C V2C 2T3 250-371-3780 Phone 250-82-4154 Fax 250-319-2054 Cell Stephen.Rothman@gov.bc.ca

From: Ryan Brown [mailto:rbrown@mountpolley.com] Sent: Thursday, January 8, 2015 10:53 AM To: Rothman, Stephen MEM:EX Subject: RE: Polley Lake channel design

Hi Steve,

Sorry for the delay, I have contacted our engineer for the project, and they are finalizing the drawing of the project. I will hopefully have them by the end of the day.

Regards,

Ryan

From: Rothman, Stephen MEM:EX [mailto:Stephen.Rothman@gov.bc.ca]
Sent: Thursday, January 08, 2015 9:55 AM
To: Ryan Brown
Subject: Polley Lake channel design

Ryan,

As discussed last week could you please forward me the design for the Polley lake channel. Thank You Steve

S. G. Rothman, P. Eng Senior Inspector - Health & Safety Ministry of Energy & Mines 441 Columbia Street, Kamloops B.C V2C 2T3 250-371-3780 Phone 250-82-4154 Fax 250-319-2054 Cell Stephen.Rothman@gov.bc.ca











<u>Chris Carr</u>
"Luke Moger"
Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; "Don Parsons"; "Jim Kuipers"
RE: KCB Laboratory Reports
Friday, January 9, 2015 7:42:06 AM
image001.png

Hi Luke,

Thank you for forwarding the lab data.

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

s.22

 From: Luke Moger [mailto:Imoger@mountpolley.com]

 Sent: January-07-15 12:40 PM

 To: Jim Kuipers (jkuipers@kuipersassoc.com); 'Chris Carr'
 s.22

 Cc: Demchuk, Tania EMNG:EX (Tania.Demchuk@gov.bc.ca); rick.adams@gov.bc.ca; Don Parsons

 Subject: KCB Laboratory Reports

Dear Jim and Chris;

For your review, please find attached the latest set of data completed by KCB as part of the 2014 Geotechnical Investigation.

Kindest Regards,

Luke

?	

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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com

From:	<u>Chris Carr</u>
To:	"Luke Moger"
Cc:	Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; "Don Parsons"; "Jim Kuipers"
Subject:	Technical specifications TSF Breach Repair
Date:	Friday, January 9, 2015 7:50:46 AM
Attachments:	image001.png

Hi Luke,

The technical specifications will be reviewed by MEM in due course.

Regards,

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

 From: Luke Moger [mailto:Imoger@mountpolley.com]

 Sent: December-26-14 10:35 PM

 To: Jim Kuipers (jkuipers@kuipersassoc.com); 'Chris Carr'
 s.22

 Cc: Demchuk, Tania EMNG:EX (Tania.Demchuk@gov.bc.ca); rick.adams@gov.bc.ca; Don Parsons

 Subject: FW: Stability Analyses and Embankment Design Update [M-200 Permit - Approccing the TSF

 Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Jim and Chris;

Please find attached (as referenced below) the 2015 Freshet Management Embankment Technical Specifications.

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

From: Luke Moger

Sent: December-26-14 10:31 PM

To: Howe, Diane J EMNG:EX (<u>Diane.Howe@gov.bc.ca</u>)

Cc: Demchuk, Tania EMNG:EX (<u>Tania.Demchuk@gov.bc.ca</u>); <u>rick.adams@gov.bc.ca</u>; Don Parsons; Dale Reimer

Subject: RE: Stability Analyses and Embankment Design Update [M-200 Permit - Approccing the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Diane;

As per clause C.2.(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, please find attached a document with the construction specifications and QA/QC as required for submission prior to initial embankment construction.

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:
 <u>LMoger@MountPolley.com</u>

From:	Warnock, George MEM:EX
To:	"Chris Carr"
Cc:	Demchuk, Tania MEM:EX; Hoffman, AI MEM:EX
Subject:	FW: Mount Polley IERP
Date:	Friday, January 9, 2015 5:06:13 PM
Attachments:	image001.jpg
	ScanToEmail 0221.pdf

FYI...Any comments?

From: Hoffman, Al MEM:EX
Sent: Friday, January 9, 2015 3:33 PM
To: Narynski, Heather M MEM:EX; Warnock, George MEM:EX; Pocklington, Cheryl M MEM:EX; Demchuk, Tania MEM:EX; Hemphill, Naomi MEM:EX
Cc: Howe, Diane J MEM:EX
Subject: FW: Mount Polley IERP

Tania

I assume this was a permit condition of the recent permit amendment.

Al

From: Dale Reimer [mailto:dreimer@mountpolley.com] Sent: Friday, January 9, 2015 12:35 PM To: Hoffman, AI MEM:EX Subject: Mount Polley IERP

Hi Al: Please find attached the submission of nominees for the IERP. Regards: Dale

Logo				
		?		



Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

January 7, 2015

Mr. Al Hoffman Chief Inspector of Mines Ministry of Energy and Mines Health, Safety and Permitting Branch PO Box 9320, Stn Prov Govt Victoria, BC V8W 9N3

Dear Mr. Hoffman;

Re: Amendment to Permit M-200 <u>Approving TSF Breach Repair and Perimeter Embankment Buttress Design for</u> <u>2015 Freshet</u>

Mount Polley Mining Corporation (MPMC) subject to Permit Amendment Condition A-5 is pleased submit the nominees for the Independent Engineering Review Panel (IERP) to provide expert technical guidance related to all aspects of the design, construction, operation and closure planning for the Tailings Storage Facility.

These three (3) BC Professional Engineers have been advised of their nomination and responsibilities inherent to the Mount Polley Mine IERP. They have tendered their acceptance pending your approval. A brief introduction follows, detailed resumes are attached;

- Nigel Skermer, P.Eng., BC Soil Mechanics Engineer (University of Manchester). Member of the Highland Valley Copper Tailings Review Board and local First Nations nominee. Experience with failure review, particularly landslides.
- John Brodie, P.Eng., BC Geological Engineer (UBC). Mine waste, reclamation and closure planning specialist. Experience with dam geotechnical design.
- Rod Smith, P.Eng., BC Geological Engineer (University of California). Member of the Highland Valley Copper Tailings Review Board and Geotechnical Board. Experience with hydrogeology, dam safety and seismology.

I look forward to your early correspondence in this matter.

Sincerely

Dale Reimer General Manager Mount Polley Mining Corporation

Attachments

Pages 28 through 52 redacted for the following reasons: s.22

From:Demchuk, Tania MEM:EXTo:Steve Robertson (srobertson@imperialmetals.com)Subject:RE: Mount Polley IERPDate:Tuesday, January 13, 2015 10:51:00 AMAttachments:image001.jpg

Steve,

I think the attachment prevented this email from going through to you on the first try. Tania

From: Demchuk, Tania MEM:EX
Sent: Tuesday, January 13, 2015 10:43 AM
To: Dale Reimer; Steve Robertson (srobertson@imperialmetals.com)
Cc: Hoffman, AI MEM:EX
Subject: RE: Mount Polley IERP

Good Morning Dale and Steve,

Following up on your nominations for the IERP for Mount Polley, I have a couple of questions:

- 1. The letter references that Nigel Skermer is a local First Nations nominee. Could you please clarify if he is a nominee of Williams Lake and Soda Creek Indian Bands, or if that comment is in reference to the Highland Valley Copper Tailings Review Board?
- 2. Was there a follow-up response/discussion with First Nations regarding their letter of December 8, 2014 to Steve Robertson? Specifically I am wondering if there was some discussion regarding the nominees or other mechanisms for involvement/observer status on the IERP with the local First Nations?

Please feel free to give me a call 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: Dale Reimer [mailto:dreimer@mountpolley.com] Sent: Friday, January 9, 2015 12:35 PM To: Hoffman, AI MEM:EX Subject: Mount Polley IERP

Hi Al: Please find attached the submission of nominees for the IERP. Regards: Dale

Logo			

From:	Chris Carr
To:	Demchuk, Tania MEM:EX
Subject:	RE: Bi-Weekly Construction Progress Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]
Date:	Tuesday, January 13, 2015 11:31:48 AM
Attachments:	image001.png

Hi Tania,

I have reviewed Report #1 for the period December 17 to 30, 2014. The report includes information required under Condition 5 (a) of the permit.

Although not specified in the permit I think the following information should be included in 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.

Regards,

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

s.22

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]
Sent: January-12-15 1:33 PM
To: Luke Moger; Howe, Diane J MEM:EX
Cc: Adams, Rick MEM:EX; Dale Reimer; Eldridge, Terry; Chris Carr s.22 Jim Kuipers; Rothman, Stephen MEM:EX; 'Douglas (Mobile) Watt'; Thorpe, Rolly MEM:EX
Subject: RE: Bi-Weekly Construction Progress Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Hi Luke,

Apologies for the delay in a reply to the first bi-weekly construction progress report, and Happy New Year. Thank-you for the submission. By way of this email, I am sharing it with Chris Carr, Jim Kuipers, Doug Watt and Steve Rothman for their information.

For future bi-weekly reports, please include Chris, Jim, Doug and Steve on the distribution list so that they are remaining informed of progress.

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: 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

From:	Adams, Rick MEM:EX
To:	Fenwick, Leigh-Ann ENV:EX
Cc:	Demchuk, Tania MEM:EX
Subject:	FW: Mt. Polley Return to Restricted Operations
Date:	Friday, January 16, 2015 8:27:55 AM
Attachments:	Mt. Polley Return to Restricted Operations.msg

Leigh-Ann, as requested by Tania, please find attached an updated MDRC distribution list for Mt. Polley's application for return to restricted operations. Please review and advise if there are any individuals you would like to see added, and also if there are any MOE EPD staff currently on the list who don't need to be included- with consideration to how MOE EPD is resourcing the Mount Polley file, and whether this is now viewed as a regular EMA/MA amendment application, or is still under the umbrella of the response to the breach incident.

Please note this is already a larger than usual MDRC membership due to First Nations, community, and agency concerns regarding the Mount Polley operation post TSF breach.

Rick Adams Inspector of Mines 250-828-4583

From:	<u>Chris Carr</u>
To:	Demchuk, Tania MEM:EX
Cc:	McConnachie, Jennifer MEM:EX; Warnock, George MEM:EX
Subject:	RE: M-200 Permit Amendment Application: Return to Restricted Operations
Date:	Sunday, January 18, 2015 7:26:44 PM
Attachments:	image001.png

Hi Tania,

The risk assessment I had in mind was some form of regulatory review rather than a technical review. The technical issues would however have a bearing on the risk assessment/review. I think it may be worth developing an internal assessment process for this and other projects although I am not sure what this would involve. Further discussion is required.

Chris

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]
Sent: January-18-15 6:16 PM
To: Chris Carr
Cc: McConnachie, Jennifer MEM:EX; Warnock, George MEM:EX
Subject: RE: M-200 Permit Amendment Application: Return to Restricted Operations

Hi Chris,

I have similar comments regarding the need for a long-term water management plan as part of this application. In addition, the December 17 permit amendment for breach repair has a condition that is clear that long-term site-wide water management is required by September 30, 2015 or with any restart application.

Also agree with the rest of your comments. I don't think that we have the expertise to conduct a formal risk assessment, this is not something we typically do. Do you have a suggestion for an approach or expertise who may be able to assist? Or do you believe that this is something we can do internally?

Thank-you for reviewing this and sending comments this weekend. Rick and Adams and I plan to speak to the company at 9:00 tomorrow morning regarding our concerns, and at 1:00 with Lorax regarding their review of the hydrogeology. I will copy you on the written correspondence that goes back to the company.

Tania

From: Chris Cars.22Sent: Sunday, January 18, 2015 1:20 PMTo: Demchuk, Tania MEM:EXCc: McConnachie, Jennifer MEM:EX; Warnock, George MEM:EXSubject: RE: M-200 Permit Amendment Application: Return to Restricted Operations

Hi Tania,

I have completed a screening review of the application dated January 13, 2015. I think the Ministry should look at the risks associated with the application to restart mining operations and the impact on site wide water storage. There are obviously benefits to MPMC to restart mining but the application does not address the possible long-term impacts.

The application is to cover mining and milling for one year, however the Ministry should consider what the impacts are beyond then depending on whether the mine closes or continues operation.

The application states "For the period under consideration the capacity of the Springer Pit should be sufficient to provide storage for both contact water and tailings regardless of the status of the TSF; however as the large volumes of annual contact water quickly exceeds the storage capacity of the pit, a long-term solution will be required". I consider that the long-term solution should be presented in this application.

Based on the hydrology study completed by Golder (Appendix C: Springer Pit Hydrology Report) the pit lake will overflow at approximate elevation 1050 m, however the water level has to be maintained below elevation 1030 m otherwise the groundwater will be impacted. Eventually water will have to be pumped from the Springer Pit to the TSF. The application states that the storage capacity of the TSF can be used after the 2015 Freshet to ensure that the Springer Pit does not reach the elevation when the pit lake water starts entering the groundwater (elevation 1030 m). At some point the TSF embankment dams will have to be raised to provide sufficient capacity if discharge of water to the environment is not approved. Note: there is a limit to how high the TSF embankment dams can be raised.

Whatever the long-term solution is, I believe that water will eventually have to be released to the environment (most likely from the TSF) either directly, if water quality meets discharge criteria, or after treatment.

Other issues to be considered:

Monthly evaluation and adjustment of the water balance will be required if the application is approved.

Preparation of an Operation, Maintenance and Surveillance Manual for tailings discharge to Springer Pit and operating procedures for surface water control if the application is approved.

Loss of ore reserves if the Springer Pit is filled with tailings and PAG waste rock and these materials are not removed.

Possible change from currently permitted cemented aggregate fill (CAF) to cemented tailings paste for underground backfill. This would require a permit amendment.

I would suggest that a formal risk analysis be undertaken. The application should also be reviewed by the IERP.

Regards,

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

s.22

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]Sent: January-16-15 2:44 PMTo: Chris Carrs.22McConnachie, Jennifer MEM:EXSubject: FW: M-200 Permit Amendment Application: Return to Restricted Operations

Hi Both,

Please find the Mount Polley restart application attached. I have been completing a screen of the application today and am realizing that it would be helpful to have any initial thoughts on application completeness or deficiencies from you. My initial thoughts are that the description of site water balance and management, particularly with respect to longer term planning are deficient. Overall, I am not sure that this is an acceptable application to move forward to the MDRC.

If you have time to take a quick look, any initial thoughts from you by the end of the day on Monday would be appreciated (happy to receive those via a phone call). Sorry for the rush request.

Tania

From: Luke Moger [mailto:Imoger@mountpolley.com]
Sent: Tuesday, January 13, 2015 7:10 AM
To: Howe, Diane J MEM:EX
Cc: Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer
Subject: M-200 Permit Amendment Application: Return to Restricted Operations

Dear Diane;

As per Section 10.1.2 of the British Columbia Mines Act, please find attached a digital copy of our application (and corresponding cover letter) to amend Mount Polley Mining Corporations M-200 Permit for restricted operations at the Mount Polley Mine. If you would please indicate any additional parties that should receive copies of this document it would be greatly appreciated. Additionally, if hard copies of this application are requested, please indicate how many and to whom and we will be happy to provide. As noted in the attached cover letter, we are requesting that a Regional Mine Development Review Committee meeting be scheduled for late January of
early February to discuss this application; Tania Demchuk and Rick Adams have been cc'd on the submission of this application accordingly.

A copy of this permit will also be provided to the Ministry of Environment, along with other documentation required in supporting the amendment for their permitting application process.

If you should have any questions or comments, please don't hesitate to contact Dale Reimer at (250) 790-2215 ext. 2600.

Kindest Regards,

Luke

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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com

From:	Pocklington, Cheryl M MEM:EX	
То:	Demchuk, Tania MEM:EX	
Subject:	VA14-01704 - KP Submission to IERP - Rev 0.pdf	
Date:	Thursday, January 22, 2015 5:31:39 PM	
Attachments:	VA14-01704 - KP Submission to IERP - Rev 0.pdf ATT00001.txt	

www.knightpiesold.com

Knight Piésold

December 5, 2014

File No.:VA101-1/34-A.01 Cont. No.:VA14-01704



Dear Dr. Morgenstern,

Re: Review Panel Call for Input – Knight Piésold Ltd. Submission

Knight Piésold Ltd. (KP) is pleased to submit this letter in response to the November 6, 2014 invitation from the Mount Polley Independent Expert Engineering Investigation and Review Panel (the Panel) to provide information that may be pertinent to the investigation of the Mount Polley Tailings Storage Facility (TSF) Perimeter Embankment breach. We have also included information relevant to the specific questions provided by the Panel in your letter to Mr. Ken Brouwer dated November 24, 2014.

KP sympathizes with all those that are affected by the event, sharing their concerns about its effects on the environment. KP is supporting all three of the main investigations into this unfortunate incident and is keenly interested in determining what caused the embankment breach. KP is not familiar with the details of the incident, nor does it have any knowledge of the design, construction, operation and water management practices of the Mount Polley TSF since 2010. In February 2011, KP formally withdrew services and officially handed over Engineer of Record (EoR) responsibilities to AMEC.

KP has already provided extensive information relating to the Mount Polley TSF to the Panel as per 'Order Requiring Production of Records and Things', (N. Morgenstern, September 8, 2014). KP acknowledged in the subsequent submission that additional information was available but was not included due to the volume of the information and the short time frame that was available to compile and submit it. We are pleased to have the opportunity to provide additional information, both in this submission and in the upcoming Panel interview scheduled with Mr. Ken Brouwer, P.Eng. for December 12, 2014.

The following information may be pertinent to the investigation and is based on recent publically available information including aerial images and newspaper reports, as well as KP's knowledge of activities and conditions at the Mount Polley Mine prior to KP's departure from the project. KP has not been provided an opportunity to visit the site and examine the conditions at the breach, and thus has relied on publically available information and past experience in providing the following comments:

- 1. The attached PowerPoint presentation (Attachment 1) was prepared by KP in February 2007 and presented to Mount Polley Mining Corporation (MPMC) at that time. This presentation is included because it presents an overview summary of some of the design, construction and operation activities completed by KP up to that time.
- 2. The initial design of the Mount Polley TSF was reviewed by an independent Panel of engineers from 1995 to 1997. Panel members were Mr. Fred Matich and Mr. Chuck Brawner, two well respected specialists in the geotechnical community. Once operations began in 1997, Mr. Brawner continued on contract as a reviewer of the Mount Polley TSF for the Ministry of Energy and Mines for several years. Feedback from the review of this Panel was incorporated into the design of the initial construction stages of the Mount Polley TSF.
- 3. In a letter from KP to Ron Martel of MPMC, dated February 3, 2011 (Attachment 2), KP expressed its concern about site water management practices conducted by MPMC and their impact on water accumulation and storage requirements for the tailings impoundment. KP highlighted that "site water management practices [, as these] can have a significant impact on water accumulation at the mine and the storage requirements for the tailings," and concluded the letter by recommending "that MPMC adopt a pro-

Knight Piésold Ltd. | Suite 1400 – 750 West Pender St, Vancouver, BC Canada V6C 2T8 | p. +1.604.685.0543 f. +1.604.685.0147



active approach and have an experienced reviewer examine the overall site water management system..." KP does not know if this recommendation was acted upon.

- 4. In a letter from KP to Mr. Brian Kynoch of MPMC, dated February 10, 2011 (Attachment 3), KP stated that "The embankments and the overall tailings impoundment are getting large and it is extremely important that they be monitored, constructed and operated properly to prevent problems in the future." The intent of this statement was to emphasize the care and diligence that was required during ongoing TSF operations/development and to highlight the fact that the embankment stability needed to be carefully assessed for future embankment designs.
- 5. The need for additional investigations, monitoring and design adjustments to the TSF was also highlighted in the handover meeting that KP had with AMEC and MPMC as part of a formal transfer of the Engineer of Record responsibilities to AMEC. In particular, KP highlighted the importance of proper site water management, maintaining tailings beaches, upgrading and enhancing the instrumentation systems, and developing stabilizing buttresses along the embankments to enhance the stability where potentially weaker silt materials are present in the dam foundations. KP also stressed the importance of site supervision including a strong engineering site presence during construction and of following rigorous QA/QC procedures. The attached Tables 1 and 2, dated March 08, 2011 (Attachment 4), provide a summary of some of the information discussed in the handover meeting as well as a listing of documents to be provided by KP, which were subsequently provided. The key items to note from these tables are as follows:
 - The seepage analysis is updated and reported in each staged design report.
 - o The stability analysis is updated and reported in each staged design report.
 - The stability analysis requirements are dependent on the design method selected.
 - The 'Operating Monitoring and Surveillance Manual' should be updated annually.
 - Overall site water management needs to be reviewed with regard to mass balance for pit water storage and tailings storage pond.
 - o The stability of the perimeter embankment needs to include (for) borrow pit development.
 - The operations of the TSF tailings deposition strategy should be reviewed to ensure that the design intent of a continuous beach is maintained.
 - The current TSF monitoring system instrumentation has a number of malfunctioning or missing instruments. (Their) replacement (or) alternate monitoring plans need to be developed (as) a high priority item.

As indicated above, the stability of the Perimeter Embankment was specifically discussed and KP provided recommendations to assess the implications of tension cracking that had been identified in 2010 along a section of the Perimeter Embankment. Observations of the tension cracking were discussed in KP's 2010 TSF Inspection Report (VA101-1/29-2, January 25, 2011).

6. Surficial investigations of the foundation conditions for the embankments determined that the glaciolacustrine unit encountered within the TSF basin is a continuous laminated unit near the Main Embankment and present as discontinuous layers within the glacial till unit to the northeast near the Perimeter Embankment. KP's Stage 6A Construction Report (VA101-1/23-1, July 10, 2009) included drill logs and geologic sections of a borrow area downstream of the Perimeter Embankment that identified glaciolacustrine units within and below glacial till materials. A letter from KP to Chris Carr, the BC Inspector of Mines, dated December 19, 2007 (Attachment 5), stated that KP "adopted a conservative design philosophy and [has] incorporated an additional stabilizing buttress in the Main Embankment design to provide for [sic] an additional contingency measure for further enhancing the stability," and furthermore that "the elevation of the buttress will be progressively increased from Stage 6 through closure in order to ensure

ensure that a suitable factor of safety is provided, even for very conservative shear strength parameters." KP's design philosophy was to install buttresses in areas with potentially weak foundation materials. The buttressing requirements for the Main Embankment were reiterated during 2008 and 2009 as indicated in VA08-02223 and VA09-00838 (Attachment 5). From aerial photos it appears that the buttress expansions at the Main Embankment were not completed, nor does it appear that the haul road along the toe of the Perimeter Embankment was expanded to serve as an additional buttress, as per KP recommendations.

- 7. In 2010, as part of the Stage 6 construction, the downstream face of the Perimeter Embankment was constructed to an interim slope of 1.4H:1V. This interim slope, which was notably steeper than the final design slope of 2H:1V, was permitted because the width of the interim dam crest was considerably overbuilt, as indicated on the attached Figure 1 (Attachment 6), and because of the extensive drained tailings beach that was present. This concept of temporarily overbuilding the embankment raise and coincidentally oversteepening the downstream slope is illustrated on slides 19 and 20 in the attached PowerPoint presentation (Attachment 1). It is evident from various photos of the breach area that the on-going staged expansions to the Perimeter Embankment incorporated a very steep (angle of repose) slope angle for the much higher embankment that was constructed subsequent to KP's departure from the Project.
- 8. The use of cycloned tailings sand for dam construction was considered in 1999, and a trial cyclone sand berm was built at a location just east of the Perimeter Embankment Seepage Collection Pond, as part of the Stage 3 construction of the Perimeter Embankment. The cycloned sand material was found to be suitable as a construction material, but plans to use it for embankment construction were abandoned because of poor productivity due to the variable feed and fine grind of the tailings, along with high unit rate costs compared to alternate construction materials.
- 9. In 2010, when KP was last involved with the design, construction and operation of the Mount Polley TSF, there was less than 1 million m³ of water in the tailings impoundment and the TSF was functioning as designed. There was a significant growth in stored water since that time, as indicated in satellite photos (Attachment 7) and from various publically available documents that state that the pond size was approximately 10 million m³ at the time of the TSF embankment breach. This condition suggests that the TSF pond was in a net accumulation state and the water management systems were not operating to maintain an effective water balance, which would allow for development of a large stabilizing tailings beach adjacent to the embankments.
- 10. The design of the TSF embankments prior to 2011 included the fundamental requirement that a blanket of tailings solids be present immediately upstream of all embankments and along the abutments. Thus, a fundamental objective of the tailings management plan was to establish beaches adjacent to the embankments. However, as stated in email correspondence between Ken Brouwer of KP and Ron Martel of MPMC, dated October 5, 2006, "it is not necessary to continuously maintain a minimum width of exposed beach adjacent to the embankment, and periodic temporary (less than 2 months duration) shallow flooding (less than 0.5 meters depth) of the beaches is anticipated." It was our experience that MPMC was sometimes challenged to comply with these depth and duration requirements. Photos of the TSF show that water was abutting the upstream face of the Main Embankment in 2008 (Attachment 7), and from our recollection this condition was attributable to MPMC's inability to discharge tailings from the Main Embankment because of tailings pipeline mobility constraints. It is noted that the satellite photos show that there were nearly no beaches at any of the embankments in the months immediately prior to the breach (Attachment 7) and that water was abutting the upstream face of the Perimeter Embankment in the vicinity of the breach location at that time. The depth of beach flooding and the duration of flooding are not clear, but on the basis of the consistency of beach flooding evident in the 2013-2014 orthoimagery (Attachment 7), it is possible that the restrictions on the depth and duration of flooding may have been compromised.
- 11. It appears from satellite photos that the reclaim barge was relocated closer to the Perimeter Embankment at some point after KP's departure from the project, thereby limiting the ability to discharge tailings from the Perimeter Embankment for the purpose of maintaining the tailings beaches in that area. (Attachment 7)

- 12. Online photos show evidence of surface water erosion in rockfill materials along the east side of the breach, which suggests that relatively clean water flowed over the dam crest during the initial stages of the breach. The erosive action would have subsequently caused rapid downcutting through the embankment fill and in the adjacent tailings solids, followed by static liquefaction and slumping of the eroded tailings mass that would have mixed with tailings water and resulted in the mudflow that is evident along the flow path.
- 13. With the apparent large size of the tailings pond and its close proximity to the Perimeter Embankment, the rate of seepage through the embankment drainage system, which includes an upstream toe drain, would likely have been substantial. As such, pumping and piping installations, additional to the original facilities located towards the east end of the Perimeter Embankment Seepage Recycle Pond, would likely have been required. The only recycle pipelines visible on satellite photos of the post event facility appear to pass through the embankment, indicating that they were installed prior to the most recent embankment raise. It is not known if additional recycle pipelines were installed on the embankment in the area of the breach.
- 14. A review of climate data for August 3 to 4, 2014, from the BC Ministry of Forests' climate stations at Gavin (11 km SW of the TSF) and Likely (13 km NE of the TSF), as obtained from the Department of Earth, Ocean & Atmospheric Sciences at UBC, indicates reasonably tranquil weather conditions prior to and at the time of the TSF embankment breach. No precipitation was noted in the 24 hours preceding the breach, and winds generally blew from the east at speeds of approximately 6 kph (1.7 m/s) to 9 kph (2.5 m/s) for the three hours preceding the breach. The lack of precipitation would result in no rise in the TSF pond level, and the low wind speeds and easterly wind direction would result in no wave run-up at the breach location. Thus, it does not seem likely that the breach could have resulted from overtopping due to wave action.
- 15. The satellite photographs and media reports clearly indicate that excess water was present in the tailings pond at the time of the breach and that the required freeboard allowances may have been compromised. However, from the publicly available information and photographic data, it is unclear what triggering event caused the initial flow of tailings water over the Perimeter Embankment.' KP is not privy to other information that may be available about the triggering event, and thus further comment about potential triggering mechanisms would be speculative at this time.
- 16. We have had discussions from other mining industry participants about a potential industry response that would lead to greater social licence and acceptance by public stakeholders. We have included a Draft summary memo (Attachment 8) which outlines what this potential industry response may look like.

KP will be pleased to provide additional specific information requested by the Panel. Please contact the undersigned with any requests for clarification or supplemental information.

Yours truly, KNIGHT PIESOLD LTD.

Signed:

Ken Brouwer President Reviewed:

és Galbraith. Senior Engineer

Approved:

Ken Embree, P.Eng. Managing Principal

VA14-01704 December 5, 2014

References:

- Knight Piésold Ltd., 2009. Mount Polley Mine Tailings Storage Facility Report on Stage 6A Construction, Ref. No. VA101-1/23-1, Rev 0, July 10, 2009.
- Knight Piésold Ltd., 2011. Mount Polley Mine Tailings Storage Facility Report on 2010 Annual Inspection, Ref. No. VA101-1/29-2, Rev 1, January 25, 2011.

Attachments:

Attachment 1	Tailings Facility Summary - PowerPoint Presentation (Feb 26, 2007)		
Attachment 2	KP Letter (VA11-00252, February 3, 2011) and MPMC Response Letter (March 3, 2011)		
Attachment 3	Mount Polley Tailings Storage Facility Engineer of Record (VA11-00298, February 10, 2011)		
Attachment 4	Tailings Storage Facility – Engineer of Record Handover (VA11-00444, March 8, 2011)		
Attachment 5	Mount Polley Stage 6 TSF Design (Buttress) (VA07-01853, December 19, 2007), KP Letter		
	VA08-02223 (December 5, 2008), and KP Letter VA09-00838 (July 3, 2009)		
Attachment 6	TSF Perimeter Embankment – Arrangement Prior to Handover (Figure 1)		
Attachment 7	Mount Polley Project – Imagery and Facilities (Figures 1, 2 and 3)		
Attachment 8	Mount Polley Industry Response (VA14-01615, October 30, 2014)		

/kjb

VA14-01704

Attachment 1

Mount Polley Project

Tailings Facility Summary



February 26, 2007

Overview of Presentation

- General Information
- Project Background
- On-going Operations and Monitoring
- Test Heap Leach Pad Overview

General Information

Mount Polley Project, 2006 Air photo



Sold

February 26, 2007

General Information

- Production started June 1997
- Care and Maintenance status October 2001 to March 2005
- Regular inspections
- Start up March 2005
- Stage 4 Tailings Storage Facility (TSF) construction per existing permits to El. 948m from May 2005 October 2006
- Additional Mines Branch permits required for on-going expansion of TSF
- Stage 4 raise was an upstream cap
- Stage 5 raise is a modified centerline construction process
- Stage 5 crest to be constructed to El. 951m
- Stage 6 upstream cap to be constructed to El. 954 m

Recent TSF Technical Reviews

- Nick Rose MEMPR
- Dam Safety Review AMEC
- MEMPR Chris Carr comments
 - closure arrangement
 - Dam Consequence Classification
 - Lacustrine strength & Main Embankment buttress.
 - Tailings Beaches

- Project Background Hydrometeorology (Update Required)

Mean annual precipitation of 755mm at TSF

24 HR Probable Maximum Precipitation (PMP) is 203mm

72 HR Probable Maximum Precipitation (PMP) is approximately 320mm



February 26, 2007

Project Background -Hydrometeorology (PMP & PMF)

The PMP, or Probable Maximum Precipitation, is theoretically, the greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographical location at a certain time of the year.

≥ 24 Hr. PMP of 203 mm: 679,000 m³ \rightarrow 0.40 m

72 Hr. PMP of 320 mm: 1,070,000 m³ → 0.63 m

The PMF, or Probable Maximum Flood, is the flood that can be expected from the most severe combination of critical meteorologic (i.e. PMP) and hydrologic conditions (i.e. snowpack) that are reasonably possible in a region.

- The average annual snowfall runoff for the area is 304 mm
 - 24 Hr. PMF (203mm + 304 mm): 1,696,000 m³ → 1.00 m
 - 72 Hr. PMF (320mm + 304 mm): 2,087,000 m³ → 1.23 m
- The 1:10 year snowfall runoff for the area is 629 mm.
 - 24 Hr. PMF (203mm + 629 mm): 2,783,000 m³ → 1.63 m
 - 72 Hr. PMF (320mm + 629 mm): $3,174,000 \text{ m}^3 \rightarrow 1.87 \text{ m}$

February 26, 2007

EMAILS_Part 6-1 Page 146 of 400

Project Background – Water Management

Site Water Management (Wight pit not shown)



Knight Piesold ref #: 101-01/18

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Project Background - Water Balance (Update Required)

Typical water balance calculations for Wight Pit expansion:



February 26, 2007

TSF - Staged Development

Proposed On-going Stages



EMAILS_Part 6-1 Page 148 of 400

TSF - Depth Area Capacity Curve



February 26, 2007

Tailings Storage Facility (TSF) layout:

•Pond El. as of Feb 20, 2007: 945.46 m

•Estimated rate of rise for the pond level during the next 4 months: 1.9 m Perimeter Embankment
Avg. Zone S El: 948.5m
Min. Zone S El: 948.0m

Main Embankment •Current Zone S El: 949.7 m •Min: Zone S El: 949.0

South Embankment •Current Zone S El: 948.7 m •Min. Zone S El: 948.5 m

2006 Air Photo

February 26, 2007

TSF - Stage 5 Estimated Percent Complete

- All estimations are based on quantities placed to complete stage 5, not time to place.
- Perimeter
 Embankment
 - Zone U: 0%
 - Zone S: 0%
 - Zone F: 0%
 - Zone T: 0%
 - Zone C: 40%
 - Total Embankment: 10%

- Main Embankment
 - Zone U: 0%
 - Zone S: 60%
 - Zone F: 50%
 - Zone T: 50%
 - Zone C: 95%
 - Total
 Embankment: 75%

- South Embankment
 - Zone U: 0%
 - Zone S: 25%
 - Zone F: 0%
 - Zone T: 40%
 - Zone C: 0%
 - Total Embankment: 15%

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- Currently Permitted:
 - Stage 1a/1b constructed to El. 934m in 1996/1997 reviewed by Fred Matich
 - Stage 2a/2b constructed to El. 937m in 1998 reviewed by Chuck Brawner
 - Stage 3a/3b constructed to El. 942.5m in 2000/2001 reviewed by Chris Carr
 - Stage 3c constructed to El. 945m in 2004/2005 reviewed by Chris Carr
 - Stage 4 construction to El. 948m on embankments- Approved by Chris Carr
 - Stage 5 construction to El. 951m on embankments in progress Approved by Chris Carr
- Pending Permits:
 - Stage 6 construction to El. 954m on embankments
 - Design and permitting to be completed
 - On-going design and expansions to El. 965m

Project Background





Project Background – Tailings Properties

Tailings Slurry:

- Solid throughput: 20,000 tonnes per day
- Percent solids: 25 30%
- Solid Specific Gravity: 2.70
- In situ density: 1.4 tonne/m³
- Geochemical characteristics:



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

- Seepage water quality: Ron Martel
 - Elevated sulphate levels now occurring in TSF



February 26, 2007

EMAILS_Part 6-1 Page 155 of 400

TSF - Stage 5 Design

Estimated waste rock used for haul road was approximately 2,675,000 tonnes. Estimated waste rock placed at the TSF was approximately 3,000,000 tonnes. Estimated percentage complete for waste rock as of stage 5 is approximately 85% to 90%



February 26, 2007

Knight Piesold ref #: 101-01/18

070

Perimeter Embankment:

Raise Zone C, S, F and T to El. 951 m. Zone C can be temporarily placed at the angle of repose.



Perimeter Embankment:
 Zone C configuration options.



February 26, 2007

Main Embankment:

Raise Zone C, S, F and T to El. 951 m. Zone C can be temporarily placed at the angle of repose.



Main Embankment: Place Zone C at 2:1



EMAILS_Part 6-1 Page 160 of 400

February 26, 2007

Main Embankment X-section



February 26, 2007

South Embankment X-section:



February 26, 2007

South Embankment X-section:



February 26, 2007

TSF - Ultimate Design

Draft South Embankment X-section



February 26, 2007

The existing runoff ditch is located on the upstream side of the access road. The lowest elevations are between 949 m and 950 m near the SE.

The proposed ditch will run along the new access road at an approximate elevation of 965 m.



070

February 26, 2007

TSF - Ultimate Design

Design Criteria

Design Operation Life	7 years	
Hazard rating: During Operations After Closure	HIGH by CDA Consequence Classification HIGH by CDA Consequence Classification	
Design Earthquakes: Operations DBE MDE After Closure MCE	1 in 475 year event (M = 6.5, A _{max} = 0.037 g) 50% of the 1 in 2000 year event or MCE (M = 6.5, A _{max} = 0.065 g) 1 in 2000 year event	
Embankment Crest Width : (Final Width)	8 m	
Design Tonnage	7,300,000 tpy (20,000 tpd)	
Freeboard: Operations/Closure	24 Hr. PMP event (679,000 m ³) + wave height \rightarrow 0.40 m + 0.60 m = 1.00 m 72 Hr. PMP event (1,070,000 m ³) + wave height \rightarrow 0.63 m + 0.60 m = 1.23 m 24 Hr. PMF 1:10 yr. event (2,783,000 m ³) + wave height \rightarrow 1.63 m + 0.60 m = 2.23 m 72 Hr. PMF 1:10 yr. event (3,174,000 m ³) + wave height \rightarrow 1.87 m + 0.60 m = 2.47 m	
Storage Capacity:	76,000,000 tonnes	
TSF - Total Freeboard

Wave height calculation

- Maximum wind speed: 25 km/hr
- Direction bearing: 335 degrees
- Maximum fetch: 1.6 km
- From table 6.7 given in the United States Department of Interior's "Design of Small Dams," the predicted wave height would be 0.6 m.

Total Freeboard

- ≥ 24 Hr. PMP event \rightarrow 0.40 m + 0.60 m = 1.00 m
- 72 Hr. PMP event \rightarrow 0.63 m + 0.60 m = 1.23 m
- 24 Hr. PMF event (10 yr. snow pack) → 1.63 m + 0.60 m = 2.23 m
- 72 Hr. PMF event (10 yr. snow pack) → 1.87 m + 0.60 m = 2.47 m

Inclinometer readings







Typical inclinometer reading

Knight Piesold ref #: 101-01/18





Typical Drain Flow



Typical foundation drain flow readings

Typical upstream toe drain flow readings

February 26, 2007



💙 🚸 Hydrogeology



February 26, 2007

TSF - Tailings Deposition

- Water Management
 - Tailings Deposition Strategy





February 26, 2007

 $\otimes = Pump$





- Seepage from Main Embankment Seepage Recycle Pond pumped into tailings pond
- -Tailings supernatant pond volume increases over life of mine

 Freeboard maintained for containment of PMP runoff plus 1m for wave run-up Knight Piesold ref #: 101-01/18

STSF - Potential Future Operations

Water Discharge locations



TSF – 1999 Closure Plan

Proposed Closure Plan

**

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



February 26, 2007

TSF - Potential Revised Closure Plan

Water Discharge locations



February 26, 2007

Knight Piesold ref #: 101-01/18

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Test Heap Leach Pad - Overview

- Constructed between August and November 2006.
- Hydrostatic Test was passed in December 2006,
 - Items to complete:
 - Drainage pipe collection system
 - Protective drainage layer.



Test Heap Leach Pad -Hydrostatic Test

Filled with water pumped from the Cariboo Pit.

Test deemed complete when leakage rate stabilized at 12 l/min after 24 hours.



February 26, 2007

*

Test Heap Leach Pad - Location & Future Expansion

As-built drawing

February 26, 2007

Volume to crest of the test pad is approximately 55,000 m³



Questions on TSF?



sola

February 26, 2007

Attachment 2



File No.:VA101-1/29-A.01 Cont. No.:VA11-00252 Suite 1400 - 750 West Pender Street Vancouver, BC Canada V6C 2T8

Tel: 604.685.0543 *Fax:* 604.685.0147 *www.knightpiesold.com*

February 3, 2011

Mr. Ron Martel Environmental Superintendent Mount Polley Mining Corporation P.O. Box 12 Likely, BC V0L 1N0

Dear Ron,

Re: Mount Polley Mine – Site Water Management

Knight Piésold (KP) recently issued the 2010 annual inspection report for the Tailings Storage Facility (TSF) at the Mount Polley Mine. Although the primary focus of the annual inspection is to evaluate the performance of the TSF, the inspection also considers site water management practices, as these can have a significant impact on water accumulation at the mine and the storage requirements for the tailings impoundment.

KP previously assisted with assessing the operational water balance for the overall site. However, Mount Polley Mining Corporation (MPMC) has been managing the water balance in-house for the last two years and KP has had no involvement with it during this time. The water balance for the mine site was operating with a significant water surplus when KP last reviewed the information, with surplus water progressively accumulating within the TSF and the Cariboo and Wight Pits. KP understands that the quality of the water that is stored in the TSF and the pits is not suitable for discharge to the environment, and that MPMC does not yet have a permit to discharge excess water.

MPMC recently provided KP with a copy of an amendment (2009) to the mine operating permit that allows for the transfer of water from the TSF to the Cariboo Pit. This permit amendment allows for filling of the Cariboo Pit up to a designated maximum water level, and also stipulates that a minimum water cover be maintained over Potentially Acid Generating (PAG) waste rock that has been placed in the pit. KP has a general knowledge of the Cariboo Pit, but has not completed relevant geotechnical or hydrological studies for it. However, our overview assessment of the TSF operations, conducted as part of the 2010 Annual Inspection, suggests that a significant amount of water was transferred out of the TSF as the impounded supernatant water was considerably less than in previous years. MPMC site staff confirmed that tailings supernatant water had been transferred from the TSF to the Cariboo Pit to reduce the volume of water stored within the TSF.

The storage capacity for surplus water in the Cariboo Pit is limited by the geometry of the pit, the amount of PAG waste rock being stored in the pit, and the upper storage limit as defined in the operating mine permit. It is our opinion that the volume of water currently being stored in the Cariboo Pit is lower than would have been predicted by the site water balance, and it is possible that significant leakage may have occurred during filling of the Cariboo Pit, resulting in the discharge of poor quality water to adjacent water courses.

KP included a recommendation in the 2010 Annual Inspection report that the water balance and water management practices be reviewed to ensure compliance with the intent of the current permits. Our



Knight Piésold

concern is that some of the water transferred from the TSF to the Cariboo Pit is not being contained, but rather is being discharged as seepage and/or overflow to adjacent receiving waters. KP therefore recommends that MPMC adopt a pro-active approach and have an experienced reviewer examine the overall site water management system, with particular focus on the hydrogeological characteristics of the Cariboo and Wight Pits, to evaluate the current practices for managing site surplus water to confirm compliance with existing storage and discharge permits.

We trust that this information will be of assistance to MPMC in their continuing operation of the Mount Polley Mine. Please contact the undersigned if you have any questions or comments.

Yours truly, KNIGHT PIESOLD LTD.

GINE

Signed: Les Galbraith, P. Eng. Senior Engineer

Approved: Ken Brouwer, P.Eng. Managing Director

Copy To: Tim Fisch (MPMC), Bryan Kynoch (Imperial Metals Corporation)

/lg

-> 101-1/29. 01



MOUNT POLLEY MINING CORPORATION

A DIVISION OF IMPERIAL METALS CORPORATION Box 12, Likely B.C. VOL 1N0 Phone (250)-790-2216, Fax (250)-790-2268

March 3rd, 2011

Mr. Les Galbraith Senior Engineer Knight Piésold Consulting #1400 – 750 West Pender Street Vancouver, BC V6C 2T8

Re: Mount Polley Mine - Site Water Management

Dear Les:

We confirm that significant water leakage from the Cariboo pit has not taken place, and that the water balance continues to accurately predict the water levels at all locations at the site including the Cariboo pit. The water balance continues to work well; the negative accounts are the result of drought conditions we experienced over the last twelve months.

We were quite concerned about the opinion you expressed in your letter of February 3, 2011, "that the volume of water stored in the Cariboo pit is lower than would have been predicted by the site water balance, and that it is possible that significant leakage may have occurred during the filling of the Cariboo pit, resulting in the discharge of poor quality water to adjacent water courses." Monitoring of ground water and surface water courses downstream confirm this is not the case, and as we noted above the water balance continues to accurately predict the level of water in the Cariboo pit.

Transfer of water between the open pits and the tailings impoundment facility was always contemplated, and each pit has a permitted water fill elevation. It is recommended in the operating plans that Knight Piesold helped develop that we fill the pits to these levels as quickly as possible to minimize the potential for mineral oxidation and metal leaching. The Cariboo pit was already filled to capacity once before, during the period of temporary suspension, the monitoring of wells and surface flows then also indicated that the water was well contained.

In your letter you acknowledge that you have not been involved in the management of the water balance at Mount Polley for the last two years. While we appreciate that you shared your concerns with us, it is important for you to ensure that such highly sensitive views take into account current information, such as in this case, recent drought conditions, together with all relevant historical data.

We at Mount Polley and Imperial Metals pay close attention and take our responsibility to manage water seriously. The water management plan is evaluated on a continual basis and adjustments made to avoid impacts to the environment. Mount Polley has taken a pro-active approach, working closely with engineers at head office as well as other consultants who provide an outside review of the water management practices at the site and ensure we are in compliance with our permits.

Yours truk Month Polles Mining Corporation Marte Kynoch, Tim Fisch, Ken Brouwer

Attachment 3

Knight Piés CONSULTING

File No.:VA101-1/29-A.01 Cont. No.:VA11-00298 Suite 1400 - 750 West Pender Street Vancouver, BC Canada V6C 2T8

Tel: 604.685.0543 Fax: 604.685.0147 www.knightpiesold.com

February 10, 2011

Mr. Brian Kynoch Mount Polley Mining Corporation Suite 200 - 580 Hornby Street Vancouver, BC V6C 3B6

Dear Brian,

Re: Mount Polley Tailings Storage Facility Engineer of Record

We have completed all assignments and on January 25, 2011 issued to Mount Polley Mining Corporation (MPMC) the final versions of the 'Tailings Storage Facility - Report on the 2010 Annual Inspection' and 'Tailings Storage Facility – Report on Stage 6B Construction'.

We are currently assuming that MPMC will be retaining the services of a separate individual or organization to take over as the Engineer of Record for the tailings storage facility, as a result of Knight Piésold's decision to opt out of the bidding process implemented by MPMC late last year. We would like to facilitate a formal handover to the new individual/group, as it is essential that it be recognized that Knight Piésold will not have any responsibility for any aspects of the on-going operations, or of any modifications to the facilities that are undertaken from now onwards. To date, the tailings impoundment has been developed using the observational approach, wherein the design is modified as appropriate depending on actual performance and conditions. It must be understood that Knight Piésold will no longer have any responsibility for the performance of the tailings storage facility.

The embankments and the overall tailings impoundment are getting large and it is extremely important that they be monitored, constructed and operated properly to prevent problems in the future. Knight Piésold would be happy to assist in the formal handover to the new Engineer of Record.

As we have a long relationship with the Mines Branch and the Ministry of Energy, Mines and Petroleum Resources, we consider that it is prudent to notify them of the change in status. Therefore, we have copied them on this correspondence.

We would like to thank you for our long and constructive association at the Mount Polley Mine and look forward to working together again in the future.

Signed: Ken Brouwer, P.Eng. Managing Director

Approved: Jeremy Haile, P.Eng. President

Copy To:

Don Parsons (IMC), Ron Martel (MPMC), Tim Fisch (MPMC) Al Hoffman, Chief Inspector of Mines /kjb



EMAILS_Part 6-1 Page 185 of 400

Attachment 4

TABLE 1

MOUNT POLLEY MINING CORPORATION MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - ENGINEER OF RECORD HANDOVER DOCUMENT REQUEST

Information Requested	Knight Piésold Response		
VA101-1/8 Design of the TSF to Ultimate Design Mar 14/2005	Provided 8 March 2011 (VA11 -00444)		
Depth/Area/Capacity Curve	Provided in the 'Design of the Tailings Storage Facility To Ultimate Elevation' report VA101-01/8-1 Figure 2.1		
Filling Schedule	Provided in the 'Stage 6 Design of the Tailings Storage Facility' report VA101-01/18-1 Figure 3.1		
Material Quantities Versus Elevation	The material requirements are dependant on the design method selected, future construction volumes will depend on the future design. The historic estimated construction volumes are included in each stage raise design report. The ultimate TSF estimated volumes are included in the 'Design of the Tailings Storage Facility To Ultimate Elevation' report VA101-01/8-1.		
Seepage Analyses	A seepage analysis for the ultimate TSF is included in VA101-01/8-1. The seepage analysis is updated and reported in each staged raise design report.		
Stability Analyses	A stability analysis for the ultimate TSF is included in the report VA101-01/08-1. The stability analysis is updated and reported in each staged raise design report.		
Monitoring data required to continue the on-going construction of the dam	The monitoring requirements are dependant on the design method selected, future monitoring will depend on the future design. Monitoring requirements are described in the 'Operating, Monitoring and Surveillance Manual' VA101-01/9-1. This report should be updated annually.		
Stability analysis data required to continue the on-going construction of the dam	The stability analysis requirements are dependant on the design method selected.		
Historic QA/QC data required to continue the on-going construction of the dam	The QA/QC data is for each staged raise is reported in the stage raise construction report.		
M:\1\01\00001\34\A\Report\1 - Communications Relevant to Transfer of EOR from the term of term	om KP to AMEC\7 - Internal Tables\[Data request.xlsx]Sheet1		

TABLE 2

MOUNT POLLEY MINING CORPORATION MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY - ENGINEER OF RECORD HANDOVER ADDITIONAL INFORMATION/STUDIES

Area	Knight Piésold Comment		
Site water management	Overall site water management needs to be reviewed with regard to mass balance for pit water storage and tailings		
	storage facility pond		
Borrow Pit impacts on stability	The stability of the perimeter embankment needs to include borrow pit development.		
Operations of the TSF beach	The operations of the TSF tailings deposition strategy to be reviewed to ensure the design intent of a continuous beach is		
	maintained.		
TSF monitoring	The current TSF monitoring system instrumentation has a number of malfunctioning or missing instruments. The replacement of alternate monitoring plans need to be developed. KP considers this a high priority item.		

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0	08MAR'11	ISSUED WITH VA11-0044	GIJ	GIJ	KJB
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Attachment 5



Our Reference: VA101-1/18-A.01 Continuity Nbr.: VA07-01853

December 19, 2007

Knight Piésold Ltd.

Suite 1400 750 West Pender Street Vancouver, British Columbia Canada V6C 2T8

Telephone: 604.685.0543 Facsimile: 604.685.0147 Email: vancouver@knightpiesold.com

Mr. Chris Carr Geotechnical Mines Inspector Ministry of Energy, Mines and Petroleum Resources 4th Floor, 1810 Blanshard Street Victoria, BC V8W 9N3

Dear Chris,

Re: Mount Polley Stage 6 TSF Design

This letter is in response to comments by Mr. Chris Carr who has requested the following information before proceeding with the permit conditions for the Stage 6 embankment raise for the Tailings Storage Facility at Mount Polley Mine. Mr. Carr's comments and responses from Knight Piésold are as follows:

Provide the results of direct shear testing on lacustrine soils, if these tests have been completed.

Two brass tube samples of the lacustrine unit were collected on May 13, 2007. The samples were collected at a depth of approximately 2.5 to 3.0 meters in a testpit excavated downstream of the Main Embankment adjacent to the Main Embankment Seepage Collection Pond. The samples were sent to the Knight Piésold lab for direct shear testing at normal stresses of 400, 800 and 1600 kPa. The lab results are included in Appendix A. The resulting friction angles for the samples ranged from 21 to 25 degrees, with an average value of 23 degrees. The shear strength did not decrease significantly following the peak strength, and the average residual friction angle at 20% strain was 22 degrees.

It is recognised that it is sometimes difficult to determine the lower bound shear strength parameters for a layered lacustrine deposit, and it is possible that the current lab results may not represent the weakest plane within the entire lacustrine unit. Therefore, Knight Piésold has adopted a conservative design philosophy and has incorporated an additional stabilizing buttress in the Main Embankment design to provide for an additional contingency measure for further enhancing the stability. The elevation of the buttress will be progressively increased from Stage 6 through closure in order to ensure that a suitable factor of safety is provided, even for very conservative shear strength parameters.

Provide cross-sections showing stability analyses for dam raise to elevation 958 m.

The cross-section used for the stability analysis for the Main Embankment is shown on Figure 1. The cross-section includes the following:





- The embankment crest was modelled with an embankment elevation of 958 m,
- The downstream buttress was modelled at an elevation of 925 m. The current elevation of the downstream buttress is 917 m. The Stage 6 construction program involves raising the elevation of the buttress to elevation 925 m to ensure that the required Factor of Safety is achieved for the Stage 6 embankment configuration.
- The lacustrine unit at the Main Embankment was modelled with a thickness of 12 m. A study comparing the drained residual strength to the clay content, liquid limit, and effective normal stress was completed by Stark and Eid (1995). The results of the study indicate that the drained residual strength of a material with a clay content ranging from 25 to 50%, with a liquid of 40%, and an effective normal stress of 700 kPa is in the order of 24 degrees. A conservative friction angle of 24 degrees was applied for the lacustrine unit. Subsequent direct shear tests conducted by Knight Piésold also indicate that the peak friction angle of the lacustrine unit is in the range of 21 to 25 degrees, (average of 23 degrees). The average residual friction angle at 20% strain was 22 degrees.
- The stability analysis was completed with the elevated pore pressures in the lacustrine unit (approximately 2.5m above ground) as the piezometers installed in the lacustrine material indicate slight artesian conditions within this material.

The results of the stability analyses indicate that the factor of safety for the Stage 6 TSF Main Embankment for static conditions was approximately 1.48 for a lacustrine friction angle of 24 degrees. A sensitivity stability analysis was also completed using different friction angles for the lacustrine unit. The results of the sensitivity stability analysis are shown on Figure 2. The factor of safety was approximately 1.44 for a friction angle of 23 degrees, the average friction angle from the direct shear tests on the lacustrine unit. The factor of safety for the lower end direct shear test friction angle of 21 degrees was approximately 1.35. The sensitivity analysis also demonstrates that the embankment would remain stable with a factor of safety greater than 1.1 for an extreme lower bound residual friction angle of 15 degrees for the lacustrine unit.

Stability analyses were also completed using conservative residual undrained shear strength, (Su/p') values to calculate the factor of safety for undrained conditions in the lacustrine unit under large strain conditions. The analyses were completed using typical tau/sigma values for soft clayey materials in the order of 0.25 to 0.3. The factor of safety for the Stage 6 configuration was approximately 1.1 for a tau/sigma value of 0.25, indicating that there is also sufficient undrained strength in the lacustrine unit for the embankment to remain stable.

Provide slope inclinometer depth vs. cumulative displacement plots showing cumulative displacement from date of installation.

Three new slope inclinometers were installed downstream of the toe of the Main Embankment during the Stage 4 construction program. One of the inclinometers installed in 2001 (SI01-01) was damaged during the placement of the shell zone material and is no longer functioning. The last reading for SI01-01 was March 2006. There are four functioning inclinometers installed at the Main Embankment.

The results of the inclinometer readings indicate that there have not been any significant deviations measured in the inclinometers since their installation. There were no measurable deformations recorded

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in the inclinometers during or after the Stage 5 construction program. The results of the readings for inclinometers are shown on Figures 3 to 7.

Yours sincerely,

KNIGHT PIESOLD J 21/07 Les Galbraith,

Senior Engineer

Ken Brouwer, P.Eng.
 Managing Director

Attachments:

Figure 1 Rev 0 – Main Embankment Stability Section Figure 2 Rev 0 – Lacustrine Unit Sensitivity Analyses Figure 3 Rev 0 – Inclinometer SI 01-01 – Displacement Vs. Depth Figure 4 Rev 0 – Inclinometer SI 01-02 – Displacement Vs. Depth Figure 5 Rev 0 – Inclinometer SI 06-01 – Displacement Vs. Depth Figure 6 Rev 0 – Inclinometer SI 06-02 – Displacement Vs. Depth Figure 7 Rev 0 – Inclinometer SI 06-03 – Displacement Vs. Depth Appendix A – Direct Shear Testing Results

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EMAILS Part 6-1 Page 193 of 400

















File No.:VA101-1/23-A.01 Cont. No.:VA08-02223 .

Suite 1400 - 750 West Pender Street Vancouver, BC Canada V6C 2T8

- H . -

Tel: 604.685.0543 Fax: 604.685.0147 www.knightpiesold.com

December 5, 2008

Mr. Ron Martel Environmental Superintendent Mount Polley Mining Corporation P.O. Box 12 Likely, BC V0L 1N0

Dear Ron,

Re: Buttress Requirements for the Main Embankment

This letter outlines the requirements for the buttress downstream of the Tailings Storage Facility (TSF) Main Embankment. Recent survey data indicates that the current elevation of the rockfill buttress is approximately 917 m. A previous stability analysis completed for the Stage 6 Main Embankment design was updated with the current buttress elevation and downstream slope angle to assess the effect on the static factor of safety.

The cross-section used for the stability analysis for the Main Embankment is shown on Figure 1. The cross-section includes the following:

- The embankment crest was modeled with an embankment elevation of 958 m to simulate the end of the Stage 6 construction program. The current elevation of the embankment crest is approximately 954 m.
- The downstream buttress was modeled at its current elevation of 917 m.
- The stability analysis was completed with elevated pore pressures in the lacustrine unit (approximately three meters above ground) to simulate slight artesian groundwater conditions within this material.
- All materials used in the stability analysis were given the same strength parameters as the ones
 previously used for the Stage 6 design of the Main Embankment.

The results of the updated stability analysis indicate that the factor of safety for the Stage 6 TSF Main Embankment for static conditions is approximately 1.27. In order to achieve a minimum static factor of safety of 1.30, the buttress requires a two meter raise in elevation from 917 to 919 m. This raise in elevation equates to approximately 35,000 m³ of rockfill.

The slope stability model mentioned above was also utilized to determine the static factor of safety of the Main Embankment with the current elevation of the embankment crest. The cross-section used for this stability analysis is shown on Figure 2. The cross-section includes the following:

- The embankment crest was modeled with its current elevation of 954 m;
- The downstream buttress was modeled at its current elevation of 917 m; and
- The downstream slope of the Main Embankment was modeled at its current angle. The current angle is equal to the angle of repose of the rockfill, approximately 37 degrees.

The results of this analysis indicate that the factor of safety for the current configuration of the Main Embankment for static conditions is approximately 1.3. If the embankment crest of the Main



EMAILS_Part 6-1 Page 200 of 400

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Embankment is raised above its current elevation of 954 m to 958 m, the downstream rockfill buttress will require a two meter raise from 917 to 919 m to maintain a static factor of safety of 1.3.

It should be noted that the factor of safety of the Main Embankment is highly sensitive to the friction angle of the lacustrine unit. In the stability analyses performed in support of this letter, a conservative friction angle of 24 degrees was applied to the lacustrine unit. This friction angle is based on lab tests conducted by Knight Piésold. However, it is recognized that it is sometimes difficult to determine the lower bound shear strength parameters for a layered lacustrine deposit and it is possible that the current lab results may not represent the weakest plane within the entire lacustrine unit. Therefore, the buttress downstream of the Main Embankment has been incorporated into the design to provide a contingency measure against a reduction in the factor of safety due to a potentially weaker lacustrine unit. The elevation of the buttress will be progressively increased from Stage 6 to closure in order to ensure that a suitable factor of safety is provided, even for conservative shear strength parameters.

Yours truly, KNIGHT PIESOLD LTD.

Alengron

Signed: Andre Gagnon, EIT Staff Engineer

Approved: Ken Brouwer, P.Eng. Managing Director

Attachments:

Figure 1 Rev 0 Figure 2 Rev 0 Main Embankment Stability Section – End of Stage 6 Construction Program Main Embankment Stability Section – Current Configuration

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Reviewed: Les Galbraith, P.Eng. Senior Engineer

VA08-02223 December 5, 2008 M:\1\01\00001\23\A\Correspondence\VA08-02223\Figure 1

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EMAILS_Part 6-1 Page 202 of 400
M:\1\01\00001\23\A\Correspondence\VA08-02223\Figure 2

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EMAILS_Part 6-1 Page 203 of 400



File No.:VA101-1/23-A.01 Cont. No.:VA09-00838 Suite 1400 - 750 West Pender Street Vancouver, BC Canada V6C 2T8

Tel: 604.685.0543 Fax: 604.685.0147 www.knightpiesold.com

July 3, 2009

Mr. Ron Martel Environmental Superintendent Mount Polley Mining Corporation P.O. Box 12 Likely, BC VOL 1N0

Dear Ron,

Re: Buttress Requirement for the Main Embankment

This letter provides an update on the buttress requirements for the Main Embankment of the Tailings Storage Facility (TSF) based on displacement data that have been collected from inclinometer SI01-02.

There are currently four working inclinometers installed at the Main Embankment. The inclinometers were installed to measure potential deflections in the lacustrine silts which lie beneath the Main Embankment. Inclinometers SI01-01 and SI01-02 were installed in 2001 with inclinometers SI06-1, 2, and 3 being installed in 2006. Inclinometer SI01-10 is no longer functioning. The inclinometers are measured on a regular basis and no measurable deformations had been recorded prior to July 2008, at which time the inclinometer readings for SI01-02 identified a slight displacement at a depth of approximately 10 m below the ground surface. The monitoring data indicates that the cumulative displacement is slowly increasing, with the total displacement as compared to the baseline reading (taken on February 1, 2007), being approximately 2.4 mm at a depth of 10 m. The measured displacement, although quite small, indicates movement along a potentially weak layer, or a pre-sheared zone, within the lacustrine unit.

The stability of the Main Embankment and the buttress requirements were re-evaluated based on the recent displacements measured in inclinometer SI01-02. The factor of safety for the Main Embankment is very sensitive to the friction angle of the lacustrine unit. Previous stability analyses assumed a friction angle of 24 degrees for the lacustrine unit, which was based on direct shear lab tests on brass tube samples collected from a testpit investigation in 2007. It was recognized by Knight Piésold, and confirmed by the Dam Safety Review, that it is sometimes difficult to determine the lower bound shear strength parameters for a layered lacustrine deposit and it is possible that the lab results may not be representative of a potentially weaker plane within the entire lacustrine unit. Therefore, a buttress downstream of the Main Embankment was incorporated into the design to provide a contingency measure against a reduction in SI01-02 allows for a lower bound friction angle for the lacustrine silts to be estimated by back calculating from the stability analyses. This was competed by modeling a shear plane at the displacement depth of 10 m, and adjusting the friction angle of the lacustrine silts until a factor of safety of 1.1, and factor of safety that may be representative of slight movements within the dam, was achieved for the current embankment section and pore pressure conditions.



EMAILS_Part 6-1 Page 204 of 400

Knight Piésold

The results of the back analyses indicate that the lower bound friction angle of a weak plane in the lacustrine silts may be as low as 16 or 17 degrees. The stability analyses were then completed for the Main Embankment for the following three cases:

- Stage 6a Embankment (Crest Elevation of 954 m)
- 2) Stage 6b Embankment (Crest Elevation of 958 m), and
- 3) Ultimate Embankment (Crest Elevation of 970 m).

The geometry of the buttress was modified for each case until a static factor of safety of 1.3 was achieved for static conditions for operations and 1.5 for closure conditions for the ultimate embankment. The embankment section for the Stage 6a and 6b modelled a downstream slope of 1.4H:1V, which is the current downstream slope of the shell zone. The embankment section for the ultimate embankment configuration modeled a downstream slope of 2H:1V. The stability analysis was completed for the ultimate embankment to establish the downstream limits of the buttress.

Premature closure conditions were not considered for this study. The foundation pore pressures in the lacustrine silts were modeled as being 6 m above the ground surface, which is the piezometric trigger level for the foundation piezometers at the Main Embankment.

Potential displacements under earthquake loading from the OBE and the MDE were estimated using the simplified methods of Newmark (1965) and Makdisi-Seed (1977). The two methods estimate the displacement of the potential sliding mass based on the average maximum ground acceleration along the slip surface and the yield acceleration.

The results of the stability analyses indicate that the existing buttress, which is at an elevation of 918 m, will need to be raised and extended further downstream to provide a minimum factor of safety requirement of 1.3 during operations. The buttress geometry has been based on extending the buttress downstream to the ultimate toe, corresponding to dam elevation of 970 m, to facilitate the placement of buttress material year round as the foundation preparation work will have been completed in advance. The immediate requirement is to establish the buttress on the west side of the Main Embankment where the displacements are currently being measured in inclinometer SI01-02. The buttress elevation, approximate volumes for the west side of the Main Embankment, and the potential displacements for the OBE and the MDE are presented as follows. Knight Plésold recommends that the Stage 6a buttress be constructed prior to the commencement of the Stage 6b construction program. The potential embankment displacements corresponding to the OBE and the MDE are considered to be minimal and would not have a significant impact on embankment freeboard or the ongoing operation of the TSF.

Case	Buttress Elevation (m)	App Volume (m ³)	Potential Displacements OBE/MDE	
Stage 6a Embankment	919 m	65,000	5cm/10cm	
Stage 6b Embankment	920 m	90,000	5cm/10cm	

The approximate extent of the buttress for the west side of the Main Embankment is shown on Figure 1.

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The buttress requirements outlined in this letter address the western side of the Main Embankment only, from station 17+50 to 20+00, as this is where inclinometer SI01-02 is located. No displacements have been recorded to date in the other three operating inclinometers at the Main Embankment, all of which are located to the east of inclinometer SI01-02. However, the weaker layer that is currently being monitored in inclinometer SI01-02 would likely extend laterally to the east, requiring buttress modifications along the entire dam. This expansion of the buttress should be planned for 2010, unless ongoing monitoring of the inclinometers indicates additional displacements in SI06-1, 2 and 3, in which case the buttress should be expanded along the entire embankments as per the western side as previously discussed. Additionally, the buttress will need to be extended through the seepage collection pond, and over the Main Embankment Sump, located downstream of the Main Embankment where the dam height is at it's highest. The extent of the buttress at the location of the seepage collection pond can be discussed the week of July 6 during the site visit by Ken Brouwer and Greg Smyth.

Please do not hesitate to contact us should you have any question concerning the extension of the buttress.

Yours truly, KNIGHT PIESOLD LTD.

Signed: Loos Lottah. Leila Morstabilini, M.Sc. Civil Engineering

Reviewed: Les Galbraith, P.Eng. Senior Engineer

Approved: Ken Brouwer, P.Eng. Managing Director

Attachments: Figure 1 Rev 0

Main Embankment - Stage 6 Buttress Requirements

/lm

VA09-00838 July 3, 2009



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APPENDIX A

DIRECT SHEAR TESTING RESULTS

(10 Pages)



Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.

Checked By: spb

EMAILS_Part 6-1 Page 209 of 400

DIRECT SHEAR TEST

Date:	7/2/07				
Client:	Knight Piésol	d Ltd.			
Project:	Mt. Polley				
Project No.:	DV108-77.8				
Location:	TP-07				
Sample Number:	03-1				
Description:					
Remarks:	Failure tanger inundated.	nts drawn at peak	shear stress and appr	roximatel <mark>y</mark> 20% strain.	Specimens were not
Type of Sample:	Liner				
Assumed Specific	Gravity=2.8	LL=	PL=	PI=	

	Parameters	for Specimen No. 1		
Specimen Parameter	Initial	Consolidated	Final	
Moisture content: Moist soil+tare, gms.	411.920		261.250	
Moisture content: Dry soil+tare, gms.	360.290		238.380	
Moisture content: Tare, gms.	113.640		113.750	
Moisture, %	20.9	18.4	18.4	
Moist specimen weight, gms.	155.6			
Diameter, in.	2.42	2.42		
Area, in. ²	4.58	4.58		
Height, in.	1.00	0.98		
Net decrease in height, in.		0.02		
Wet Density, pcf	129.3	129.6		
Dry density, pcf	106.9	109.5		
Void ratio	0.6351	0.5958		
Saturation, %	92.3	86.2		

Test Readings for Specimen No. 1

Load ring constant = 31.4108 lbs. per input unit Normal stress = 4.2 ksf Strain rate, %/min. = 0.08

Fail. Stress = 3.23 ksf at reading no. 11

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Ult. Stress = 2.16 ksf at reading no. 25

No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf
0	0.0000	0.0000	0.0	0.0	0.00
1	0.0050	0.7163	22.5	0.2	0.71
2	0.0100	1.1302	35.5	0.4	1.12
3	0.0150	1.4868	46.7	0.6	1.47
4	0.0200	1.8051	56.7	0.8	1.78
5	0.0250	2.1808	68.5	1.0	2.15
6	0.0300	2.4991	78.5	1.2	2.47
7	0.0350	2.8080	88.2	1.4	2.77
8	0.0400	2.9958	94.1	1.7	2.96
9	0.0450	3.1295	98.3	1.9	3.09
10	0.0500	3.2250	101.3	2.1	3.18
11	0.0550	3.2759	102.9	2.3	3.23
				-	

Knight Piesold Geotechnical Lab. ________ EMAILS_Part 6-1 Page 210 of 400

7/9/2007

Test Readings for Specimen No. 1									
	Horizontal				Shear				
No.	Def. Dial in.	Load Dial	Load Ibs.	Strain %	Stress ksf				
12	0.0600	3.0658	96.3	2.5	3.02				
13	0.0650	2.8271	88.8	2.7	2.79				
14	0.0700	2.6902	84.5	2.9	2.65				
15	0.0800	2.6138	82.1	3.3	2.58				
16	0.1050	2.5437	79.9	4.3	2.51				
17	0.1500	2.5469	80.0	6.2	2.51				
18	0.1900	2.4737	77.7	7.9	2.44				
19	0.2200	2.4036	75.5	9.1	2.37				
20	0.2600	2.3782	74.7	10.8	2.35				
21	0.3000	2.3081	72.5	12.4	2.28				
22	0.3400	2.2699	71.3	14.1	2.24				
23	0.3850	2.2381	70.3	15.9	2.21				
24	0.4300	2.2126	69.5	17.8	2.18				
25	0.4750	2.1871	68.7	19.7	2.16				
			0.011		Paramete	rs for Specimen No. 2	1		
Spe	ecimen Par	ameter			Initial	Consolidated	Final		
Mois	ture conter	t: Moist	soil+tar	e, gms.	411.920		270.940		
Mois	ture conter	t: Dry so	il+tare.	ams.	360.290		251.610		
Mois	ture conter	t: Tare. o	ams.	5	113.640		113.080		
Mois	ture, %				20.9	14.0	14.0		
Mois	t specimen	weight,	ams.		153.3				
Diam	eter, in.				2.42	2.42			
Area	in. ²				4.58	4.58			
Heia	ht in				1.00	0.96			
Net	lecrease in	height, i	n.		1.00	0.04			
Wet	Density pc	f			127 4	124.9			
Dry	lensity ncf	5. 6			105.3	109.6			
Void	ratio				0.6598	0 5951			
Satu	ration %				88.8	65.7			
Julu				Т	oct Doadi	nge for Specimon No.	2		
Load	ring const	ant - 31	4108 lbs	per int	ut unit	ngs for specimen no.	4		
Norn	nal stress -	84 ksf	1100 103	. per ing	di unit				
Strai	n rate %/m	in = 0.08	6						
Fail	Stress = 4 (53 ksf at 1	reading	no 20					
Ult. S	Stress = 3.9	3 ksf at re	eading r	10. 31					
	Horizontal				Shear				
No.	Def. Dial in.	Load Dial	Load Ibs.	Strain %	Stress				
0	0.0000	0.0000	0.0	0.0	0.00				
1	0.0050	0.4839	15.2	0.2	0.48				
2	0.0100	0.6463	20.3	0.4	0.64				
3	0.0150	0.8341	26.2	0.6	0.82				
4	0.0200	1.0856	34.1	0.8	1.07				
5	0.0250	1.7160	53.9	1.0	1.69				
6	0.0300	2.2220	69.8	1.2	2.19				
7	0.0350	2.4512	77.0	1.4	2.42				

_ Knight Piesold Geotechnical Lab. ________ EMAILS_Part 6-1 Page 211 of 400

2.62

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0.0400 2.6551 83.4 1.7

				Т	est Rea	dings for Specimen No. 2
No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf	
9	0.0500	2.8764	90.4	2.1	2.84	
10	0.0550	3.1340	98.4	2.3	3.09	
11	0.0600	3.4224	107.5	2.5	3.38	
12	0.0650	3.5879	112.7	2.7	3.54	
13	0.0700	3.7662	118.3	2.9	3.72	
14	0.0750	3.9381	123.7	3.1	3.89	
15	0.0800	4.1642	130.8	3.3	4.11	
16	0.0850	4.3202	135.7	3.5	4.26	
17	0.0900	4.4603	140.1	3.7	4.40	
18	0.0950	4.5589	143.2	3.9	4.50	
19	0.1100	4.6736	146.8	4.6	4.61	
20	0.1200	4.6895	147.3	5.0	4.63	
21	0.1250	4.6513	146.1	5.2	4.59	
22	0.1350	4.5112	141.7	5.6	4.45	
23	0.1450	4.4157	138.7	6.0	4.36	
24	0.1800	4.3011	135.1	7.5	4.24	
25	0.2200	4.2183	132.5	9.1	4.16	
26	0.2600	4.1610	130.7	10.8	4.11	
27	0.3050	4.0719	127.9	12.6	4.02	
28	0.3500	3.9891	125.3	14.5	3.94	
29	0.3900	3.9604	124.4	16.1	3.91	
30	0.4350	3.8745	121.7	18.0	3.82	
31	0.4750	3.9795	125.0	19.7	3.93	

Parameters for Specimen No. 3									
Specimen Parameter	Initial	Consolidated	Final						
Moisture content: Moist soil+tare, gms.	411.920		558.350						
Moisture content: Dry soil+tare, gms.	360.290		530.350						
Moisture content: Tare, gms.	113.640		395.540						
Moisture, %	20.9	20.8	20.8						
Moist specimen weight, gms.	168.2								
Diameter, in.	2.42	2.42							
Area, in. ²	4.60	4.60							
Height, in.	1.10	1.04							
Net decrease in height, in.		0.06							
Wet Density, pcf	126.6	133.5							
Dry density, pcf	104.7	110.5							
Void ratio	0.6694	0.5814							
Saturation, %	87.6	100.0							

Test Readings for Specimen No. 3

Normal stress = 16.8 ksf Strain rate, %/min. = 0.08

Fail. Stress = 8.00 ksf at reading no. 15

Ult. Stress = 7.21 ksf at reading no. 24

No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf
0	0.0000	8.000	0.0	0.0	0.00
1	0.0050	38.200	30.2	0.2	0.95
2	0.0100	77.050	69.0	0.4	2.16
3	0.0150	103.800	95.8	0.6	3.00
4	0.0200	126.000	118.0	0.8	3.69
5	0.0250	147.800	139.8	1.0	4.38
6	0.0300	180.600	172.6	1.2	5.40
7	0.0350	216.600	208.6	1.4	6.53
8	0.0400	233.200	225.2	1.7	7.05
9	0.0450	246.700	238.7	1.9	7.47
10	0.0500	252.700	244.7	2.1	7.66
11	0.0600	257.600	249.6	2.5	7.81
12	0.0650	259.600	251.6	2.7	7.88
13	0.0700	260.800	252.8	2.9	7.91
14	0.0800	261.340	253.3	3.3	7.93
15	0.1050	263.500	255.5	4.3	8.00
16	0.1500	262.700	254.7	6.2	7.97
17	0.1900	262.600	254.6	7.9	7.97
18	0.2200	260.900	252.9	9.1	7.92
19	0.2600	257.300	249.3	10.7	7.80
20	0.3000	255.000	247.0	12.4	7.73
21	0.3400	253.040	245.0	14.0	7.67
22	0.3850	247.200	239.2	15.9	7.49
23	0.4300	241.620	233.6	17.8	7.31
24	0.4750	238.140	230.1	19.6	7.21



Cursory interpretations provided require review by a professional engineer. Knight Piesold accepts no responsibility in subsequent analyses.

DIRECT SHEAR TEST

Date:	7/1/07				
Client:	Knight Piésol	d Ltd.			
Project:	Mt. Polley				
Project No.:	DV108-77.8				
Location:	TP-07				
Sample Number:	03-2				
Description:					
Remarks:	Failure tanger inundated.	nts drawn at peak	shear stress and appr	roximately 20% strain.	Specimens were not
Type of Sample:	Liner				
Assumed Specific	Gravity=2.8	LL=	PL=	PI=	

	Parameters	for Specimen No. 1		
Specimen Parameter	Initial	Consolidated	Final	
Moisture content: Moist soil+tare, gms.	232.190		268.370	
Moisture content: Dry soil+tare, gms.	210.920		239.020	
Moisture content: Tare, gms.	115.830		114.860	
Moisture, %	22.4	23.6	23.6	
Moist specimen weight, gms.	151.9			
Diameter, in.	2.42	2.42		
Area, in. ²	4.58	4.58		
Height, in.	0.99	0.98		
Net decrease in height, in.		0.01		
Wet Density, pcf	126.9	130.0		
Dry density, pcf	103.7	105.2		
Void ratio	0.6859	0.6621		
Saturation, %	91.3	100.0		

Test Readings for Specimen No. 1

Load ring constant = 31.4108 lbs. per input unit Normal stress = 4.2 ksf Strain rate, %/min. = 0.08

Fail. Stress = 2.47 ksf at reading no. 18

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Ult. Stress = 2.04 ksf at reading no. 31

No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf
0	0.0000	0.0000	0.0	0.0	0.00
1	0.0050	0.6272	19.7	0.2	0.62
2	0.0100	0.9392	29.5	0.4	0.93
3	0.0150	1.1684	36.7	0.6	1.15
4	0.0200	1.3403	42.1	0.8	1.32
5	0.0250	1.4868	46.7	1.0	1.47
6	0.0300	1.6077	50.5	1.2	1.59
7	0.0350	1.7032	53.5	1.4	1.68
8	0.0400	1.7796	55.9	1.7	1.76
9	0.0450	1.8433	57.9	1.9	1.82
10	0.0500	1.9038	59.8	2.1	1.88
11	0.0550	1.9707	61.9	2.3	1.94
				1	

___ Knight Piesold Geotechnical Lab. _______ EMAILS_Part 6-1 Page 215 of 400

7/9/2007

	Test Readings for Specimen No. 1								
No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf				
12	0.0600	2.0534	64.5	2.5	2.03				
13	0.0650	2.1362	67.1	2.7	2.11				
14	0.0700	2.2062	69.3	2.9	2.18				
15	0.0750	2.3527	73.9	3.1	2.32				
16	0.0800	2.4355	76.5	3.3	2.40				
17	0.0850	2.4928	78.3	3.5	2.46				
18	0.0950	2.5055	78.7	3.9	2.47				
19	0.1050	2.4227	76.1	4.3	2.39				
20	0.1300	2.3654	74.3	5.4	2.33				
21	0.1400	2.2699	71.3	5.8	2.24				
22	0.1850	2.2636	71.1	7.7	2.23				
23	0.2050	2.2031	69.2	8.5	2.17				
24	0.2450	2.2190	69.7	10.1	2.19				
25	0.2550	2.1680	68.1	10.6	2.14				
26	0.3000	2.1521	67.6	12.4	2.12				
27	0.3400	2.1330	67.0	14.1	2.10				
28	0.3850	2.1171	66.5	15.9	2.09				
29	0.3950	2.0662	64.9	16.3	2.04				
30	0.4400	2.0598	64.7	18.2	2.03				
31	0.4850	2.0662	64.9	20.1	2.04				

	Parameters	for Specimen No. 2		
Specimen Parameter	Initial	Consolidated	Final	
Moisture content: Moist soil+tare, gms.	232.190		247.060	
Moisture content: Dry soil+tare, gms.	210.920		219.110	
Moisture content: Tare, gms.	115.830		90.990	
Moisture, %	22.4	21.8	21.8	
Moist specimen weight, gms.	156.9			
Diameter, in.	2.42	2.42		
Area, in. ²	4.58	4.58		
Height, in.	1.01	0.98		
Net decrease in height, in.		0.02		
Wet Density, pcf	129.6	132.2		
Dry density, pcf	105.9	108.5		
Void ratio	0.6501	0.6107		
Saturation, %	96.3	100.0		
Saturation, %	90.3	100.0		

Test Readings for Specimen No. 2 Load ring constant = 31.4108 lbs. per input unit

Normal stress = 8.400 ksf

Strain rate, %/min. = 0.08

Fail. Stress = 5.04 ksf at reading no. 12

Ult. Stress = 4.11 ksf at reading no. 24

No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf
0	0.0000	0.0000	0.0	0.0	0.00
1	0.0050	1.0156	31.9	0.2	1.00
2	0.0100	1.6905	53.1	0.4	1.67
3	0.0150	2.2254	69.9	0.6	2.20
4	0.0200	2.7411	86.1	0.8	2.70
5	0.0250	3.1995	100.5	1.0	3.16
6	0.0300	3.8681	121.5	1.2	3.82
7	0.0350	4.3202	135.7	1.4	4.26
8	0.0500	4.7147	148.1	2.1	4.65
9	0.0550	4.8614	152.7	2.3	4.80
10	0.0600	5.0110	157.4	2.5	4.94
11	0.0700	5.0970	160.1	2.9	5.03
12	0.0800	5.1097	160.5	3.3	5.04
13	0.0950	4.9696	156.1	3.9	4.90
14	0.1050	4.8550	152.5	4.3	4.79
15	0.1150	4.7468	149.1	4.8	4.68
16	0.1350	4.6194	145.1	5.6	4.56
17	0.1600	4.5048	141.5	6.6	4.44
18	0.2000	4.4093	138.5	8.3	4.35
19	0.2450	4.3902	137.9	10.1	4.33
20	0.2900	4.3711	137.3	12.0	4.31
21	0.3300	4.3265	135.9	13.7	4.27
22	0.3750	4.2756	134.3	15.5	4.22
23	0.4200	4.1992	131.9	17.4	4.14
24	0.4600	4.1610	130.7	19.0	4.11

	Parameters	for Specimen No. 3		
Specimen Parameter	Initial	Consolidated	Final	
Moisture content: Moist soil+tare, gms.	232.190		278.370	
Moisture content: Dry soil+tare, gms.	210.920		248.000	
Moisture content: Tare, gms.	115.830		112.530	
Moisture, %	22.4	22.4	22.4	
Moist specimen weight, gms.	167.5			
Diameter, in.	2.42	2.42		
Area, in. ²	4.60	4.60		
Height, in.	1.10	1.06		
Net decrease in height, in.		0.05		
Wet Density, pcf	125.9	131.5		
Dry density, pcf	102.9	107.4		
Void ratio	0.6987	0.6278		
Saturation, %	89.6	100.0		

Test Readings for Specimen No. 3

Normal stress = 16.8 ksf Strain rate, %/min. = 0.08

Fail. Stress = 8.47 ksf at reading no. 14

Ult. Stress = 7.27 ksf at reading no. 26

No.	Horizontal Def. Dial in.	Load Dial	Load Ibs.	Strain %	Shear Stress ksf
0	0.0000	0.480	0.0	0.0	0.00
1	0.0050	6.330	5.8	0.2	0.18
2	0.0100	23.740	23.3	0.4	0.73
3	0.0150	45.110	44.6	0.6	1.40
4	0.0200	74.500	74.0	0.8	2.32
5	0.0250	99.570	99.1	1.0	3.10
6	0.0300	120.400	119.9	1.2	3.75
7	0.0350	154.640	154.2	1.4	4.83
8	0.0400	184.790	184.3	1.7	5.77
9	0.0450	208.990	208.5	1.9	6.53
10	0.0500	227.630	227.2	2.1	7.11
11	0.0550	241.740	241.3	2.3	7.55
12	0.0600	259.190	258.7	2.5	8.10
13	0.0650	268.560	268.1	2.7	8.39
14	0.0700	271.000	270.5	2.9	8.47
15	0.0800	269.440	269.0	3.3	8.42
16	0.1050	265.760	265.3	4.3	8.31
17	0.1500	264.870	264.4	6.2	8.28
18	0.1900	261.710	261.2	7.9	8.18
19	0.2200	257.880	257.4	9.1	8.06
20	0.2200	256.250	255.8	9.1	8.01
21	0.2600	253.030	252.6	10.7	7.91
22	0.3000	247.090	246.6	12.4	7.72
23	0.3400	243.180	242.7	14.0	7.60
24	0.3850	242.890	242.4	15.9	7.59
25	0.4300	237.230	236.8	17.8	7.41
26	0.4750	232.580	232.1	19.6	7.27

Attachment 6



Attachment 7



Copyright







Attachment 8

Knight Piésold

www.knightpiesold.com

MEMORANDUM

To:	Mr. Ken Brouwer	Date:	Oct 30, 2014
Copy To:	Greg Smyth	File No.:	VA101-1/34-A.01
From:	Chris Brodie	Cont. No.:	VA14-01615
Re:	Mount Polley Industry Response		

Please see below a summary of our recent discussion, where you related themes derived from previous conversations with other parties.

The Mount Polley Mine tailings facility breached in August 2014. This event created significant concern from within and without the mining industry in British Columbia, Canada, and beyond. Several investigations are currently ongoing to understand the mechanism of the failure, and to recommend changes as appropriate to avoid future similar occurrences at tailings facilities. It is considered likely that government will react to recommendations put forward, and it is critical that the mining industry and involved stakeholders provide review and input to any recommendations proposed for adoption. There has been a risk identified where government, in the interests of assuaging public discomfort quickly, may be motivated to pass new legislation that would greatly affect tailings design and management in the future, without sufficient input from industry.

For the most part, industry response has taken the approach of isolating and minimizing the impacts of the Mount Polley incident. References in the media continue to focus on the benign nature of the tailings at Mount Polley and the lack of injuries sustained in the incident. This approach may not be sufficient to support social license and prevent increased regulatory hurdles in the future. The public do not typically differentiate between types of tailings; they simply need comfort that no further incidents will occur for any facility.

In an effort to provide confidence in the industry and ensure intelligent regulation of tailings structures in the future, it may be necessary to convene a special committee to make recommendations for the mining industry. In order to be effective, this committee would require membership from technical experts, First Nations, Provincial and Federal government, and NGO's. It would have to operate in a transparent manner, with regular public reporting. Similar committees for mining oversight have been successfully operated in other jurisdictions (e.g. Good Neighbors Agreement at the Stillwater Mine in Montana).

On behalf of industry, the Mining Association of BC has handled much of the media inquiries regarding the Mount Polley incident, however given the industry-wide nature of possible ramifications, it may be best to have the committee formed under its national counterpart, the Mining Association of Canada (MAC). The MAC has already formed partnerships with several organizations that may provide committee members, including:

- · Mining Association of British Columbia
- Association for Mineral Exploration British Columbia
- Assembly of First Nations
- Canadian Aboriginal Minerals Association
- Canadian Council for Aboriginal Business
- · Canadian Institute of Mining, Metallurgy and Petroleum
- Canadian Mining Industry Research Organization
- Canadian Mining Innovation Council
- Prospectors & Developers Association of Canada

Knight Piésold

- Canadian Environmental Assessment Agency
- Environment Canada
- Fisheries and Oceans Canada
- Natural Resources Canada

Additional partnerships would include:

- BC Ministry of Energy and Mines
- BC Ministry of Environment
- BC Assembly of First Nations with deference to the specific territories of the Williams Lake Indian Band and Xat'sull First Nation.

On consensus, a Non-Government Organization with technical understanding of tailings facility design and management should also be invited to sit on the committee.

Finally, but perhaps most importantly, the committee should rely on established experts from the mining industry to interpret investigative findings and offer feasible recommendations for change in the industry. These experts should be sourced from mining companies and their specialist consultants.

In order for the committee to operate, funding will be required. It is unlikely that significant funding will be available from the public sector beyond monies already apportioned to the ongoing investigations. It should be assumed that private sector funding will form the basis of the resources available. Companies within the membership of the MAC should be approached for contributions to a fund pool.

Funding will be required for the following:

- Honoraria for committee member participation
- First Nation participation compensation (should they need to contract their representatives, or require additional resources in order to participate fulsomely)
- Travel and communication
- Meeting space and presentation materials
- Web site design and maintenance
- Media relations
- Government relations

It will be important that savvy media relations are able to broadcast the intent, process, and findings of the committee so as to show transparency and cooperation in the face of public scrutiny. This in turn will alleviate regulatory decisions in the future and enhance the ability of future projects to gain social license.

Signed:

Chris Brodie, R.P.Bio – Manager - Environmental Services

From: To:	Hoffman, Al MEM:EX Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; "Douglas Kiloh"; Hemphill, Naomi MEM:EX; Demchuk, Tasia MEM:EX: Warnack, Coorae MEM:EX: Naruseki, Leather M MEM:EX: "Keith P. Ekwaed"
Subject:	Draft Response to Reimers Investigation Report
Date: Attachments:	Sunday, January 25, 2015 7:12:21 PM Document1.docx

A starting point for our discussion on how we respond to Mr. Reimer's Investigation Report. The MPMC investigation is far from complete in my estimation. We will have to think of the strategy of sending it now or waiting until after the Independent Panel Report release.

Also the report clearly points to the third party (which I assume he means the engineers who designed the dam). We will have to see if this lines up with the panel and our report. The report doesn't clearly describe any impact that resulted from the change in consulting engineers (if there was one?)

It also doesn't provide any reports from Thurber or Golder to support these findings.

I look forward to your input.

Al

Mr. Dale Reimer Mine Manager Mount Polley Mining Corporation (MPMC) Box 12, Likely, BC VOL1N0

By email dreamer@mountpolley.com and registered mail

Dear Mr. Reimer:

Thank you for your letter dated January 15, 2015 which you have indicated completes the requirement of an investigation pursuant to Part 1.7.1 (4) of the Health, Safety and Reclamation Code for Mines in British Columbia. Staff and I have reviewed your letter and I provide the following review comments and orders.

Root Cause of Tailings Storage Facility (TSF) Failure

Your investigation report concludes that failure mechanism was a result of factors that you outline in Sections (1) (a), (b) and (c) of your letter. In summary and paraphrasing your letter:

- a. the undrained shear strength of the glaciolacustrine (GLU) soil layer was exceeded,
- the TSF did not achieve the Factor of Safety (FOS) as calculated by the third party advisors engaged by MPMC because an appropriate analysis of the GLU's undrained shear strength had not been carried out, and;
- c. The GLU was not as strong as the third party advisors had assumed and the GLU was overstressed and the failure resulted because the design FOS of the TSF was in error.

We will review your conclusions and compare and contrast them with the Independent Panel Report and with the Chief Inspector's Investigation when both investigations are complete.

Any Unsafe Conditions, Acts, or Procedures which Contributed in any Manner to the Accident

In the opinion of you and your investigation team, the MPMC investigation clearly indicates the failure of the TSF was a result of the root causes as you have outlined above. The concern that is unanswered is to what extent you investigation analyzed any other contributing causes and what evidence do you have to eliminate any conceivable contributing causes such as:

- a. Compliance with the construction design by both MPMC and your construction contractors;
- Oversight of the dam construction through your QA/AC methodology and reporting processes and feedback;
- c. The management of the mine water balance and supernatant freeboard;

- d. The MPMC emergency response plan document and the actual response of MPMC to the accident, and;
- e. Any other factors or processes that may have contribute to the TSF failure.

The Mine Manager shall provide the Chief Inspector with copies of any supporting investigation reports that were conducted by third party agencies to support these findings above.

As indicated previously, the Chief Inspector will provide additional review comments once the Chief Inspector and Independent Panel Investigations are complete and released.

In the interim please provide documentation that shows that you have fully investigated any contributing causes and any supporting documentation. This additional review will be completed and submitted to the Chief Inspector by March 1, 2015.

Thank you for your co-operation in this matter.

Sincerely,

Al Hoffman, P.Eng. Chief Inspector of Mines

Ec: Investigation team etc.

From:	Warnock, George MEM:EX
To:	Hoffman, AI MEM:EX; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; "Douglas Kiloh"; Hemphill, Naomi
	MEM:EX; Demchuk, Tania MEM:EX; Narynski, Heather M MEM:EX; "Keith R. Elwood"
Subject:	RE: Draft Response to Reimers Investigation Report
Date:	Monday, January 26, 2015 1:44:08 PM
Attachments:	MPMC Response gw review.docx

Hi Al,

Looks good – see minor suggested revisions in the attached.

Regards,

George

From: Hoffman, AI MEM:EX

Sent: Sunday, January 25, 2015 7:12 PM

To: Kuppers, Haley MÉM:EX; Pocklington, Cheryl M MEM:EX; 'Douglas Kiloh'; Hemphill, Naomi MEM:EX; Demchuk, Tania MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EX; 'Keith R. Elwood' **Subject:** Draft Response to Reimers Investigation Report

A starting point for our discussion on how we respond to Mr. Reimer's Investigation Report. The MPMC investigation is far from complete in my estimation. We will have to think of the strategy of sending it now or waiting until after the Independent Panel Report release.

Also the report clearly points to the third party (which I assume he means the engineers who designed the dam). We will have to see if this lines up with the panel and our report. The report doesn't clearly describe any impact that resulted from the change in consulting engineers (if there was one?)

It also doesn't provide any reports from Thurber or Golder to support these findings.

I look forward to your input.

Al

Mr. Dale Reimer Mine Manager Mount Polley Mining Corporation (MPMC) Box 12, -Likely, BC V0L1N0

By email s.13

.....

Dear Mr. Reimer:

Thank you for your letter dated January 15, 2015 which you have indicated completes the requirement of an investigation pursuant to Part 1.7.1 (4) of the Health, Safety and Reclamation Code for Mines in British Columbia. Staff and I have reviewed your letter and I provide the following review comments and orders.

nd registered mail

Root Cause of Tailings Storage Facility (TSF) Failure

Your investigation report concludes that <u>the</u> failure mechanism was a result of factors that you outline in Sections (1) (a), (b) and (c) of your letter. In summary and paraphrasing your letter:

- a. In the undrained shear strength of the glaciolacustrine (GLU) soil layer was exceeded,
- the TSF did not achieve the Factor of Safety (FOS) as calculated by the third party advisors engaged by MPMC because an appropriate analysis of the GLU's undrained shear strength had not been carried out, and;
- c. The GLU was not as strong as the third party advisors had assumed and the GLU was overstressed and the failure resulted because the design FOS of the TSF was in error.

We will review your conclusions and compare and contrast them with the Independent Panel Report and with the Chief Inspector's Investigation when both investigations are complete.

Any Unsafe Conditions, Acts, or Procedures which Contributed in any Manner to the Accident

In the opinion of you and your investigation team, the MPMC investigation clearly indicates the failure of the TSF was a result of the root causes as you have outlined above. The concern that is unanswered is to what extent your investigation analyzed any other contributing causes and what evidence do you have to eliminate any conceivable contributing causes such as:

- a. Compliance with the construction design by both MPMC and your construction contractors;
- Oversight of the dam construction through your QA/AC methodology and reporting processes and feedback;
- c. The management of the mine water balance and supernatant freeboard <u>and the effect this may</u> <u>have had on the consequence of the event</u>;

- d. The MPMC emergency response plan document and the actual response of MPMC to the accident, and;
- e. Any other factors or processes that may have contribute to the TSF failure.

The Mine Manager shall provide the Chief Inspector with copies of any supporting investigation reports that were conducted by third party agencies to support these <u>above</u> findings-above.

As indicated previously, the Chief Inspector will provide additional review comments once the Chief Inspector and Independent Panel Investigations are complete and released.

In the interim please provide documentation that shows that you have fully investigated any contributing causes and any supporting documentation. This additional review <u>will_shall</u> be completed and submitted to the Chief Inspector by March 1, 2015.

Thank you for your co-operation in this matter.

Sincerely,

Al Hoffman, P.Eng. Chief Inspector of Mines

Ec: Investigation team etc.

From:	Adams, Rick MEM:EX
To:	Demchuk, Tania MEM:EX
Subject:	FW: CONFIDENTIAL: Mt Polley Update
Date:	Tuesday, January 27, 2015 10:25:07 AM

Tania, I sent this to my supervisors as well. Just FYI. Same messages, just different words as to what you provided David Morel just now.

From: Adams, Rick MEM:EX Sent: Tuesday, January 27, 2015 10:23 AM To: Hupman, C Bruce MEM:EX; Vukovic, Nick MEM:EX Subject: CONFIDENTIAL: Mt Polley Update

Update on Mt. Polley's application to re-start restricted mine operations.

Key issues:

- The application makes it very apparent the mine runs out of water storage capacity (both Springer Pit and TSF) in late 2015/early 2016- whether they re-start restricted operations or not;
- Mt Polley does not address this issue in their application, as the previously proposed reverse-osmosis water treatment is now not under further consideration by Mt. Polley because:
 - Of cost and brine management issues;
 - Mt Polley Mine believes the TSF breach has shown that their mine effluent water has very limited impact on the receiving environment; and
 - Mt Polley believes most of the elevated metals levels are contained in the suspended solids. So, with a settling pond system on site, they should be able to release passively treated mine contact water by pipeline to Quesnel Lake and achieve water quality specs once beyond the initial dilution zone of the diffuser;
- Mt Polley staff consider this application to restart restricted operations an interim temporary application, or a single phase of a broader application to come, and ask that the longer (than immediate) term water management issues be deferred until then. Mt. Polley plpans to submit a subsequent application for full resumption of operations.
- The water management issue is an immediate issues, as the mine will have to discharge water in only 10-12 months from now;
- Mt Polley staff and consultants are still working on the proposal for discharge to Quesnel Lake and are not ready for this concept to be released to First Nations or the public, so, therefore, made no mention of water treatment nor discharge in their application;
- MEM staff (Tania and Rick) have concerns that insufficient information, and no longer term water management information, has been provided with the application, and the position that would place the Deputy Chief Inspector in when faced with a permit decision. Also concerned with proceeding to review an application which proposes to discharge water from mill operations to the TSF in advance of the Expert Panel and CI's Reports being released. There may also be geotechnical concerns with using the TSF as water storage facility (as opposed to a tailings storage facility) beyond the immediate need to capture 2015 freshet waters. A final concern is that, in rushing through the TSF breach repair

application, commitments were made to the public and First Nations that the breach repair was only to capture and store freshet water to prevent further release of tailings into Hazeltine Creek- and not for mine operations.

- MEM staff believe it will be very difficult to manage an MDRC permitting process towards a successful given this obvious information gap, and heightened public and First Nations sensitivities regarding this site.
- MEM staff also fully appreciate Mt. Polley Mine's strong desire/need:
 - To retain their existing trained workforce;
 - To commence at least restricted operations to generate some cash flow to offset their extensive remediation costs; and
 - To generate NAG rock for TSF buttressing from open pit mining operations which generate some cash flow, instead of having to extract NAG rock for TSF buttressing from existing waste dumps; and that
 - The water management issue exists whether Mt. Polley resumes operations or nottailings deposited in Springer Pit from operations would only accelerate the water issue's urgency by about 2 months.
- A call is planned for today with Diane Howe and George Warnock of MEM to determine if there is a suitable path forward with the existing application, or whether Mt Polley must address the longer term water management issues within this application before proceeding to MDRC review.
- Another call is planned for discussions with MOE EPD staff too, as this affects the EMA application also.

Mt Polley Mine is stuck between a rock and a hard place right now.

Rick

From: Demchuk, Tania MEM:EX
Sent: Tuesday, January 27, 2015 9:35 AM
To: Bunce, Hubert ENV:EX; Fenwick, Leigh-Ann ENV:EX
Cc: Adams, Rick MEM:EX
Subject: FW: Follow-up notes from Jan 26 meeting with Imperial Metals re: Mount Polley restricted restart

Good morning Hubert and Leigh-Ann,

Below is a summary of our meeting with Imperial Metals yesterday. My understanding is that the company has had preliminary discussions with MOE regarding the conceptual plan of discharge of site contact water to Quesnel Lake via pipeline, following some form of settling or additional treatment if required. This plan is still in very early stages of consideration and they are not prepared to discuss it publically yet until more details have been worked out. This is understandable.

They also indicated the intention to apply for approval for additional construction to increase height (and storage capacity) on the breach repair for construction to be completed during late summer/fall of this year.

As noted in the summary below, Rick and I need to discuss the above with our geotechnical engineers and Diane. We also believe that it would be extremely helpful to have a meeting with both MOE and MEM at the table to discuss options for moving forward.

MEM remains concerned that the data in the application shows storage capacity on site will be reached by November unless construction to increase water storage capacity of the TSF is approved, and that discharge of surplus water is required soon after that. It is noted that there is some additional capacity in the Springer pit, however no information is available regarding geochemistry and potential impacts to groundwater if the Springer pit fills above 1030 m, which has been identified as the elevation where pit lake water may start to influence local groundwater.

To summarize, we have not yet arrived at a proposed date for an MDRC or an understanding of when the company will be able to address the MEM screening comments. Discussions are ongoing to arrive at an appropriate path forward.

Tania

From: Demchuk, Tania MEM:EX
Sent: Monday, January 26, 2015 1:20 PM
To: Steve Robertson (<u>srobertson@imperialmetals.com</u>); Don Parsons
Cc: Adams, Rick MEM:EX; Howe, Diane J EMPR:EX (<u>Diane.Howe@gov.bc.ca</u>)
Subject: Follow-up notes from Jan 26 meeting with Imperial Metals re: Mount Polley restricted restart

Steve and Don,

Thank-you for meeting this morning with Rick Adams, Andrew Rollo and myself to discuss the application for proposed restricted restart of operations at Mount Polley mine. This meeting was intended to provide an opportunity to clarify the intent of the application submitted to the ministry on January 13, 2015 and have a discussion of possible options for proceeding as proposed.

To summarize:

- It is understood that a restricted restart of operations is important to enable Mount Polley Mining Corporation to maintain their workforce and provide non-PAG waste rock to be used to buttress the embankments as required following completion of ongoing site investigation work currently underway.
- It is understood that tailings will be placed into the Springer Pit not the TSF, but that the TSF is required in the proposed plan to store water. To allow the TSF adequate water storage capacity, an application to authorize construction of a lift on the breach repair would be submitted. Construction of any lift on the breach repair would be required to start in the summer/early fall and be complete prior to winter of this year.
- The site has a surplus of water and Imperial Metals/Mount Polley Mining Corporation are currently assessing options to address the water surplus. They have engaged expertise at Golder to assist with this planning. An early conceptual plan may be available for discussion within the next couple of weeks, the timing of this depends on the results of ongoing analysis. The earliest that a discharge application could be submitted is May/June as the

completion of the environmental impact assessment will inform the ability to move forward with the proposed discharge plan. The current thinking is to discharge surplus water via a pipeline and diffuser to Quesnel Lake, following passive treatment system on site to remove solids. Additional information regarding such a plan is required prior to introducing it to the MDRC or other committees, as currently there remain a number of questions and considerations to be resolved.

- The previously proposed reverse osmosis water treatment plant is no longer being pursued due to cost and brine management issues.
- Mount Polley Mining Corporation couldn't plan for full operations involving full use of the tailing storage facility within their current application, in the absence of the Expert Panel Report.
- Mount Polley Mining Corporation desires to proceed with the current application being a short term phase of a broader, phased application process for returning to full operations and full use of the tailings storage facility. Mount Polley Mining Corporation proposes the long term water management plan, and discharge application, be provided with that broader application once they have had a few months more time. There is also a need to fully assess the mine economics with respect to costs of any required work to buttress the TSF for future use, once there is an better understanding of how much buttressing will be required.
- Regardless of whether or not a restricted restart of operations occurs, the site will be out of water storage capacity by early 2016 (or late 2015 with no capacity increase in the TSF), and discharge will be required.
 - There may be some additional capacity in the Springer pit, however additional work to resolve potential impacts to groundwater is required. This includes water quality modelling.
- It is requested that the proposed restricted restart application be kept separate from any discussion of discharge applications, MEM notes that based on the plan as submitted, these questions will come up during the review process and there needs to be a way of discussing and resolving them in some way.
- MEM committed to following up with respect to the ability to permit a lift on the TSF breach repair, such as what would be required for Fall 2015 to address the water surplus, prior to the conclusion of all investigations.
- MEM committed to following up regarding possible options for moving forward with the proposed plan.
- It is suggested that a follow-up meeting involving MOE would be useful for a more fulsome discussion of options for permitting and information required for discharge (and treatment if necessary).

Best Regards,

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:	Adams, Rick MEM:EX						
To:	<u>(Aaron.Higginbottom@williamslakeband.ca); Adams, Rick MEM:EX; Amy Crook (amy@fairmining.ca);</u>						
	ann.louie@williamslakeband.ca; Art Frye; Awmack, Ken AGRI:EX; b.sellars@xatsull.com; Birtles, Robert; Bunce,						
	<u>Hubert ENV:EX;</u> Chris Car s.22 Dale Reimer (dreimer@mountpolley.com); <u>Darryl Hussey</u>						
	(Darryl.Hussey@dfo-mpo.gc.ca); Demchuk, Tania MEM:EX; Don Parsons; Donna Dixon; Doug Watt						
	(dwatt@telus.net); Fenwick, Leigh-Ann ENV:EX; Gash, Michael ABR:EX; Hill, Douglas J ENV:EX; Hoffos, Robin						
	<u>FLNR:EX;</u> Howe, Diane J MEM:EX; Huska, Stephanie ENV:EX; Jacinda Mack (miningcoordinator@nstq.org);						
	Jacinda Mack s.22 Janis Bell (jbell@cariboord.bc.ca); Jennings, Harry D FLNR:EX; Jim						
	<u>Kuipers (jkuipers@kuipersassoc.com); Joan Sorley (jsorley@cariboord.bc.ca); Julia Banks</u>						
	<u>(nrmanager@xatsull.com); Katie McMahen (KMcMahen@mountpolley.com); Keogh, Kym A ENV:EX; Kerley.</u>						
	Jason F FLNR:EX; Luke Moger; Matscha, Gabriele ENV:EX; McConnachie, Jennifer MEM:EX; Metcalfe, Shelley						
	ENV:EX; Morris, Tricia ABR:EX; Rick Holmes (carenvir@wlake.com); Rothman, Stephen MEM:EX; Ryan Brown;						
	Steve Robertson; Vanderburgh, Ken FLNR:EX; Vukovic, Nick MEM:EX; Walt Cobb (mayor@williamslake.ca); Walt						
	<u>Cobb (wcobb@williamslake.ca); Weir, David J FLNR:EX; Willie Sellars (willie.sellars@williamslakeband.ca);</u>						
	Yamelst, Brian H ENV:EX						
Subject:	Cariboo MDRC Update: Mt Polley Mine Applications for Restart of Restricted Mine Operations						
Date:	Tuesday, January 27, 2015 3:01:09 PM						

Please be advised as an update:

- Mt Polley Mine has submitted draft Mines Act permit and Environmental Management Act permit amendment applications proposing a restart of restricted mine operations, further to the concept discussed very briefly at previous Cariboo MDRC meetings regarding the 2015 Freshet project/breach repair;
- The Ministry of Energy and Mines, Ministry of Environment, and technical advisors of the Williams Lake Indian Band and Xats'ull First Nation, have conducted a screening level review of those applications;
- The Ministry of Energy and Mines and the Ministry of Environment have provided screening level comments to Mt Polley Mine staff; and
- Discussions between the two Ministries and Mt Polley Mine staff are continuing regarding additional information required to enable these applications to be reviewed through the Cariboo MDRC process, and to set a date for that review process.

I will advise further once those discussions are concluded.

Rick Adams, RPF Chair, Car boo MDRC 2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3 Telephone: 250-828-4583

From:	Adams, Rick MEM:EX
То:	Howe, Diane J MEM:EX; Demchuk, Tania MEM:EX
Subject:	RE: Minister Bennett"s Comments Regarding Restart of Mount Polley and Use of TSF
Date:	Monday, February 2, 2015 11:59:19 AM
Attachments:	image001.png

Thanks, Diane. Subsequent to Kim's comment, Kate Musgrove was able to locate the transcript of Minister Bennett's speech and provide it to Bruce.

In that transcript, Minister Bennet said, "...although government is certainly willing to have the Mount Polley Mine reopen and employ those workers that sustain their families in that region, and that would be an important step, we are going to take the time that is necessary to review that application that we have from the company, and certainly the use of the existing tailings storage facility is not something that is planned for anytime soon. We will at the very least have to wait until the other two reports are available before we would even consider the use of that existing tailings storage facility."

Not sure if I am reading too much into this, but am providing this as a heads up in the event Minister Bennett's comments:

- a) impact how the MDRC review of Mount Polley Mine's application for restart of restricted operations may proceed; or
- b) require a corporate communications strategy be developed given what follows.

Please consider:

The existing TSF will be used to capture and store2.1 million m3 of 2015 freshet water storage as soon as the breach repair and cut off wall is completed by Apr1, 2015- well before the Chief Inspector's Investigation Report and the CO's Investigation Report are released.

Further, while the application MEM received from Mount Polley on January 13, 2015, proposes the re-start of restricted operations at Mount Polley with the deposit of tailings into Springer Pit, not into the TSF, that application also states:

- in periods of peak flow during run-off, it is possible that the central collection sump will be partially redirected into the tailings impoundment (assuming a repair has been completed to store water);
- the TSF basin will be available after the breach repair to store any water flows which are in excess of the capacity of the reclaim water system (estimated to be approximately 8,000USGPM). Any water which bypasses the CCS will report via gravity to the Till Borrow Pit, where a second pumping system will transfer water into the TSF;
- the schedule assumes that the TSF breach water will continue being collected and pumped to Springer Pit until March 2015, later being contained with the TSF in April 2015. For the remainder of 2015, the projections for site contact water accumulation are taken from the water balance assuming that the TSF breach has been repaired. The site water schedule assumes that all contact water collected on site will be pumped to the Springer Pit until the end of August 2015. This would cause the Springer Pit to rise to a peak level of approximately the 1025m elevation by August;

• Starting in September 2015, the Springer Pit water level would be pumped down or maintained, with the water being sent to the TSF. The TSF can be used for storage of contact water as early as construction of the breach repair is complete. The contingency basin which will be created as a part of the 2015 Freshet Management Plan will have a capacity of 2,100,000m3. This (TSF) storage capacity could be used after freshet to ensure that the Springer Pit does not reach the elevation when pit lake water would start entering ground water (estimated to be close to the 1030m elevation).

Given the above, MEM is already considering use of the TSF in advance of the release of the other two reports. Scheduling of an MDRC meeting once the revised application is submitted by Mount Polley will involve MEM further considering use of the TSF in advance of the two reports. The application proposes pumping contact water (displaced by the deposition of tailings and interstitial water into Springer Pit) from Springer Pit into the TSF by August 2015 when Springer Pit reaches its peak level before it would begin to significantly interact with groundwater- which may occur before the CO's Investigation Report is released.

Please advise of your thoughts on this, and whether or not it impacts MEM's ability to move forward with the MDRC process at this time.

Rick

From: Howe, Diane J MEM:EX
Sent: Friday, January 30, 2015 3:13 PM
To: Adams, Rick MEM:EX
Subject: FW: Minister Bennett's Comments Regarding Restart of Mount Polley and Use of TSF

? Does this help. Doesn't sound like he was referring to all TSF's in the making.

Regards, Diane

Diane Howe Deputy Chief Inspector, Reclamation and Permitting Ministry of Energy and Mines Victoria, BC (250) 952-0183



From: Bellefontaine, Kim MEM:EX
Sent: Friday, January 30, 2015 2:08 PM
To: Howe, Diane J MEM:EX
Subject: RE: Minister Bennett's Comments Regarding Restart of Mount Polley and Use of TSF

The feed was breaking up a lot during this point.

The Minister was talking about the restart application with tailings to the pit and the need to make sure the safety of the existing facility.

Don't think he specifically spoke to discharge to the tsf.

From: Howe, Diane J MEM:EX
Sent: Friday, January 30, 2015 1:49 PM
To: Bellefontaine, Kim MEM:EX
Subject: FW: Minister Bennett's Comments Regarding Restart of Mount Polley and Use of TSF

I missed some of Bennet's discussion, did you hear any of what Rick is asking?

Regards, Diane

Diane Howe

Deputy Chief Inspector, Reclamation and Permitting Ministry of Energy and Mines Victoria, BC (250) 952-0183



From: Adams, Rick MEM:EX
Sent: Friday, January 30, 2015 1:11 PM
To: Hupman, C Bruce MEM:EX; Demchuk, Tania MEM:EX; Howe, Diane J MEM:EX
Subject: Minister Bennett's Comments Regarding Restart of Mount Polley and Use of TSF

Our feed was poor at the office on the Panel Report webcast today and cut out during Minister Bennett's comments regarding restart of My Polley and use of the TSF.

I believe our Minister may have said the Ministry would not consider any mining discharge to the TSF until the CI's Report, and possibly the CO/DFO/RCMP Report also, is in. If you heard and captured that segment of Mr. Bennett's comments clearly, can you please provide? I couldn't find it to replay anywhere online.

The current application by Mt. Polley calls for discharge of tailings into Springer Pit, but as Springer Pit fills then requires water to go to the TSF by sometime this fall.

Rick Adams, RPF Inspector of Mines 2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3 Telephone: 250-828-4583

All electronic client submissions must be submitted to MMD-Kamloops@gov.bc.ca

From:	Warnock, George MEM:EX
To:	Demchuk, Tania MEM:EX
Cc:	Hemphill, Naomi MEM:EX; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Hoffman, Al MEM:EX; "McLeod, Harvey"; "Howard Plewes"
Subject:	RE: Panel Investigation work
Date:	Thursday, February 5, 2015 10:32:10 AM
Attachments:	image001.png

Hi Tania,

The investigation team discussed this issue with Harvey and Howard on Tuesday. We are in agreement that the "Failure Mechanism" report (currently being prepared by KCB) should be provided to MPMC when it is available. By cc to this email I will ask Harvey or Howard to contact you directly with an expected schedule. The final report on the advanced laboratory analyses will also be provided to MPMC and I will ask KCB for an updated schedule for that report as well.

[Harvey, Howard – you should not interpret this as pressure to push those reports out any sooner than planned – take the time you need to complete this work.]

This information is being provided to MPMC as MEM does not wish to withhold any information that could result in better informed design decisions by Golder.

Regards,

George

From: Demchuk, Tania MEM:EX
Sent: Thursday, February 5, 2015 10:07 AM
To: Warnock, George MEM:EX; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Hoffman, Al MEM:EX; 'McLeod, Harvey'
Cc: Hemphill, Naomi MEM:EX
Subject: FW: Panel Investigation work

Hi All,

In addition to the email from Luke Moger below, I am looking for some comment from the Investigation Team:

MPMC and Golder would like to ensure they have received all relevant information related to KCB's geotechnical investigation and analysis so that Golder can move forward with an appropriate design basis for buttressing and other requirements for the TSF, as well as any additional required site investigation work.

- 1. Are you able to confirm or provide some explanation to MPMC and Golder regarding KCB's interpretation of mechanism of failure? Mainly they are concerned with understanding any other mechanism of failure if one has been identied.
- 2. Will KCB be providing the Progress Report 4 to MPMC and Golder? If so, when? If not, why?

Ensuring an appropriate design is in place that considers all relevant information is a time-sensitive issue regarding the breach repair.

I would appreciate being able to reply to MPMC by the end of the week if possible. Let me know if you need to discuss. Thank-you!

Tania

From: Luke Moger [mailto:Imoger@mountpolley.com]
Sent: Thursday, February 5, 2015 9:30 AM
To: <u>HPlewes@klohn.com</u>
Cc: Demchuk, Tania MEM:EX; Eldridge, Terry; Don Parsons
Subject: Panel Investigation work

Dear Howard;

Would you be able to coordinate the transfer of the digital files for KCB's laboratory testing program to MPMC? Golder has requested this information as part of the Mount Polley mine 2015 Freshet Embankment construction design update and review process.

As I am sure you can appreciate, the design and construction timelines are very sensitive on this project, and so if you would be able to provide some clarification on when this information could be provided it would be greatly appreciated.

Kindest Regards,

Luke



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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com

From:	Chris Carr
To:	Demchuk, Tania MEM:EX
Cc:	Howe, Diane J MEM:EX; Adams, Rick MEM:EX
Subject:	RE: DRAFT: additional Mt Polley restart comments for review
Date:	Friday, February 6, 2015 12:05:52 PM
Attachments:	$\underline{28Jan2015\ Followup\ letter\ to\ restart\ application\ screening\ comments\ CCedits.docx}$

Hi Tania,

I have provided some suggestions for inclusion in the letter.

The draft letter clearly states that the TSF will not be used for storing contact water, however I think we have to separate the requirements for storing or release of contact water from the requirements to store tailings. In other words we can consider the use of the TSF for restart operations assuming that all the technical requirements are satisfied and that contact water goes elsewhere both during operations and after closure. I have added some text to address some of the requirements that would have to be considered by the Ministry prior to approving the TSF for storing tailings as part of a mine restart. It would make more sense to me if MPMC used the extra capacity in the Springer Pit solely for contact water storage. Let me know what you think.

Regards,

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

s.22

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

 Sent: February-06-15 6:09 AM

 To: Howe, Diane J MEM:EX; Adams, Rick MEM:EX; Chris Carr

 s.22

 Subject: DRAFT: additional Mt Polley restart comments for review

Hi All,

Please find attached follow-up comments on the restricted restart application for Mount Polley. I would appreciate any additional input given the discussions over the last few days.

Chris, please add any additional comments or requirements related to geotechnical concerns.

If possible, I would appreciate any feedback by 3:00 so the comments can go out today.

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 Dear Dale,

Re: Mount Polley Restricted Restart of Operations – options for application review

Ministry of Energy and Mines (MEM) and Ministry of Environment (MOE) technical staff have reviewed Mount Polley Mining Corporation's (MPMC) applications for permits to allow a restricted restart of operations. Screening comments have been submitted to MPMC setting out additional information required to proceed to a formal application review.

The Ministry of Energy and Mines has had follow-up conversations with MPMC and Imperial Metals on January 22, 2015; January 26, 2015; and, February 4, 2015 to discuss the screening comments and options for proceeding towards permitting a restricted restart of operations.

The theme of the requested additional information is focussed on water management at the mine site, specifically the need for a clear plan to manage surplus mine-contact water to ensure ongoing protection of the environment. The application must clearly set out how surplus water on the mine will be managed given that it is not acceptable to use the tailings storage facility (TSF) as a surplus water management (storage) location.

The need for agencies and reviewers to be provided with additional information is based on the following items:

- Time is of the essence in establishing a robust plan to manage the surplus of contact water at the mine site. The application states that long-term plans are required for water management. MEM reiterates that these plans are required now, given that data suggests there will be a need to discharge water from site, or develop additional storage capacity by September of 2015 with a restricted restart, or November 2015 under current conditions (in an average precipitation year). This ministry can no longer support use of the TSF as the plan for surplus water management. (comment)
- 2. The information presented in the application states that "Starting in September 2015, the Springer Pit water level would be pumped down or maintained (below 1030 m above sea level), with water being sent to the TSF" and "Should additional capacity be required, it is anticipated that more capacity could be created in the TSF through an additional build on top of the 2015 Freshet repair."

Figure 9 in the application shows that the TSF is being used to store site contact water starting in September 2015. The TSF breach repair is currently permitted to an elevation of 950 m asl. The data shown by Figure 9 indicates that 950 m asl is exceeded at some point in November, suggesting that construction of an additional lift on the breach repair is required to be complete by November (under average conditions) to allow sufficient water storage capacity on site. (comment)

3. The information in item 2 above is based on the Springer Pit Lake remaining below an elevation of 1030 m asl to avoid any impacts on groundwater. Section 3.2 of the application states that the Springer Pit has capacity to store water until sometime before the end of 2016, however this assumes a lake elevation greater than 1030 m asl, and also still requires discharge sometime in 2016. If lake elevation exceeds 1030 m asl, it is not currently understood what the impact to

groundwater would be. This requires an understanding of pit water quality and analysis of impact to groundwater, which is not presented. So, although there appears to be some volume of additional storage capacity in the Springer Pit, the <u>lack of detailed information on water</u> <u>quality and the potential impact on groundwater-application</u> precludes its use at this time. (comment)

4. Following discussions with Imperial Metals on January 26, and February 4, 2015, the Ministry understands that the company has commenced work to address the water surplus through development of plans to discharge water. These plans are at a scoping or conceptual stage of development, and substantive additional work is required to develop the plan in a format acceptable to the Ministry of Environment (MOE). It is understood that discussions have occurred with MOE to help Imperial Metals and Mount Polley Mining Corporation (MPMC) understand the permit application requirements. Golder Associates, who will be developing the discharge application for MPMC, has estimated it will take approximately three months before a suitable application is prepared. (comment)

The information set out below is required to be addressed and included in a resubmission of the application for restricted restart of operations. At that time, the updated application will require rescreening to ensure it is adequate to commence the formal review process:

- 5. An updated application document that fully incorporates information set out in the screening comments provided on January 20, 2015, as well as the comments below. Note that it will not be acceptable to submit responses as an addendum to the application. MEM requests the inclusion of a summary table that outlines where the various comments are addressed in the updated application.
- 6. Prior to making a permitting decision on the restricted restart application, MEM must have assurance from both MPMC and MOE that a viable discharge plan is under consideration and appears reasonable. While the issue of water surplus on site must be immediately addressed regardless of operational status of the mine, the proposed restart application reduces the limited existing storage capacity on site and moves forward the date by which discharge of surplus water is required.

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- a. The Mines Act permit application must clearly present short-, intermediate- and long-term water management plans. Plans must be clear about where water is being directed on the mine site and how the projected water surplus is to be managed.
- b. Based on the understanding set out in the January 13, 2015 application and subsequent discussions, it is understood that the current plan is to obtain a discharge permit that would allow discharge to commence on site by September 2015. This is very ambitious, and MEM questions if that timeline is achievable following discussions with MPMC, MOE and Golder on February 4, 2015. The application must set out the contingency plans that will be in place to address the water surplus if a discharge permit and

required infrastructure are not in place when site storage capacity is reached (in September, 2015 or later if additional capacity is found on site)?

- c. There is additional storage capacity in the Springer Pit that has is not planned for use due to increased groundwater interaction above an elevation of 1030 m asl.
 - i. Is using this storage capacity now part of the plan? If so, how much additional time does this give you?
 - If there is a plan to use this capacity, the application requires a discussion of potential impacts to groundwater quality. During the discussion on February 4, 2015, it was indicated that the information is available to make that assessment (i.e. hydrogeology, water chemistry, etc). The application is must present the analysis used to draw conclusions about the risk to groundwater if the pit lake is to exceed 1030 m asl.
- 7. The application requires clarification regarding the intention to place a lift on the breach repair.

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s.13 ote that the same expedited process for application approval that was in place for the TSF Breach Repair will not be provided for future applications. That was viewed as a special circumstance given the importance of enabling construction to be completed in advance of spring freshet. Any future plans for the TSF must be informed by the report of the Independent Expert Review Panel, and must also be reviewed by Mount Polley Mining Corporation's Independent Engineering Review Board.

- 8. Increases to ore stockpiles are proposed in <u>the</u> application. The application must clearly explain the plan for these stockpiles if the site moves to closure before they are processed. This must include a summary of existing and expected stockpile volumes and associated costs for relocation of these stockpiles if required.
- 9. The application must include an update to the "Future Plans" section to reflect updated thoughts on additional permitting requirements and timelines. This should include clear identification of key milestones for the site and the associated plans for permitting.

Application Review and Mine Development Review Committee Process:

MEM has committed to an open and transparent process for the review of the restricted restart and all future applications. It is likely that applications, once accepted for review, will be made public.

MEM would like to take this opportunity to remind you that while an expedited process was put in place to enable permitting of the breach repair for the 2015 Freshet. f-Future applications are a priority and will require more reasonable timelines for technical review and consultation. This restart application, once accepted, will also require a 30 day public consultation period.

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Assessment Certificate for the mine. Your contact at the Environmental Assessment Office is Shelley Murphy. Please contact her at 250-387-1447.

Please do not hesitate to contact me with any questions about the above comments, or previous screening comments.

Regards,

Tania Demchuk, MSc, PGeo Senior Environmental Geoscientist Mount Polley Project Manager Ministry of Energy and Mines Hi Chris,

Please see notes with respect to the MPMC breach repair below. Rick Adams has suggested that a geotechnical inspection should be conducted prior to spring freshet. I agree that this would be wise. Could you please let me know if you would be available to conduct an inspection sometime in mid to late March?

Thanks,

George

From: Adams, Rick MEM:EX
Sent: Thursday, February 12, 2015 5:19 PM
To: Demchuk, Tania MEM:EX; Ryan Brown; Rothman, Stephen MEM:EX; Warnock, George MEM:EX
Subject: Notes From MPMC Weekly Update February 12, 104

Ryan, please review as soon as you can, and if there are any significant errors in my notes, please correct and forward to Tania before she sends to the broader distribution list tomorrow. Thanks.

Attendees: Ryan Brown, Jim Kuipers, Rick Adams

Update: Ryan

- Weather was good and construction is proceeding well, but not as fast as wanted- won't meet target start date to commence CSM work on cut off wall but still expect to finish by April 1 target
- Experiencing some earlier melting than normal and reduction in snow pack
- Breach repair is currently at 935 m elevation with 15 m to go to reach design height of 950 m
- Some days have raised the breach repair 1.5 m, but other days not going as well
- Made good progress last week but tying into the sides of the embankments is time consuming
- Last batch of filter material did not quite meet spec and Golder has instructed them to wrap the filter material in geotextile between the till and the filter and the transition material and the filter
- Hoping next batch of filter material meets spec so can avoid the time delays of double wrapping
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- ٠

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- With the long spell of warm weather, roads are sloppy but all pumps and drains are functioning properly
- They are pumping water from above the satellite dyke to the central collection sump to make more room for freshet water (estimate additional 100,000 m3)
- Springer Pit water level is at 993 m elevation which equates to about 3.5 million m3 of water stored
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- Ryan responded to a question from Jim regarding contingencies in the event freshet arrives 30 days early, by referencing pumping from above the satellite dyke to increase storage capacity at freshet, and that the breach repair itself is a contingency in the event that the pumping system can't keep up. So it would have to be a 200 year event that also arrived 30 days early before it would be an issue, and the snowpack is already significantly lower than normal. Also, they hope that by eliminating the complexity of the upstream fill and having to wrap with geotextiles, construction will speed up, and getting the equipment arrays out of the way will help as well

Rick Adams, RPF Inspector of Mines 2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3 Telephone: 250-828-4583

All electronic client submissions must be submitted to MMD-Kamloops@gov.bc.ca

From:	Chris Carr
To:	Warnock, George MEM:EX
Cc:	Adams, Rick MEM:EX; Narynski, Heather M MEM:EX; Hoffman, Al MEM:EX; Demchuk, Tania MEM:EX
Subject:	RE: Notes From MPMC Weekly Update February 12, 104
Date:	Thursday, February 12, 2015 5:59:29 PM

Hi George,

I am scheduled to visit the site on March 12, 2015 as part of a tour of the breach area and an update meeting with Golder Associates.

Chris

From: Warnock, George MEM:EX [mailto:George.Warnock@gov.bc.ca]
Sent: February-12-15 5:25 PM
To: 'Chris Carr'
Cc: Adams, Rick MEM:EX; Narynski, Heather M MEM:EX; Hoffman, Al MEM:EX; Demchuk, Tania MEM:EX
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Rick Adams, RPF Inspector of Mines 2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3 Telephone: 250-828-4583

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Hi Rick,

Sorry I missed the call yesterday. I have been out of action the past 2 days due to a back problem – hopefully the doctor can fix it this afternoon!

Geotextiles are commonly used in civil engineering projects where there is a need for a filter barrier. My concern is that MPMC appear to have made the design change and are proceeding without notifying the Ministry beforehand (although it is included as a redundancy element in the adaptive management plan).

I suggest that we request the following information from MPMC:

- Specifications of geotextile 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.

With regard to the construction delays there are several contingencies identified in the adaptive management plan. We need to be sure that water does not fill the impoundment before the cutoff wall is built. This will require continuous pumping to the Springer Pit. A second CSM rig will be required if delay in construction of the cut-off wall is identified.

Can you or Tania forward the information request to MPMC?

Regards,

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

S.Zz

Subject: RE: Notes From MPMC Weekly Update February 12, 104

Chris, my concerns from the call yesterday were:

- Falling behind in schedule for start of the cut off wall construction;
- Discussions of contingencies a couple of times;
- Some impacts from weather and water conditions; but, mainly,
- The changes and substitutions in materials from those prescribed in the original design, and the addition of having to use geotextiles because of the characteristics of the substituted materials.

I acknowledge that Golder is overseeing and directing all of this. However, I'm uncertain from a geotechnical perspective if those changes from design are significant, or routine and expected in these types of projects. Given the MPMC background, I thought there was enough there to warrant MEM having a geotechnical review of those changes, and an onsite inspection while one can still see what and how these substitutions are being made. The breach repair will be completed to the 950 m design elevation within 10 or 12 days from now at their current rate of construction. As you can't attend the site until March 12, 2015, if there is anything from my notes that raises questions or concerns for you, perhaps an earlier call with Golder should be considered. I defer to your expertise on that.

Thanks,

Rick

From: Chris Carrs.22Sent: Thursday, February 12, 2015 5:59 PMTo: Warnock, George MEM:EXCc: Adams, Rick MEM:EX; Narynski, Heather M MEM:EX; Hoffman, Al MEM:EX; Demchuk, Tania MEM:EXSubject: RE: Notes From MPMC Weekly Update February 12, 104

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Rick Adams, RPF Inspector of Mines 2nd Floor, 441 Columbia Street, Kamloops, BC V2C 2T3 Telephone: 250-828-4583

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From:	Luke Moger
To:	Howe, Diane J MEM:EX
Cc:	Demchuk, Tania MEM:EX; Adams, Rick MEM:EX; Don Parsons; Dale Reimer; Millar, Robert (Robert Millar@golder.com) (Robert Millar@golder.com)
Subject:	Updated Hydrogeological Assessment of the Springer Pit [M-200 Permit - Approccing the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]
Date:	Thursday, February 19, 2015 12:33:48 PM
Attachments:	image001.png 2014 12 16 - Updated Predictions of Pit Lake Formation for the Springer Open Pit - Mount Polley Mine (Golder).pdf

Dear Diane;

As per clause D.2.(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 updated hydrogeological assessment of the Springer Pit has been prepared by Golder Associates Ltd. for MPMC. Please note that this document was provided to MEM, MOE and First Nations in support of the *Return to Restricted Operations* Mine Permit Amendment Application (as Appendix C) dated January 12, 2015, prepared by MPMC and provided to the above-referenced groups on January 13, 2015. This present transmittal is intended to ensure that the submission is received by the above-stated condition of the existing M-200 Permit; please find attached a copy of this report.

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

Kindest Regards,

Luke

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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com



TECHNICAL MEMORANDUM

DATE December 16, 2014

REFERENCE No. 1411734-002-TM-Rev0-6000

- TO Ryan Brown, P.Eng. Mount Polley Mining Corporation
- FROM Willy Zawadzki Rob Millar

EMAIL wzawadzki@golder.com rmillar@golder.com

UPDATED PREDICTIONS OF PIT LAKE FORMATION FOR THE SPRINGER OPEN PIT - MOUNT POLLEY MINE

1.0 INTRODUCTION

This technical memorandum present the results of updated hydrogeological assessment and water balance that was conducted to predict formation of the pit lake after mine closure in the Springer Open Pit at the Mount Polley Mine Site (Mount Polley). The current mine plan considers placement of tailings and potentially acid generating (PAG) waste rock in the Springer Pit; thus this assessment includes the effects of these materials on pit lake formation. Specifically, the memo addresses the following questions that are related to the formation of this pit lake after closure:

- What will be the long term water level in the pit lake that will form above the tailings and potentially acid generation (PAG) waste rock?
- What is the quantity of long-term surface water outflow (if any) from the pit lake?
- What is the quantity of long-term groundwater seepage from the filled pit towards Bootjack Lake?

It is understood that this information is required by Mount Polley for their planning purposes. It is also understood that the quality of pit lake water will be assessed separately by Mount Polley.

The analysis presented in this memorandum builds on the analysis that was completed in 2010 for the ultimate configuration of the Springer Pit that assumed no tailings/waste rock deposition in the pit (Golder, 2010). This analysis utilized a three-dimensional groundwater model to predict groundwater seepage in the vicinity of the pit lake and a spreadsheet water balance model of the pit lake that considered this groundwater seepage together with other aspects of pit lake hydrology. The updated analysis presented in this memorandum includes additional hydrogeological and hydrologic data collected at the site since 2010 together with the current mine plan for the Springer Pit.



Golder Associates Operations in Africa, Asia, Australasia, Europe, North America and South America

2.0 CURRENT MINE PLAN

Mount Polley provided the current pit shell for the Springer Pit (Figure 1) together with elevation versus volume and elevation versus area curves for this pit shell. At present the pit bottom is located at an elevation of approximately 930 m and the lowest point along the pit crest it at an elevation of approximately 1050 m. The current mine plan assumes deposition of 1.8M m³ to 3.4M m³ of tailings in the Springer Pit which, based on volume versus elevation curve, translates into elevation of the tailings surface between 976 m and 993 m. The mine plan also assumes deposition of 8.0M m³ of PAG waste rock on top of the tailings, which corresponds to top of PAG ranging between 1030 m elevation and 1037 m elevation depending on the amount of deposited tailings.

3.0 UPDATED HYDROGEOLOGICAL MODEL

3.1 Data

The hydrogeological data that was used to develop the groundwater model for the area near the Springer Pit was described in Golder (2010). Since that time additional hydrogeological data has been collected, as follows:

- AMEC (2010) installation and bedrock permeability testing in piezometers along the shore of the Bootjack Lake and Polley Lake;
- Mount Polley measurements of groundwater inflow to the Springer Pit and Zuke Zone Underground; and
- Golder (2014) seepage observations in the Springer Pit.

The results of permeability testing in bedrock that AMEC conducted in 2010 were combined with the results of previous testing described in Golder, 2010, as presented on Figure 2. These results indicate that in general bedrock hydraulic conductivity decreases with depth from approximately $mid-10^{-7}$ m/s in the upper 50 m below ground to $mid-10^{-8}$ m/s below 100 m depth. Locally, the hydraulic conductivity of shallow bedrock appears to be higher, in the low- 10^{-6} m/s range as indicated by the results of pumping test in well R97-3.

These results were compared to estimates of bulk hydraulic conductivity of bedrock between the Polley Lake and Bootjack Lake derived from simple analytical approximations of groundwater mounding between two water bodies in response to recharge (Freeze and Cherry, 1979). Based on hydraulic heads in the range of 1120 m and 1130 m measured near the ridge separating these lake prior to mining (Knight and Piesold, 1996) and assuming average recharge rate to be approximately 30% of average annual precipitation of 670 mm/yr, the bulk hydraulic conductivity for bedrock was calculated to be approximately 1×10^{-7} m/s. Similar estimate of bulk hydraulic conductivity of bedrock near Polley Lake was obtained by the analysis of observed groundwater inflow to the Zuke Zone Underground in October 2014 of approximately 190 m³/day (34 USgpm). Overall these bulk values appear to be consistent with the results of single-well-response testing and indicate that in general bedrock near the Springer Pit has low to very low capacity to transmit groundwater (Powers and Corwin, 2007).

In 2014 Mount Polley calculated groundwater inflow to the Springer Pit based on water level rise in the pit lake after August 2014. Inflow to this pit was estimated to range between 700 m³/day (130 USgpm) and 1600 m³/day (300 USgpm). Additional observations of seepage conditions in the Springer Pit were made by Golder during the 2013 pit inspection (Golder, 2014). Seepage was observed along the east wall of the Springer Pit with this seepage likely originating due to recharge from the Caribou Pit Lake. No visible seepage was observed along the southwest wall indicating that it is unlikely that discrete zones of enhanced permeability connect Springer Pit to the Bootjack Lake.



3.2 Updated model

The hydrogeological model that was previously developed for the area near the Springer Pit (Golder, 2010) was updated based on the information that became available after its construction and to reflect the current mine plan for this pit. The extent of this model, as implemented using FEFLOW (Diersch, 2014), are presented on Figure 3. These modifications were as follows:

- The vertical model discretization was refined such that it could adequately represent changes in bedrock permeability with depth, current Springer Pit shell, and tailings deposition.
- Initial values of bedrock hydraulic conductivity was set to average values calculated from the in-situ testing, including post-2010 data as presented on Figure 2. These values were later adjusted during model calibration.
- The updated model was calibrated to hydraulic heads measured in existing piezometer installed near the Springer Pit and estimates of groundwater inflow to this pit in 2014.

The results of model calibration are presented on Figure 3. The calibrated model was capable of adequately representing hydraulic heads measured near the Springer Pit with the weighted root-mean-square error of 7%. The model predicted inflow to the Springer pit was approximately 930 m³/day (170 USgpm) which is within the range of inflows estimated by Mount Polley. Table 1 presents the values of bedrock hydraulic conductivity and recharge to groundwater that were established at the end of calibration process. The hydraulic conductivity values are well within the range of field measured values, and the recharge rate is comparable to recharge rates at similar sites in mountainous terrain. As such, the calibrated model is considered sufficiently well calibrated to provide base case predictions of groundwater seepage that are required for the pit lake water balance.

Parameter	Reasonable Lower Bound	Base Case	Reasonable Upper Bound
Bedrock Hydraulic Conductivity (m/s) 0 m to 40 m Below Ground	6 x 10 ⁻⁷	1 x 10 ⁻⁶	2 x 10 ⁻⁶
Bedrock Hydraulic Conductivity (m/s) 40 m to 100 m Below Ground	1 x 10 ⁻⁷	2 x 10 ⁻⁷	4 x 10 ⁻⁷
Bedrock Hydraulic Conductivity (m/s) 100 m to 150 m Below Ground	5 x 10 ⁻⁸	8 x 10 ⁻⁸	2 x 10 ⁻⁷
Bedrock Hydraulic Conductivity (m/s) Below 150 m Below Ground	6 x 10 ⁻⁹ m/s	1 x 10 ⁻⁸	2 x 10 ⁻⁸
Recharge Rate (mm/year)	20% of ave. precip.	30% of ave. precip.	50% of ave. precip.

Table 1: Parameter Values Used in the Groundwater Model

Note: Locally hydraulic conductivity near monitoring well GW12-2 between 0 m and 150 m below ground was reduced by a factor of 3 from the values listed in this table. This adjustment was necessary to improve the match to hydraulic heads measured at this location and is consistent with somewhat lower measurements of hydraulic conductivity that were reported for this loca ion by AMEC (2013).

Table 1 also presents the values of hydrogeological parameters for two sensitivity scenarios where the calibration results were inferior to the original calibration but still reasonable. In the reasonable lower bound scenario, recharge rate and bedrock hydraulic conductivity was lowered such that the predicted pit inflow was near the lower end of inflows estimated by Mount Polley (i.e., 700 m³/day). Conversely, in the upper bound scenario, these parameter values were increased such that the predicted pit inflow was near the upper end of estimated pit inflows (i.e., 1600 m³/day). As discussed in the next section, the predictions of groundwater seepage based on these two sensitivity scenarios quantifies the uncertainty in model predictions; whereas, the predictions based on the base case model provide the estimates of these inflows from the calibrated model.



3.3 Results

The updated hydrogeological model was used to simulate groundwater seepage near the Springer Pit Lake after closure. In the model it was assumed that the tailing would be deposited to an elevation of approximately 990 m and that their hydraulic conductivity would be 1×10^{-6} m/s. Initial simulation trials showed that the predicted groundwater seepage to and from the pit lake is not sensitive to the hydraulic conductivity of the tailings within the range of values typically observed at other mine sites (i.e. 1×10^{-7} m/s to 1×10^{-5} m/s). This observation appears reasonable considering that the tailings would be located within deeper bedrock that is less permeable compared to shallow bedrock. Deposition of waste rock on top of the tailings was implicitly represented in the model by assuming that its permeability is at least two orders of magnitude higher than the shallow bedrock and thus their presence will not impeded inflow or outflow of pit lake water to the surrounding bedrock.

Figure 4 shows groundwater flow conditions predicted by the base case model pit lake elevations between 990 m and 1050 m, whereas table 2 presents corresponding inflow and outflow of groundwater. These results indicate that groundwater inflow to the pit lake is predicted to gradually decrease from approximately 760 m³/day (140 USgpm) to 530 m³/day (100 USgpm) as the pit lake level rises to 1050 m elevation. Model results also show that groundwater outflow from the pit lake towards Bootjack Lake water is predicted to occur once the pit lake level increases above 1030 m elevation. This outflow was predicted to gradually increase to 170 m³/day (30 USgpm) once the pit lake level is at 1050 m elevation.

	Groundwater Flow (m /day)	
Into the Lake	Out of the Lake	Net ¹
760	0	760
730	0	730
700	0	700
650	0	650
640	30	610
590	90	500
530	170	360
420	60	360
350	110	240
1100	250	850
900	400	500
	Into the Lake 760 730 700 650 640 590 530 420 350 1100 900	Into the Lake Out of the Lake 760 0 730 0 730 0 700 0 650 0 640 30 590 90 530 170 420 60 350 110 1100 250 900 400

Table 2: S	pringer	Pit	Groundwater	Flows
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Note 1. Positive value indicates net inflow.

Table 2 also presents predicted inflow and outflow of groundwater from the pit lake for the sensitivity scenarios that represent lower reasonable and upper reasonable bound conditions that could be expected considering model uncertainty. These results show that, once the pit lake elevation is at 1050 m, the groundwater inflow to the lake could range between 350 m³/day and 900 m³/day. Groundwater outflow from the lake in these scenarios was predicted to range between 110 m³/day and 400 m³/day.



4.0 UPDATED WATER BALANCE MODEL

4.1 Data

Baseline climate values have been developed from combined data from Likely and Mount Polley climate stations for the period 1973 to 2014 (31 years). Precipitation occurs as rain and snow. A simplified snowpack accumulation and snowmelt is assumed with:

- No snow accumulation from April to November;
- Snowpack accumulates from December to March (all precipitation as snow); and
- Snowmelt is distributed over a 3-month period: March (5%), April (90%), and May (5%).

The average monthly distribution of the annual total of precipitation and runoff (from rain and snowmelt) is presented in Table 3.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation (%)	7.6	5.6	6.4	7.4	8	11.7	8.8	7.8	7.2	8.7	8	12.8	100
Runoff (%)	0	0	7.7	30.8	9.3	11.7	8.8	7.8	7.2	8.7	8	0	100

Table 3: Monthly Distribution (%) of Annual Precipitation and Runoff

Annual precipitation for Average, Wet and Dry years for selected return periods is summarized in Table 4. Values were derived from frequency analysis assuming a Generalised Extreme Value distribution. Monthly precipitation depths for each scenario are distributed by the proportions in Table 3.

Table 4: Annual Precipitation (mm) for Average, and Extreme Wet- and Dry-year Scenarios for a Range of Return Periods

Return Period (y)	Annual Wet (mm)	Annual Dry (mm)
Average	e	570
2	659	659
5	791	545
10	865	491
25	948	438
50	1,001	406
100	1,048	378
200	1,091	354

Note 1. Based on Generalized Extreme Value Distr bution



Runoff is calculated based on monthly seasonal runoff coefficients (Table 5). Runoff coefficient values are based on local flow measurements and water accumulation at the mine, and supplemented with values based on engineering judgement and experience from other mine operations.

Component	Dry	General	Freshet	
Open Pits	0.5	0.75	0.9	
Undisturbed catchment	0.25	0.25	0.25	
Pit Lake	1.0	1.0	1.0	
Waste Rock	0.25	0.5	0.75	

Table 5: Summary of Seasonal Runoff Coefficients

Dry: July to October. General: November to February. Freshet: March to June.

Monthly runoff for Average, Wet and Dry years is estimated by multiplying the annual precipitation (Table 4) by the monthly proportion (Table 3), and by the appropriate runoff coefficient (Table 5).

Evaporation from the pit lake (Table 6) is estimated from pan evaporation data from Mount Polley (2005 to 2012) and calculated evaporation using the Penman equation with Mount Polley climate data (solar radiation, wind, temp, etc).

Table 6: Monthly Evaporation Values (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average	0	0	0	0	53.4	95.5	103.9	89.9	47.9	18.2	0.3	0	409.1

4.2 Updated Model

The Springer Pit water balance model is set up using the GoldSim simulation software¹. The schematic flowchart representing this model is shown in Figure 5. The model runoff runs on a monthly time step and calculates inflows to and outflows from the pit while tracking the change in the pit lake water level. The elevation-volume and elevation-area curves for Springer Pit that were implemented in the model are shown in Figure 6. The spillover elevation is 1050 m.

The model is run from a nominal start date of January 1, 2016. At this time the tailings and waste rock have been placed in the pit. Case 1 consists of 3.4 Mm³ of saturated tailings overlain by 8.0 Mm³ of waste rock. Case 2 consists of 1.8 Mm³ of saturated tailings overlain by 8.0 Mm³ of waste rock. The waste rock has an assumed porosity of 0.25, which is initially dry.

4.3 Results

Under average precipitation conditions, approximately 4 years are requires for the water level to reach the top of the waste rock, and an additional 11 years for Case 1, and 15 years for Case 2 to reach the spillover elevation of 1050 m (Figure 7).



¹ http://www.goldsim.com

Filling of the pit lake above the waste rock from an elevation of 1040 m was assessed for a range of conditions for Wet years (10-year and 100-year) together with Upper Reasonable Bound groundwater inflows (Table 2), and Dry years (10-year and 100-year) together with Lower Reasonable Bound groundwater inflows (Figure 8). Results show that under all combinations assessed, the pit lake will reach the spillover elevation; however, the time for the pit lake to fill from 1040 m varies from approximately 4 years to 16 years depending upon the scenario.

Once the water level reaches the spillover elevation, the pit lake will be maintained at or near the spillover elevation, and excess surface flow will discharge from the pit (Figure 9). Under average precipitation conditions, the annual surface discharge volume would be approximately 284,000 m^3 /yr with approximately 92,000 m^3 /month (3,070 m^3 /day) during the peak of the freshet in the month of April (Figure 10). During the Dry-year scenarios, it was predicted that the pit lake level would maintained within 1 m of the spillover elevation, even during the dry summer months.

5.0 SUMMARY AND RECOMMENDATIONS

The hydrogeological assessment and water balance for the closure conditions at the Springer Pit Lake was updated based on hydrogeological and hydrological data that has been collected since 2010. The update also considered the current mine plan that assumes storage of tailings and PAG west rock in the Springer Pit. The assessment was based on updated hydrogeological and water balance models and the key model predictions are as follows:

- Groundwater inflow to the Springer Pit Lake could gradually decrease from approximately 760 m³/day (140 USgpm) to 530 m³/day (100 USgpm) as the pit lake level rises to 1050 m elevation.
- Considering the uncertainty in model predictions, groundwater inflow to the lake could range between 350 m3/day and 900 m³/day when the pit lake level is at 1050 m.
- Groundwater outflow from the pit lake towards Bootjack Lake water would occur once the pit lake level increases above 1030 m elevation. This outflow was predicted to gradually increase to 170 m³/day (30 USgpm) once the pit lake level is at 1050 m elevation.
- Considering the uncertainty in model predictions, groundwater outflow form the lake could range between 110 m³/day and 400 m³/day.
- Under all scenarios investigated, the pit will fill and reach the spillover elevation of 1050 m; only the length
 of time to reach this level changes for each scenario.
- Under Average precipitation conditions and Base Case groundwater inflows, the pit lake will reach the spillover point in approximately 15 Years for Case 1, and 19 years for Case 2.
- A pit lake will form and be maintained with one meter from the spillover elevation even during the 100-year Dry precipitation and Lower Reasonable groundwater inflows scenario.
- Under Average precipitation conditions, the annual spillover volume would be approximately 284,000 m³/yr with approximately 92,000 m³/month (3,070 m³/day) during the peak of the freshet.



It is recommended that monitoring be conducted during tailings and waste rock deposition in the Springer Pit, and during initial formation and operation of the pit lake. This monitoring should include measurements of pit lake level and water discharge, and measurement of hydraulic heads in nearby piezometers on at least monthly basis. This information should be compared to predictions provided in this memorandum and, if necessary, these predictions should be updated if the monitoring data indicate that the pit lake behaviour is significantly different than modelled.

6.0 CLOSURE

We trust that the above information is sufficient for your needs at this time. Should you have any questions or require clarification, please do not hesitate contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.

Mindus

Willy Zawadzki, P.Geo. Principal - Senior Hydrogeologist

Don Chorley, MSc, P.Geo. Senior Hydrogeologist, Principal

WZ/RM/DWC/ch

Attachments:Figure 1: Site Plan
Figure 2: Summary of Available Hydraulic Conductivity Data for Bedrock
Figure 3: Predicted Hydrogeological Conditions Model Calibration to Dewatered Springer Pit
Figure 4: Predicted Hydrogeological Conditions Pit Lake Elevation 990 m to 1050 m
Figure 5: Springer Pit Lake Water Balance Flow Chart
Figure 6: Springer Pit Fill Curves
Figure 7: Springer Pit Filling Times for Average Climate Conditions
Figure 8: Springer Pit Lake Filling Times for Wet and Dry Scenarios
Figure 9: Pond Elevation and Cumulative Spill Volume – Average Precipitation and Base Case Groundwater
Figure 10: Monthly Spill Volumes – Average Precipitation and Base Case Groundwater

Attachment 1: Study Limitations

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Rob Millar, P.Eng. Associate - Senior Water Resources Engineer



7.0 REFERENCES

- AMEC Americas Ltd., 2013. *Mount Polley Mine Hydrogeology Assessment and Data Review*. Submitted to Mount Polley Mining Corporation on March 26, 2013.
- Diersch, H.G. 2014. *FEFLOW v. 6.2 Finite Element Subsurface Flow and Transport Simulation System*. DHI-WASY Institute for Water Resources Planning and System Research Ltd., Berlin, Germany
- Golder Associates Ltd. 2010. *Predictions of Pit Lake Formation for the Springer Open Pit Mount Polley Mine.* submitted to Mount Polley Mining Corporation on August 19, 2010.
- Knight and Piesold Ltd., 1996. Report on Geotechnical Investigations and Design of Open Pits and Waste Dumps (Ref. N. 1628/1).
- Powers, J.P. and A.B. Corwin. 2007. Construction Dewatering and Groundwater Control: New Methods and Applications. Wiley, NY.







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LEGEND:



Direct Precipitation

Groundwater Seepage Flows

Springer Catchment Runoff

Pit Wall Runoff

Spills

MOUNT POLLEY MINING CORPORATION LIKELY, BC			UPDATE PREDICTIONS OF PIT LAKE FORMATION FOR THE SPRINGER PIT			
CONSULTANT	YYYY-MM-DD	2014-10-25				
	PREPARED	APB	SPRINGER PIT LAKE WATER BALANCE FLOW	CHARI		
Colder	DESIGN	APB				
Golder	DESIGN REVIEW	APB RGM	PROJECT No. Rev.			

EMAILS_Part 6-1 Page 305 of 400


EMAILS_Part 6-1 Page 306 of 400











Study Limitations

This document has been prepared for the exclusive use of Mount Polley. The factual information, descriptions, interpretations, and comments contained herein are specific to the project described in this document and do not apply to any other project or site. Under no circumstances may this information be used for any other purposes than those specified in the scope of work unless explicitly stipulated in the text of this document or formally authorized by Golder. This document must be read in its entirety as some sections could be falsely interpreted when taken individually or out-of-context. As well, the final version of this document and its content supersedes any other text, opinion or preliminary version produced by Golder.

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Hydrogeologic/hydrologic investigations and groundwater modelling are dynamic and inexact sciences. They are dynamic in the sense that the state of any hydrological system is changing with time, and in the sense that the science is continually developing new techniques to evaluate these systems. They are inexact in the sense that groundwater systems are complicated beyond human capability to evaluate them comprehensively in detail, and we invariably do not have sufficient data to do so. A groundwater model uses the laws of science and mathematics to draw together the available data into a mathematical or computer-based representation of the essential features of an existing hydrogeologic system. While the model itself obviously lacks the detailed reality of the existing hydrogeologic system, the behaviour of a valid groundwater model reasonably approximates that of the real system. The validity and accuracy of the model depends on the amount of data available relative to the degree of complexity of the geologic formations, the site geochemistry, the fate and transport of the dissolved compounds, and on the quality and degree of accuracy of the data entered. Therefore, every groundwater model is a simplification of a reality and the models described herein are not an exception.

The professional groundwater modelling services performed as described in this document were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practising under similar conditions, subject to the quantity and quality of available data, the time limits and financial and physical constraints applicable to the services. Unless otherwise specified, the results of previous or simultaneous work provided by sources other than Golder and quoted and/or used herein are considered as having been obtained according to recognised and accepted professional rules and practices, and therefore deemed valid. This model provides a predictive scientific tool to evaluate the impacts on a real groundwater system of specified hydrological stresses and/or to compare various scenarios in a decision-making process. However and despite the professional care taken during the construction of the model and in conducting the simulations, its accuracy is bound to the normal uncertainty associated to groundwater modelling and no warranty, expressed or implied, is made.

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From:	Chris Carr
To:	Demchuk, Tania MEM:EX
Cc:	<u>"Jim Kuipers"</u>
Subject:	RE: Proposed phone call: Contingency and Adaptive Management Plans
Date:	Tuesday, February 24, 2015 6:14:32 PM

Hi Tania and Jim,

I can make time either Thursday or Friday.

Chris

-----Original Message-----From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca] Sent: February-24-15 5:07 PM To: Chris Carr s.22 Jim Kuipers Subject: Re: Proposed phone call: Contingency and Adaptive Management Plans

Chris and Jim,

You two are key to this discussion. Do either of those two time slots work for you? Or would you prefer to wait until next week when Terry is also available? My schedule is somewhat limited next week but I will try to be available if possible.

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 Feb 24, 2015, at 4:19 PM, "Luke Moger" <lmoger@mountpolley.com<<u>mailto:lmoger@mountpolley.com</u>>> wrote:

Hi Tania;

Terry has indicated that he is unavailable Thursday and Friday, and Andy that he is available Thursday afternoon and Friday morning.

MPMC are scheduled to be finished our aforementioned meetings on Thursday by 2:30pm, and so would be available after then to have the discussion. How is 2:30pm, Thursday, February 26th? Alternatively, we could be more flexible next week with advanced planning of a meeting.

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 3:40 PM 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<<u>mailto:Andy_Haynes@golder.com</u>>); Bunce, Hubert ENV:EX; 'Jacinda Mack' Subject: RE: Proposed phone call: Contingency and Adaptive Management Plans

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<<u>mailto:Andy_Haynes@golder.com</u>>); 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<<u>mailto:Andy_Haynes@golder.com</u>>); Bunce, Hubert ENV:EX; 'Jacinda Mack' Subject: Proposed phone call: Contingency and Adaptive Management Plans

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)

o Decision point: need for update of the plan based on the discussion

. Contingency Plan / Water Management Plan - see attached comments from MEM

o Update on progress of work requirements set out in the plan

o 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

From:	Hoffman, AI MEM:EX
То:	Pocklington, Cheryl M MEM:EX; Demchuk, Tania MEM:EX; Morel, David P MEM:EX; Howe, Diane J MEM:EX; Kuppers, Haley MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EX
Subject:	Fwd: Feb 18th advisory letter
Date:	Wednesday, February 25, 2015 12:19:00 PM
Attachments:	image001.jpg ATT00001.htm Feb 25 2015 Response to MoE Feb 18 Advisory Ltr.docx ATT00002.htm

FYI

Sent from my iPhone

Begin forwarded message:

From: Dale Reimer <<u>dreimer@mountpolley.com</u>> Date: February 25, 2015 at 9:46:38 AM PST To: "Hubert Bunce (<u>hubert.bunce@gov.bc.ca</u>)" <<u>hubert.bunce@gov.bc.ca</u>> Cc: "Dahl, RK ENV:EX" <<u>RK.Dahl@gov.bc.ca</u>>, "Hoffman, Al MEM:EX" <<u>Al.Hoffman@gov.bc.ca</u>>, "<u>SHsia@imperialmetals.com</u>" <<u>SHsia@imperialmetals.com</u>> Subject: Feb 18th advisory letter

Hubert: Please find attached the response to your advisory letter of February 18th. Regards: Dale



Mount Polley Mining Corporation

IMPERIAL METALS CORPORATION

February 25, 2015

VIA EMAIL TO Hubert.Bunce@gov.bc.ca

Ministry of Environment

Mining Operations – Environmental Protection Division 2080 Labieux Road Nanaimo, BC V9T 6J9

Dear Mr. Bunce:

Re: Non-Compliance Advisory Letter, Order 107461

We write in response to your Non-compliance Advisory Letter, Order 107461 (the "Order"), dated February 18, 2015 ("Advisory Letter"). We ask that you withdraw the Advisory Letter on the following bases:

As you state in the Advisory Letter, on February 13 and 14, 2015, Mount Polley reported a discharge of mine-contact water into Bootjack Creek and Hazeltine Creek, respectively. Reporting of these incidents was done as required pursuant to the regulatory regime governing Mount Polley.

Mount Polley does not agree with your characterization in the Advisory Letter of these incidents as violations of the Order, nor do we agree that our reports of these incidents amount to violation reports. Mount Polley did not advise that it was out of compliance with section 1 of the Order under the *Environmental Management Act* and Mount Polley does not view either of these incidents as non-compliant with the Order.

Mount Polley is in compliance with the Order

As Ministry of Environment and Ministry of Forests, Land and Natural Resource Operations staff saw first-hand on February 12, 2015, when they toured the impacted area, Mount Polley has done a vast amount of work with respect to breach response and remediation over the past six months. This is the background context within which the incidents occurred and must be considered along with specific context of the incidents, which we discuss below.

First and foremost, the multiple, extreme and early thaw and rainfall events that occurred in relatively quick succession of each other and that lead to the discharges were unusual. They were unforeseen and could not reasonably have been anticipated at the time. It is not even spring yet and there have been three spring melts within a short time-frame at the mine. These circumstances resulted in the incidents.

Further, as you are aware and have been aware for some time, prior to the TSF failure, Mount Polley was implementing a water management plan to deal with its yearly surplus of mine-contact water. Implementation of that plan was interrupted by the tailings dam breach and the resulting more urgent tailings dam breach response and remediation that is now necessarily underway. The TSF 2015 freshet breach repair plan is very much part of Mount Polley's strategy to control spring melt and surplus water-generating events and the Ministry has previously advised that works associated with spring thaw preparation are a priority. Thus, currently, Mount Polley is attempting to cope with water surplus issues including those caused by extreme weather events without all of its intended water management structures yet being in place as previously planned. All of these intended structures and expected timeframes have been communicated to the Ministry.

Despite these very difficult circumstances, Mount Polley has taken additional and substantial measures to cope with the three "spring" thaw events and has already put in place, prior to these incidents, a number of processes to ensure that mine-contact water is not discharged. These measures are adaptive efforts to cope with conditions encountered. During planning for management of spring thaw, neither MPMC nor the Ministry had foreseen their need. The Ministry of Environment has been and continues to be kept aware of the plans based on foreseeable seasonal conditions with a substantive and realistic planning horizon. As you are aware, the processes are detailed in manuals and plans supplied to the ministries since December 2014, these include:

Manual or Plan	<u>Submission</u>
Water Management Inspection Manual	January 30, 2015
Water Management Plan	January 30, 2015
2015 Freshet Management Embankment – Adaptive Management Plan	January 30, 2015
Surface Erosion and Sediment Control Plan	February 12, 2015
Water Management Contingency Plan	February 13, 2015

The Operation, Maintenance and Surveillance Manual will be submitted 30 days prior to commissioning the 2015 TSF Breach Repair will further update management systems, as will the Emergency Preparedness and Response Plan which will be submitted prior to the commissioning of the Breach Repair.

These plans detail the installation, maintenance and inspection of the water management systems and were all in effect at the time of the discharge. An inspection by a Ministry of Environment representative, Jack Green, on January 27, 2015 confirmed that 'freeboard in the Central Collection Sump was well above 1 metre' and the 'Till Borrow was virtually empty' at the time. The inspector recommended that the works be inspected regularly and maintained in good working order.

When Mount Polley became aware that there might be the first (of now three) spring thaw and/or extreme rainfall events, it undertook measures including the sourcing of additional pumps, installation of additional pumps at the Central Collection Sump (CCS), operational measures to create freeboard in the CCS, daily inspections and increased inspections in advance of forecast warming. We have previously described these measures to the Ministry in phone calls and correspondence. In fact, with specific reference to the event noted in your letter, the CCS was inspected at 2:30 pm that day by Don Parsons, who was accompanied by our Environmental Consultant, Lee Nikl. They observed the central collection sump to be intact with adequate freeboard. The occurrence referred to by the MoE was not an overtopping event. The system was designed to handle even the very high volumes. The discharges occurred as a result of an unforeseeable failure in the containment berm and may have been caused by the dense and waterlogged snow. The culverts underneath the Polley Lake Access Road (PAR) were blocked by snow clearing activities preventing the overflow from the CCS from reaching the Till Borrow for storage. Instead, a portion of the discharge from the CCS reported to Hazeltine Creek.

The two areas where discharge occurred were each inspected the day they breached and before they breached, and at the time of inspection there was no indication that a discharge might occur. The containment berm at Bootjack Creek Sump was intact when inspected by Don Parsons and Lee Nikl between 2:00 and 2:30 p.m. on February 12, 2015; however, it was overflowing because of piping around the culverts (not overtopping) that had formed in the containment wall that separates Bootjack creek (non-contact) water from bootjack sump water. This conduit through the earthworks allowed non-contact water to bypass the containment and resulted in increased water volumes in Bootjack sump. The pump could not handle those volumes but a rental pump was rushed to the location and, once connected, the Bootjack sump was kept below the overflow level. There was no prior indication at this time that the berm might fail.

Mount Polley's response to the directions in the Advisory Letter

The Advisory Letter directs Mount Polley to:

- 1. Inspect all mine-affected water control works, *i.e.*, diversion and retention berms, ditches, sumps, pumps and related appurtenances;
- 2. Report on the results of these inspections;
- 3. Report on the adequacy and integrity of mine-affected water control works; and
- 4. Report on any improvement works undertaken or planned to resolve any inadequacies determined.

With respect to Directions #1 and #2, Mount Polley has already inspected all mineaffected water control works and has done so subsequent to the Advisory Letter, and we report that the inspections indicate these works are in good working order. Regarding the adequacy and integrity of mine-affected water control works to prevent any further discharges due to extreme weather events or otherwise, we report that:

- The inlets of the PAR culverts have been cleared.
- A spillway has been constructed in the CCS to manage overflows to the Breach Sump and Till Borrow.
- A 24" HDPE line has been installed from the Booster Pump Station to Springer Pit to increase flow capacity from the CCS.
- The Bootjack Creek Sump containment wall is under repair while water is pumped around the wall through culverts.
- Inspections now include special attention to methods of bypass around culverts.

Finally, as is described in the Incident Reports, Mount Polley will continue to inspect water creek culvert areas regularly and these inspections will now include a review of the material around these culverts to ensure adequate compaction. Also, outlet culverts under the PAR Road will be replaced with a rocked spill way.

In our view, as is described above, we have done, and are doing, everything that we reasonably can to prevent discharge of mine-contact water while we repair the TSF and associated works. We re-iterate that these works are part of the plans that Mount Polley had to address spring melt which we reasonably foresaw to occur - in the spring. Moreover, the Ministry are aware of these plans and the plenary basis for them being spring thaw occurring in the "spring". Notwithstanding, Mount Polley have been taking pre-emptive and adaptive measures, both with respect to the works in Hazeltine Creek, the TSF breach repair and other measures over and above those measures planned for.

Conclusion

We reiterate that the reported discharges did not result in Mount Polley being in noncompliance with the Order and based on the foregoing, we ask that you withdraw your Advisory Letter.

Yours truly,

MOUNT POLLEY MINING CORPORATION

Dale Reimer Mine Manager

 cc: Al Hoffman, Chief Inspector of Mines, Ministry of Energy and Mines (<u>Al.Hoffman@gov.bc.ca</u>) Detective Sergeant Kelly Dahl, Conservation Officer Service, Ministry of Environment (<u>rk.dahl@gov.bc.ca</u>)

From:	Beattie, Brent C N	<u>/IEM:EX</u>	
To:	Demchuk, Tania I	MEM:EX	
Cc:	Chris Carr	s.22	Michael Cullen; Narynski, Heather M MEM:EX; Warnock, George MEM:EX
Subject:	Re: FOR INPUT: Mount Polley Restricted restart application review timeline		
Date:	Friday, February 2	27, 2015 7:30	:05 AM

Tania,

I will make every effort to fit my schedule with this one and get up to speed on MP. Brent

Sent from my iPhone

On Feb 26, 2015, at 5:22 PM, Demchuk, Tania MEM:EX <<u>Tania.Demchuk@gov.bc.ca</u>> wrote:

Hi Chris, Michael and Brent,

There have been ongoing discussions with Imperial Metals since their submission of the Mines Act permit application for restricted restart of operations with respect to the additional information needed before a formal review process could be initiated. We are working right now to develop a timeline for the review of an updated application, in part to allow the company to see a realistic timeline for when permitting decisions could be made. I am hoping to get your feedback on the attached by mid-day Friday – I apologize for the extremely short notice on this but I have been given a very short period to get this sorted out. Do you see any issues with your availability to provide comment and participate in meetings as set out in the attachment?

Chris – I am wondering if this timeline appears reasonable to you and if you will be available during the weeks of MDRC meetings and to complete a review? Brent – I'm hoping we can bring you in to get up to speed on the Mount Polley file given Chris' looming retirement. I have run this past Heather who agrees it is a good idea to get you involved.

Michael – I've included you here because part of the proposal includes underground mining. This would be from the approved mine plan, but it is likely a good idea to take another review and make sure the plans are appropriate.

Look forward to hearing from you! Thanks, 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 <Restricted Restart draft timeline.xlsx>

From:	Chris Carr
To:	Demchuk, Tania MEM:EX
Cc:	Narynski, Heather M MEM:EX; Warnock, George MEM:EX; Beattie, Brent C MEM:EX; "Michael Cullen "
Subject:	RE: FOR INPUT: Mount Polley Restricted restart application review timeline
Date:	Friday, February 27, 2015 10:01:15 AM

Hi Tania,

I am available to review the application and participate in MDRC meetings. The timeline looks optimistic since it relies on other stakeholder availability and their ability to complete review. I will likely be carrying out mine inspections during the period late April to mid May but nothing scheduled yet.

Chris

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

 Sent: February-26-15 5:22 PM

 To: Chris Carr
 s.22

 Beattie, Brent C MEM:EX; Michael Cullen

 Cc: Narynski, Heather M MEM:EX; Warnock, George MEM:EX

 Subject: FOR INPUT: Mount Polley Restricted restart application review timeline

Hi Chris, Michael and Brent,

There have been ongoing discussions with Imperial Metals since their submission of the Mines Act permit application for restricted restart of operations with respect to the additional information needed before a formal review process could be initiated. We are working right now to develop a timeline for the review of an updated application, in part to allow the company to see a realistic timeline for when permitting decisions could be made. I am hoping to get your feedback on the attached by mid-day Friday – I apologize for the extremely short notice on this but I have been given a very short period to get this sorted out. Do you see any issues with your availability to provide comment and participate in meetings as set out in the attachment?

Chris – I am wondering if this timeline appears reasonable to you and if you will be available during the weeks of MDRC meetings and to complete a review?

Brent – I'm hoping we can bring you in to get up to speed on the Mount Polley file given Chris' looming retirement. I have run this past Heather who agrees it is a good idea to get you involved. Michael – I've included you here because part of the proposal includes underground mining. This would be from the approved mine plan, but it is likely a good idea to take another review and make sure the plans are appropriate.

Look forward to hearing from you! Thanks, 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

Hi Tania,

It should be an easy task for Golder to provide a response to my questions and any other questions that come up in the future from technical reviewers. March 31, 2015 is too late.

Chris

-----Original Message-----From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca] Sent: February-27-15 3:18 PM To: Chris Carr s.22 Subject: FW: Breach Repair: MEM Request for Additional Information

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

-----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 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

s.22

-----Original Message-----From: Demchuk, Tania MEM:EX [<u>mailto:Tania.Demchuk@gov.bc.ca</u>] 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<<u>mailto:Tania.Demchuk@gov.bc.ca</u>>>, "Dale Reimer" <dreimer@mountpolley.com<mailto:dreimer@mountpolley.com</pre>>>, "Ryan Brown" <rbrown@mountpolley.com<mailto rbrown@mountpolley.com>> Cc: "Chris Carr s.22 "Warnock, George MEM:EX" s.22 <George.Warnock@gov.bc.ca<<u>mailto:George.Warnock@gov.bc.ca</u>>>, "Andy Haynes (ahaynes@golder.com<<u>mailto:ahaynes@golder.com</u>>)" <ahaynes@golder.com<<u>mailto:ahaynes@golder.com</u>>>, "Terry Eldridge (teldridge@golder.com<<u>mailto:teldridge@golder.com</u>>)" <teldridge@golder.com<<u>mailto:teldridge@golder.com</u>>>, "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:Imoger@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 <u>s.22</u> Warnock, George MEM:EX; Andy Haynes (ahaynes@golder.com<<u>mailto:ahaynes@golder.com</u>>); Terry Eldridge (teldridge@golder.com<<u>mailto:teldridge@golder.com</u>>); 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<<u>mailto:dreimer@mountpolley.com</u>>); Luke Moger; Ryan Brown Cc: Chris Carr <u>s.22</u> Warnock, George MEM:EX; Demchuk, Tania MEM:EX; Andy Haynes (ahaynes@golder.com<<u>mailto:ahaynes@golder.com</u>>); Terry Eldridge (teldridge@golder.com<<u>mailto:teldridge@golder.com</u>>) 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: Chris Carr	
To: Demchuk, Tania MEM:EX	
Cc: Warnock, George MEM:EX	
Subject: RE: MPMC TSF Independent Engineering Review Panel - Terms of F	Reference
Date: Friday, March 6, 2015 10:11:05 AM	
Attachments: image001.png	

Hi Tania,

The IERP has been established to review the TSF only. Other mines use independent panels to review technical details for other mine components such as pits, dumps, etc. Examples that I am aware of that include all mine components include Highland Valley in BC and Syncrude in Alberta. The Kemess South GRB looked only at the TSF.

The IERP should be an stand alone independent body not influenced by the mine, design consultant, government regulators, first nations, etc. It may be beneficial to include stakeholders following the panel's deliberations (possible before the IERP issue their report?) but not include stakeholders when the work of the IERP is in progress.

I think all reports issued by the IERP should be forwarded to the Ministry. This was done for Kemess South but is not being done for Highland Valley.

It may be useful if the Ministry is informed of scheduled IERP meetings in case there are issues that the Ministry wish to provide for IERP consideration.

Chris

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

 Sent: March-05-15 7:05 PM

 To: Chris Car
 s.22

 Cc: Warnock, George MEM:EX

 Subject: FW: MPMC TSF Independent Engineering Review Panel - Terms of Reference

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:Imoger@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

From:	Hoffman, AI MEM:EX
To:	Pocklington, Cheryl M MEM:EX; Demchuk, Tania MEM:EX; Kuppers, Haley MEM:EX; Warnock, George MEM:EX;
	Narynski, Heather M MEM:EX
Subject:	FW: Extension Request
Date:	Monday, March 9, 2015 3:28:47 PM
Attachments:	image001.jpg
	March 9 2015 Ltr to Hoffman re Extension.pdf

See request for extension of deadline for investigation report.

From: Sophie Hsia [mailto:SHsia@imperialmetals.com] Sent: Monday, March 9, 2015 1:44 PM To: Hoffman, AI MEM:EX Cc: Dale Reimer Subject: Extension Request

Mr. Hoffman,

Please see the attached letter requesting an extension sent on behalf of Dale Reimer.

Regards,

01_Imperial_corporate_RGB

Sophie E. Hsia LL.B., B.C.L., LL.M. Corporate Legal Counsel shsia@imperialmetals.com 604.488.2696 | mobile 604.865.0770

Imperial Metals Corporation

200-580 Hornby Street, Vancouver, BC V6C3B6 604.669.8959 www.imperialmetals.com

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Mount Polley Mining Corporation

an Imperial Metals company Box 12 • Likely, BC VOL 1N0 • T 250.790.2215 • F 250.790.2613

March 9, 2015

VIA EMAIL: Al.Hoffman@gov.bc.ca

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

Attention: Mr. Al Hoffman, Chief Inspector of Mines

Dear Mr. Hoffman,

Re: August 4, 2014 Dam Failure at Mount Polley Mine - Investigation Report Part 1.7.2 of the Health, Safety and Reclamation Code for Mines In British Columbia (the "Code")

Thank you for your letter of February 5, 2015.

Through that letter, you requested and directed me to provide you with "copies of any supporting investigation reports that were conducted by third party agencies" to support the findings set out in my letter of January 15, 2015.

You have also asked for "a more fulsome report and supporting documentation that shows that [MPMC has] fully investigated any contributing causes", advising that "this additional review shall be completed and submitted to the Chief Inspector by March 15, 2015."

Mount Polley Mining Corporation ("MPMC") is preparing documentation to respond to those directions, and is preparing a revised investigation report pursuant to Part 1.7.1(4) of the Health, Safety and Reclamation Code for Mines in British Columbia.

In addition to the further documentation MPMC is preparing to respond to your requests, we intend to provide you with a report which is being drafted by a third party.

This report is not yet completed. The time by which that report can be completed is not a matter within the control of MPMC. I have been advised by our consultants that they will not be in a position to finalize this report until March 23, 2015. MPMC's revised investigation report will refer to and incorporate the results of this third party report.

In light of those circumstances, I respectfully request a short extension to the deadline set out in your letter, to March 24, 2015.

Thank you for your consideration of this request, and I look forward to hearing from you.

Sincerely,

MOUNT POLLEY MINING CORPORATION

Dale Reimer

AR

Mine Manager Direct Line: 250-790-2600 E-mail: dreimer@mountpolley.com

From:	Hoffman, AI MEM:EX
To:	<u>"Sophie Hsia"</u>
Cc:	Dale Reimer; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Amann-Blake, Nathaniel MEM:EX; Hynes, Michelle MEM:EX; Morel, David P MEM:EX; Demchuk, Tania MEM:EX
Subject:	RE: Extension Request Granted - MPMC Investigation Report - TSF Dam Breach
Date:	Friday, March 13, 2015 3:40:56 PM
Attachments:	image001.jpg

Sophie

Thank you for the notification. A delay in the submission of Mount Polley TSF investigation report is approved. My understanding is that the report will be submitted March 23, 2015.

Regards,

Al Hoffman, P.Eng. Chief Inspector of Mines

From: Sophie Hsia [mailto:SHsia@imperialmetals.com]
Sent: Monday, March 9, 2015 1:44 PM
To: Hoffman, AI MEM:EX
Cc: Dale Reimer
Subject: Extension Request

Mr. Hoffman,

Please see the attached letter requesting an extension sent on behalf of Dale Reimer.

Regards,

01_Imperial_corporate_RGB

Sophie E. Hsia LL.B., B.C.L., LL.M. Corporate Legal Counsel shsia@imperialmetals.com 604.488.2696 | mobile 604.865.0770

Imperial Metals Corporation

200-580 Hornby Street, Vancouver, BC V6C3B6 604.669.8959 www.imperialmetals.com

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From:	Warnock, George MEM:EX
To:	Demchuk, Tania MEM:EX
Cc:	"Chris Carr"; Rothman, Stephen MEM:EX; Beattie, Brent C MEM:EX; Narynski, Heather M MEM:EX
Subject:	FW: Filed to MMS: RE: Mount Polley March 11 site visit and meeting
Date:	Monday, March 16, 2015 4:32:19 PM
Attachments:	Mount Polley site visit March 11 2015.doc

Hi Tania,

Just FYI..Chris's site visit report has been filed to MMS.

George

From: Chris Cars.22Sent: Monday, March 16, 2015 2:58 PMTo: Demchuk, Tania MEM:EXCc: Rothman, Stephen MEM:EX; Beattie, Brent C MEM:EX; Warnock, George MEM:EXSubject: Filed to MMS: RE: Mount Polley March 11 site visit and meeting

Hi Tania,

The site visit report has been updated based on comments received and the final report is attached. I am not sure if you want to send it to MPMC?

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

s.22

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]
Sent: March-15-15 1:11 PM
To: Chris Carr; Rothman, Stephen MEM:EX; Beattie, Brent C MEM:EX
Subject: RE: Mount Polley March 11 site visit and meeting

Hi Chris,

Thank-you for pulling these together. Edits from me are attached.

Steve, are you able to confirm that you will be writing up your orders related to the mobile screening plant and also the spill pan for the diesel pump at the 9K sump?

Thank-you! Tania

From: Chris Car s.22

Sent: Friday, March 13, 2015 2:48 PM
To: Demchuk, Tania MEM:EX; Rothman, Stephen MEM:EX; Beattie, Brent C MEM:EX
Subject: Mount Polley March 11 site visit and meeting

Hi Tania/Brent/Steve,

Please review the attached draft site visit report and provide comments or anything that I missed.

Chris



MINISTRY OF ENERGY AND MINES

Mines and Mineral Resources Division

SITE VISIT REPORT

Name of Property:	Mount Polley	Permit No.: M-200 Mine # 1101163
Mine Manager:	Dale Reimer	
Company:	Mount Polley Mining Corporation	
Date of Site Visit:	March 11, 2015	

A site tour of the TSF dam breach repair, Springer Pit and portions of the surface water management system was carried out on March 11, 2015. MEM representatives included Tania Demchuk, Steve Rothman, Brent Beattie and Chris Carr. MPMC representatives included Luke Moger and Ryan Brown.

A wrap-up meeting was held with MPMC (Don Parsons, Luke Moger and Ryan Brown) and Golder Associates (Andy Haynes).

TSF Dam Breach Repair

The entire length of the breach repair has been completed (Photo 1) with placement of the upstream fill (coarse tailings sand), transition zones, cut-off-wall aggregates and compacted rockfill creating a crest width that will allow construction of the Cutter Soil Mixing (CSM) cut-off wall. The final lift was being placed to design elevation 950 m with an additional 1m lift to provide a working surface for cut-off wall construction (Photo 2). Construction of the full design width of the breach repair is in progress to finish the downstream foundation and rockfill.

It is understood that a non-woven geotextile has been installed between the foundation and the granular filter blanket to compensate for the filter gradation that is slightly out of specification.

The CSM cutter rig completed one panel before the machine was idled due to malfunction of the motherboard for the operating systems. We were informed that a replacement part was in transit and due to arrive on site on March 12. This breakdown has added about 3 to 4 days to the cut-off wall completion that was already behind schedule. The cut-off wall will therefore not meet the scheduled completion date of April 1, 2015 (note the original schedule to construct the cut-off wall is 6 weeks).

Photographs of the CSM cutter machine (Photo 3) and separate rig for cut-off wall panel sampling (Photo 4) are attached.

Springer Pit

Water level in the pit is at approximate elevation 1005 m (Photo 5). It is understood that water will start to exfiltrate from the pit to groundwater when the pond level reaches elevation 1030 m.

It is understood that 3 weeks of mining will be required to establish a bench for the tailings line to Springer Pit prior to mill restart. This mining will be through a combination of non-potentially acid generating (non-PAG) and PAG waste rock.

Non-PAG rock was being hauled from the adjacent Cariboo Pit to Hazeltine Creek remediation.

Surface Water Ditches and Sumps

Portions of the surface water management system were viewed, including the location of the 9 K Sump, NW PAG Sump and Booster Station; the downstream end of the West Ditch (Photo 6); downstream end of the Long Ditch (Photo 7 and 8); and the Central Collection Sump (Photo 9).

Wrap-up meeting

MEM expressed concerns about the delay in cut-off wall construction, in particular the stability of the partially completed embankment and effects of seepage through the embankment if the design freshet occurs before the cut-off wall is completed. The allowable pond water levels behind the breach repair embankment for various stages of embankment construction will be reviewed by Golder Associates based on the assumption that the cut-off wall is not completed prior to the 2015 freshet. MPMC will also review other temporary options for flood water storage as an added contingency although such options are expected to be limited.

MEM has requested that stability of the hillside above Bootjack Lake be assessed if the water level in Springer Pit is allowed to rise above elevation 1030 m. Initial response from Golder Associates suggests that the water level in Springer Pit will not adversely impact stability of the hillside between the pit and the lake.

Several options for managing mine-contact water in a greater than average precipitation year are being reviewed by MPMC. The preferred option may be a combination of options. The following are being considered:

- Allowing water in Springer Pit to flood above elevation 1030 m.
- Ongoing storage of water behind the 2015 Breach Repair embankment.
- Controlling TSS on site since there may be a correlation between TSS and metals concentration.
- Separation of water conveyance systems that may have different water quality and some of which may meet discharge criteria.
- Pipe discharge via diffuser to Quesnel Lake.

Report prepared by

Chris Carr, P. Eng. Geotechnical Mines Inspector On behalf of Ministry of Energy and Mines



Photo 2: Final lift for CSM working platform at south abutment



Photo 4: Cut-off Wall CSM Panel Sampling Rig






Photo 9: Central Collection Sump

From:	Narynski, Heather M MEM:EX
To:	Demchuk, Tania MEM:EX
Subject:	FW: CONFIDENTIAL: Questions regarding the Mt Polley independent investigation
Date:	Tuesday, March 17, 2015 3:44:20 PM

FYI.

Not sure whether you want to be part of this meeting. It has been scheduled from 11-12 tomorrow.

From: McNevin, Bernadette MEM:EX
Sent: Tuesday, March 17, 2015 3:20 PM
To: Hoffman, Al MEM:EX; Narynski, Heather M MEM:EX; Warnock, George MEM:EX; Morel, David P MEM:EX; Howe, Diane J MEM:EX
Cc: Amann-Blake, Nathaniel MEM:EX
Subject: CONFIDENTIAL: Questions regarding the Mt Polley independent investigation

CONFIDENTIAL: NOT FOR CIRCULATION

Good afternoon everyone

I am emailing to seek your input into the rationale for the establishment of the Mt Polley Independent Expert Engineering Investigation and Review Panel. We are preparing a determination, seeking payment from the Mt Polley Mining Corporation (MPMC) for the costs associated with the panel. This determination needs to present our argument as to why it is reasonable for MPMC to make this payment. It is likely to be challenged by MPMC so needs to be complete and sound.

s.14

Thanks. I'll send a meeting request soon.

Regards

Bernadette McNevin Director, Policy & Regulatory Reform, Mines and Mineral Resources Division, MEM Phone: (250) 952-0317 Cell: (778) 679-5226

s.14

Hoffman, AI MEM:EX
Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Hemphill, Naomi MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EX
Demchuk, Tania MEM:EX; Thomson, Barbara L JAG:EX
Fwd: Supplement to MPMC January 15, 2015 Root Cause Report
Monday, March 23, 2015 11:13:17 PM
<u>image001.jpg</u> <u>ATT00001.htm</u>
March 23 2015 Letter to Chief Inspector Hoffman.pdf

Naomi

Can you find an hour that we can meet wed pm to discuss this.

Barbara

I don't think I can agree to keep this confidential

Sent from my iPhone

Begin forwarded message:

From: "Sophie Hsia" <<u>SHsia@imperialmetals.com</u>>
To: "Hoffman, Al MEM:EX" <<u>Al.Hoffman@gov.bc.ca</u>>
Cc: "Dale Reimer" <<u>dreimer@mountpolley.com</u>>
Subject: Supplement to MPMC January 15, 2015 Root Cause Report

Dear Mr. Hoffman,

Attached please find our written response to your February 5, 2015 letter. Our privileged and confidential expert report, the latter of which is only being provided to you because you have compelled its production, and having put you on notice of its privileged and confidential nature, we provide it on condition that it be disseminated no further.

Due to their large size, the appendices (A through D) referred to in our attached letter are being provided via FTP folder.

Our privileged and confidential expert report (the "Golder Report") is also provided via FTP folder. Please note that the Golder Report is only being provided to you because you have compelled its production, and having put you on notice of its privileged and confidential nature, we provide it on condition that it be disseminated no further.

In order to access the appendices and the Golder Report, please follow the instructions below and copy and paste the file folders over to your system. It would be appreciated if you could confirm in writing successful download of all FTP folders and their contents.

The folder will remain active until end of day Friday, March 27, 2015 after which the folder will be disabled and contents deleted.

FTP Folder Access Instructions

1- In Windows Explorer (not Internet Explorer), type or copy and paste the

Regards, (on behalf of Dale Reimer) [01_Imperial_corporate_RGB] Sophie E. Hsia LL.B., B.C.L., LL.M. Corporate Legal Counsel <u>shsia@imperialmetals.com<mailto:shsia@imperialmetals.com></u> 604.488.2696 | mobile 604.865.0770 Imperial Metals Corporation 200-580 Hornby Street, Vancouver, BC V6C3B6 604.669.8959 | <u>www.imperialmetals.com<http://www.imperialmetals.com/></u> NOTICE OF CONFIDENTIALITY This e-mail, including all materials contained in or attached to this a mail_contains proprietory and confidential information

in or attached to this e-mail, contains proprietary and confidential information solely for the internal use of the intended recipient. If you have received this email in error, please notify us immediately by return e-mail or otherwise and ensure that it is permanently deleted from your systems, and do not print, copy, distribute or read its contents.

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Mount Polley Mining Corporation

an Imperial Metals company Box 12 • Likely, BC V0L 1N0 • T 250.790.2215 • F 250.790.2613

March 23, 2015

VIA EMAIL: Al.Hoffman@gov.bc.ca

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

Attention: Mr. Al Hoffman, Chief Inspector of Mines

Dear Mr. Hoffman,

Re: August 4, 2014 Dam Failure at Mount Polley Mine – Supplement to January 15, 2015 Investigation Report ("Supplement")

I write in response to your letter of February 5, 2015, which among other things, requests a supplementary report and supporting documentation that shows Mount Polley Mining Corporation ("MPMC") has fully investigated any causes that contributed to the failure of the tailings storage facility ("TSF") beyond the failure of the design to take into account the undrained shear strength of the glaciolacustrine soil layer ("GLU") in the foundation of the TSF.

Specifically, you have asked for a supplemental report setting out any evidence we have gathered to eliminate any other contributing causes such as:

- a. Compliance with the construction design by both MPMC and our construction contractors;
- b. oversight of the dam construction through QA/AC methodology and reporting processes and feedback;
- c. the management of the mine water balance and supernatant freeboard and the effect this may have had on the consequence of the event;
- d. the MPMC emergency response plan document and the response of MPMC to the accident; and
- e. any other factors or processes that may have contributed to the TSF failure.

In your letter you state that my report of January 15, 2015 falls short of the comprehensive investigation that would be expected in relation to a major incident such as a TSF failure.

Before responding to these suggested possible contributing causes individually, we would like to make one general point.

We have dedicated very substantial resources to assisting in and co-operating with the various investigations that have and continue to investigate the cause of the TSF failure. In addition we have dedicated very substantial further resources in conducting our own comprehensive investigation. This has included retaining Golder & Associates to undertake a root cause analysis, the results of which we reported to you in my letter of January 15.

Our comprehensive investigation determined that there was one mechanism of failure of the TSF and one only. This was the sudden failure of a GLU layer below the perimeter dam when the undrained shear strength of that material was exceeded. (We note that this is also the mechanism of failure subsequently identified by the Independent Engineering Panel). There was no other mechanism of failure.

As explained in our report, the potential failure of the GLU layer was not identified prior to the failure because the undrained shear strength was not determined and used in the design of the TSF by the engineers and the mistake was not subsequently identified by the engineer of record ("EOR") or any other engineer who reviewed the design. The factor of safety ("FOS") calculated by the engineers and reported to MPMC at all times exceeded what was required. There was thus a fundamental design flaw in the TSF.

As explained at some length in my report, the TSF was constructed in accordance with the design, and thus incorporated this design flaw. But for that design flaw, the TSF would not have failed. It would have exceeded the required FOS as reported by the engineers.

The consequence of this, as explained in my report, is that there was only one cause of the TSF failure, which was the design flaw which failed to take into account the undrained shear strength of the GLU which in turn resulted in the overstressing of the GLU and its consequent failure. Had this design flaw not existed, the failure would not have occurred. With this design flaw, failure was inevitable at some point.

With the greatest of respect, it is our view that your letter, and its criticism of my report as having failed to adequately consider other causes, fails to take this analysis into account.

Nevertheless, and although we do not think that there were other factors or processes that contributed to the root cause of the TSF's failure, we have commented upon the potential causes that you have set out in accordance with your direction.

You also directed me to provide you with a copy of any supporting investigation reports conducted by third party agencies. Enclosed is a report (the "Golder Report") prepared by Golder Associates, who were retained to provide their opinions in regards to the root cause of the dam's failure, in circumstances which make the report subject to legal privilege.

As noted, the Golder Report is privileged and confidential. It is only being provided to you because you have compelled its production, and having put you on notice of its privileged and confidential nature, we provide it on condition that it be disseminated no further.

Below, I respond to the five topics identified in your February 5, 2015 letter.

a. Compliance with Construction Design

As stated on page 3 of my report, the TSF was constructed in stages in accordance with the design and the recommendations of the EOR. At pages 3 and 4, there is a discussion of the information that supports this conclusion. What follows supplements that information and evidence and provides some documentary support.

Documentary evidence that MPMC and its construction contractors were compliant with dam construction design is set out in the dam's yearly as-built, annual reviews and 2006 Dam Safety Review report (the "Reports"). The Ministry of Energy and Mines ("MEM") was provided copies of the Reports as required under the *Mines Act*, and again as requested by MEM after the TSF failure. Copies of the Reports are also provided as Appendix A to this Supplement. Please also see Appendix B to the Supplement for a table extracting the applicable portions of the Reports which speak to construction design compliance.

b. Oversight of Dam Construction

Again, information in regards to this was provided in my January 15, 2015 report at page 4. What follows supplements that information.

As noted, the TSF was designed by third party engineers. Construction activities were performed by contractors. As is described above, MPMC was compliant with the construction design. MPMC's role in dam construction involved, *inter alia*, the following processes, to ensure that the TSF design requirements were carried out to the satisfaction of the TSF design engineers, which they were:

- Monitor and maintain a photographic record of ongoing construction activities
- Review borrow pit material to verify consistency
- Delineate survey zones
- Survey construction areas
- Perform compaction testing of materials
- Perform laboratory testing (moisture/grain size distribution/proctor) of materials
- Construction reports (daily/weekly/monthly/annual)
- Instrumentation readings (drains/piezometers/inclinometers)

Below (for reference) is a table from a Construction Monitoring Manual for material-specific QA/QC:

Material Type	On-Site Testing	Off-Site Testing	Sample Collection Schedule
Zone S Till Core	Source Classification: Visual inspection of borrow material. <u>In-Place Testing:</u> Visual inspection of zone dimension, and material. ND Density Testing (D6938-10) MDI Density Testing (D680-05) Moisture Content (D4318-10)	Source Classification and In- Place Testing : Proctor (D898-07 / D4718-07) Atterberg (D421-07 / D4318-10) Hydrometer Gradation (D421-07 and D422-07) Sieve Gradation (D6913-09)	Source Classification : One (1) per biweekly per source or One (1) per 10,000 m ³ per source In-Place Testing: One (1) per offset biweekly per source or one (1) per 6,500 linear meters per source Moisture Content: One (1) per 1000 linear meters per lift per day
Zone F Filter	During Production/Transportation: Wash Sieve Gradation (C117-04 and C136-06) During Placement: Visual inspection of material size, compaction, preparation, and zone dimension. Wash Sieve Gradation (C117-04 and C136-06)	During Production/Transportation: Wash Sieve Gradation (C117-04 and C136-06) <u>In-Place Testing:</u> Wash Sieve Gradation (C117-04 and C136-06)	During Production/Transportation: One (1) per 5,000 m ³ per stockpile A duplicate sample for off-site testing one (1) per stockpile In-Place Testing: One (1) per placement event or one (1) per 2,500 linear meters A duplicate sample for off-site testing one (1) per 4,500 linear meters
Zone T Transition	In-Place Testing: Wash Sieve Gradation (C117-04 and C138-06) Confirmation of waste rock inertness, as required. Visual inspection of material size, compaction, preparation, and zone dimension.	In-Place Testing: Wash Sieve Gradation (C117-04 and C136-06)	In-Place Testing: One (1) per 5,000 m ³ material placed. A duplicate sample for off- site testing one (1) per 10,000 m ³
Zone C Rockfill	Confirmation of waste rock inertness, as required. Visual in-place inspection of material size, preparation, and placement.	Not Applicable	Not Applicable

MEM was provided with copies of the Construction Monitoring Manuals for each of stage of the dam's raises, as required under the *Mines Act*, and again as requested by MEM after the TSF failure. Copies of each of these reports are provided in Appendix C.

Further details of MPMC's TSF construction QA/QC are also provided in the Reports, which are referenced above and provided with this Supplement as Appendix A. Please see Appendix B to the Supplement for a table extracting the applicable portions of the Reports which speak to oversight of the dam construction through employed QA/QC methodology and reporting processes and feedback.

MPMC's involvement with the dam construction did not contribute to the failure of the TSF.

c. Management of Mine Water Balance and Supernatant Freeboard

MPMC's effluent discharge permit (PE-11678) was first issued in 1997. During the EA process, the water balance supplied showed the site would quickly have surplus water if water from the pits and surface water from the mine site were directed to the tailings pond, and assumed "When surface water is greater than can be diverted to the tailings area, it will be discharged via sediment ponds from the site". Within two years, MPMC notified the Ministry of Environment ("MOE") that freeboard had already reached 1.86m. On February 7, 2002, MPMC was granted an amendment of PE-11678 to allow discharge to the Cariboo Pit, but not off the site.

In its water balance update of March 14, 2005, MPMC's EOR, Knight Piesold Ltd. ("KPL"), noted that the mine site was moving from a deficit to a surplus situation and recommended that MPMC find a way to discharge mine water. Thus, in September 2006, MPMC began work on a permit amendment to PE-11678 to allow discharge of its surplus water to Hazeltine Creek. The permit amendment was not granted until November 7, 2012.

The 2012 permit amendment allowed MPMC to discharge a maximum of 1.4 million cubic metres of water per year to Hazeltine Creek and only between April and October. Due to water quality constraints on allowable discharge volumes and the restrictive period during which discharge was permitted, MPMC was generally unable to discharge more than about 10% of the amended maximum allowable discharge. Thus, as MEM is aware, in mid-2013, MPMC began work on another strategy to address its water surplus issue (treatment of water and discharge to Polley Lake) and also committed to developing a long-term strategy for mine closure.

In October 2013, less than a year after the 2012 permit amendment, MPMC again initiated the permit amendment process to treat water and discharge to Polley Lake (as a short-term solution to deal with the surplus issue). First Nations consultation on this amendment was completed by March 7, 2014. The final application was received by the MOE on July 9, 2014 and the required reports were submitted two days later. MPMC had ordered the equipment required to treat the water, prior to receipt of a permit, so that discharge of surplus water could be expedited.

The TSF dams have never overtopped. On May 24, 2014, in the midst of the last permit amendment process, the TSF's freeboard was exceeded. This incident was reported to MEM and MOE staff. MEM staff investigated and determined that the elevation of the water in the TSF was above regulation, but that this was not a breach. MEM issued an Advisory for exceedance of the height of effluent within the TSF. The MEM advisory states that "Mine records show that the operation was carrying out visual dam inspections and measuring freeboard at an acceptable frequency, including daily following the May 24, 2014 incident". The MEM Advisory is attached here for your reference. Normal Operating Level freeboard (1.3m) at the TSF was re-established on July 4th, 2014.

On August 3, 2014, the day before the breach, freeboard was 2.3m.

Management of the TSF water balance and the water level in the dam did not cause the failure of the dam. Specifically, the TSF did not fail because of overtopping but by reason of the exceeding of the undrained shear strength of the GLU, as described above, and in my report of January 15, 2015.

I note that the Panel Report comes to the same conclusion in its analysis of the mechanism of the failure.

Although the water balance and level did not cause the TSF failure, it would have affected the amount of tailings released with the breach. Since this is not part of an investigation into the cause of the failure of the TSF, we have not commissioned an investigation into that aspect of the matter.

Please see Appendix B to this Supplement for a table extracting the applicable portions of the Reports which speak to management of the mine water balance and supernatant freeboard.

d. MPMC's Emergency Response Plan and its Response to the Breach

As set out in our January 15, 2015 letter, the failure of the TSF occurred around 1:10 am on August 4, 2014. The geotechnical instrumentation and inspections did not provide any warning of an impending failure. Due to the sensitivity of the GLU, once it was overstressed, no remedial actions could have been taken by MPMC to stop the failure.

The Independent Panel's Report also concludes that the failure of the dam was rapid and without precursors such that neither inspections nor instrumentation could have provided any warning or opportunity to prevent the breach.

Accordingly, MPMC's response plan and response could not have prevented the breach of the TSF and was not a contributing cause of the breach.

Nonetheless, and in accordance with your direction, the following is a description of the response of MPMC's staff to the breach:

- 1. Primary focus for the senior on site staff was the safety of personnel. The Pit Supervisor's immediate response was to secure the scene of the breach and to account for all personnel. At the time of the breach there was only one employee working in the area of the tailings breach. This employee was working on a sand cell near four corner. The supervisor ordered this employee to immediately evacuate the TSF and report to a safe location. From there, barricades and guards were put in place to ensure no unauthorized access to the breach location. At this time the supervisor was sure that all personnel from the mine were accounted for and that no mine rescue, first aid or other mine emergency response personnel were required.
- 2. The second action taken by the pit supervisor was to initiate call outs for senior management. As per Mount Polley Emergency Response procedures, the senior on site supervisor is to notify the Senior On-Call management representative of any significant occurrences at the mine. The pit supervisor had access to the weekend on call memo for August 1 to 4 and made attempts to contact the individual named. The site supervisor then continued to call other management representatives using the company phone list.
- 3. Under the direction of the Mine Operations Manager, the senior site supervisor then began to make contact with outside agencies. The first call made was to the Emergency Management BC contact line to report the event. The second call made at this time was to the Ministry of Energy and Mines, Regional Health and Safety Inspector.
- 4. Once on-site security was confirmed focus was changed to supporting outside agencies with offsite incident management, including deactivation of forest service roads and clearing of local recreation sites.

5. Emergency response work continued with the support of the MEM, MOE, the RCMP, Cariboo Regional District Emergency Operations Centre, and the Ministry of Forest, Lands and Natural Resources.

Since the TSF breach, MPMC has reviewed its Mine Emergency Response Plan (the "MERP"). A list of areas for improvement to the MERP was identified and MPMC, with guidance from MEM, has updated the MERP. A copy of the original MERP is attached as Appendix D to this Supplement. The updated MERP is available upon request.

MPMC has established a MERP Coordinator and a MERP Planning Committee, which will review the MERP annually and submit a list of recommended updates to the MERP Coordinator.

e. Any Other Contributory Factors or Processes

The Golder Report and the Panel Report conclude that the TSF failure resulted from a flaw in its design. The Independent Panel has noted that the 1.3H:1.0V slope was a "trigger" for the failure. We agree that the slope would have affected the timing of the failure, but as the Independent Panel found, even at a slope of 2.0H:1.0V, the dam was "doomed to fail" because the undrained shear strength of the GLU would have been exceeded. The 1.3H:1.0V slope at the time of failure had been designed by the EOR and their calculations showed that it exceeded the required factor of safety in the vicinity of the failure in the Perimeter embankment.

The design that included the 1.3H:1.0V slope had also been reviewed by MEM staff who had authorized MPMC to proceed with the construction of that slope.

The Golder Report rules out all other potential causes for the failure of a dam such as this.

Conclusion

As found by the Panel Report and the Golder Report, the dam failed because its design was flawed. Our investigation has reached the same conclusion, and has confirmed that there were no other factors or processes which contributed to the dam's failure.

MPMC had no knowledge of the dam's design error until it conducted its investigation into the dam breach. MPMC understood that the TSF was being designed, constructed and operated in conformance with the Health, Safety and Reclamation Code for Mines in British Columbia, its permits and accepted engineering practices. MPMC relied on engineers well-versed in the design, construction and operation of dams and was assured at all times that the TSF embankments were within the required factors of safety.

We hope that this provides the information directed in your letter of February 5, 2015.

Sincerely,

MOUNT POLLEY MINING CORPORATION

Dale Reimer Mine Manager

From:	Chris Carr
То:	Demchuk, Tania MEM:EX
Cc:	Beattie, Brent C MEM:EX
Subject:	Mt Polley TSF 2015 Freshet Embankment
Date:	Tuesday, March 24, 2015 10:58:45 AM

Hi Tania,

During the March 11 site visit I brought up a concern regarding the delay in construction of the CSM wall and the impact that this may have on embankment stability and seepage if the TSF was required to store the 2015 Freshet prior to completion of embankment construction. It was suggested at the wrap-up meeting that analyses be carried out (by Golder Associates) to determine the pond water level limits at various stages of embankment/CSM wall construction. I have not seen the results of this analysis. This could be a significant concern and should be addressed without delay. A follow-up with MPMC is probably necessary.

Regards,

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

s.22

From:	Warnock, George MEM:EX
To:	Hemphill, Naomi MEM:EX
Cc:	Hoffman, Al MEM:EX; Demchuk, Tania MEM:EX; Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Narynski, Heather M MEM:EX
Subject:	RE: Supplement to MPMC January 15, 2015 Root Cause Report
Date:	Tuesday, March 24, 2015 11:06:51 AM

Hi Naomi,

I followed the highlighted directions below, but was unable to retrieve large portions of the data provided (folders A and C). The Golder report and folders B and D have been filed to

s.15

s.15 Could you please try to download folders A and C? MPMC has indicated that they will be deleted from the ftp site on Friday.

Thanks,

George

From: Hoffman, Al MEM:EX
Sent: Monday, March 23, 2015 11:13 PM
To: Kuppers, Haley MEM:EX; Pocklington, Cheryl M MEM:EX; Hemphill, Naomi MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EX
Cc: Demchuk, Tania MEM:EX; Thomson, Barbara L JAG:EX
Subject: Fwd: Supplement to MPMC January 15, 2015 Root Cause Report

Naomi Can you find an hour that we can meet wed pm to discuss this.

Barbara

I don't think I can agree to keep this confidential

Sent from my iPhone

Begin forwarded message:

From: "Sophie Hsia" <<u>SHsia@imperialmetals.com</u>> To: "Hoffman, Al MEM:EX" <<u>Al.Hoffman@gov.bc.ca</u>> Cc: "Dale Reimer" <<u>dreimer@mountpolley.com</u>> Subject: Supplement to MPMC January 15, 2015 Root Cause Report

Dear Mr. Hoffman,

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Due to their large size, the appendices (A through D) referred to in our attached letter are being provided via FTP folder.

Our privileged and confidential expert report (the "Golder Report") is also provided via FTP folder. Please note that the Golder Report is only being provided to you because you have compelled its production, and having put you on notice of its privileged and confidential nature, we provide it on condition that it be disseminated no further.

In order to access the appendices and the Golder Report, please follow the instructions below and copy and paste the file folders over to your system.

It would be appreciated if you could confirm in writing successful download of all FTP folders and their contents.

The folder will remain active until end of day Friday, March 27, 2015 after which the folder will be disabled and contents deleted.

s.15

Regards,

(on behalf of Dale Reimer)

[01_Imperial_corporate_RGB]

Sophie E. Hsia LL.B., B.C.L., LL.M. Corporate Legal Counsel <u>shsia@imperialmetals.com</u><<u>mailto:shsia@imperialmetals.com</u>> 604.488.2696 | mobile 604.865.0770

Imperial Metals Corporation 200-580 Hornby Street, Vancouver, BC V6C3B6 604.669.8959 | <u>www.imperialmetals.com</u><<u>http://www.imperialmetals.com/</u>>

NOTICE OF CONFIDENTIALITY This e-mail, including all materials contained in or attached to this e-mail, contains proprietary and confidential information solely for the internal use of the intended recipient. If you have received this email in error, please notify us immediately by return e-mail or otherwise and ensure that it is permanently deleted from your systems, and do not print, copy, distribute or read its contents. AVIS DE CONFIDENTIALITÉ Le présent courriel, y compris tous les documents qu'il contient ou qui y sont joints, renferme des renseignements exclusifs et confidentiels destinés uniquement à l'usage interne du destinataire prévu. Si vous avez reçu le présent courriel par erreur, veuillez nous aviser immédiatement, notamment par retour de courriel, et vous assurer qu'il est supprimé de façon permanente de vos systèmes; veuillez également vous abstenir d'imprimer, de copier, de distribuer ou de lire son contenu.

From:	Chris Carr
То:	Demchuk, Tania MEM:EX
Cc:	Beattie, Brent C MEM:EX
Subject:	RE: M-200 Permit Clause C.5 (B)
Date:	Wednesday, March 25, 2015 4:44:41 PM
Attachments:	image001.png

Hi Tania,

Based on the assumption that the breach repair would be completed by April 1, 2015 (the expected completion date when the permit was issued) a letter from the EOR was required so that operation of the facility could commence pending receipt of the as-built report which can take several weeks. Approval to operate the facility is covered by Section 10.5.1 of the Code. Since the breach repair has not yet been completed the facility should not be used to store the 2015 Freshet (or any water) until approved by the Chief Inspector. We could grant an extension for submission of the EOR letter but with a proviso that the breach repair cannot be used to store water in the interim. Partial water storage could be considered but that would depend on the results of the analyses being carried out by Golder Associates (requested November 11, 2015) and approved by the Chief Inspector.

Regards,

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

s.22

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca] Sent: March-25-15 4:11 PM To: Chris Carr s.22 Subject: FW: M-200 Permit Clause C.5 (B)

Hi Chris,

Can you provide comment on the question below from Luke?

Is it correct that the April 1, 2015 deadline for submission of this letter is related to the originally scheduled completion date for the Breach Repair? If so, would we grant an extension for submission of this letter until the full construction and cut-off wall has been completed?

Thank-you, Tania

From: Luke Moger [mailto:Imoger@mountpolley.com] Sent: Wednesday, March 25, 2015 3:41 PM To: Demchuk, Tania MEM:EX Subject: M-200 Permit Clause C.5 (B) Hi Tania;

I was just hoping to get some clarification on a clause in the M-200 Permit; condition C.5 (B) requires that:

By April 1, 2015, the Permittee shall submit a letter from the Engineer of Record stating that the TSF Breach Repair has been constructed in accordance with design.

It is my understanding that the intent of this clause was for this letter to be provided at the time that the TSF Breach Repair had been completed; as such, this is not aligned with an April 1, 2015 delivery. Does my understanding agree with your interpretation/MEM's intent for the clause, (i.e. should this letter be provided upon completion of the TSF Breach Repair) or would MEM like to have a letter provided for the work completed up to April 1 as per the existing verbiage.

Kindest Regards,

Luke



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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com

From:	Beattie, Brent C MEM:EX
To:	Demchuk, Tania MEM:EX
Cc:	Chris Carr s.22
Subject:	Re: Draft OMS Manual [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]
Date:	Sunday, March 29, 2015 11:40:38 AM
Attachments:	image001.png

Tania,

I can enter it in GRIT on Monday as I have list of reports to do. Brent

Sent from my iPhone

On Mar 29, 2015, at 11:31 AM, Demchuk, Tania MEM:EX <<u>Tania.Demchuk@gov.bc.ca</u>> wrote:

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

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 followup 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:Imoger@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

<image001.png>

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

 Fax:
 +1 (250) 790-2613

 E-mail:
 LMoger@MountPolley.com

Hi Brent,

I have looked at the previous Permits that include components of the mine restart application for which geotechnical conditions apply. We need to be sure that the existing geotechnical conditions have been addressed. We may have to contact Michael Cullen with respect to the underground.

Do you have time to check the following:

Permit amendment dated August 15, 2011 Covers C2 Pit, SERDS and Temporary PAG Waste Rock Dump (I assume this is the Temporary Northwest PAG Stockpile)

Condition B.1(a) Check that the pit slope design report was submitted. We should also confirm that the C2 Pit is the proposed mining area in Caribou Pit.

Permit amendment dated March 25, 2013 Covers Boundary Zone Underground

Condition C.1(b) Confirm that written procedures for a QA/QC program were submitted to the Ministry.

Condition C.2(a) Confirm that inspections have been carried out at least once per year. Condition C.3 Confirm that a plan for backfilling was prepared, including a QA/QC program.

Permit amendment dated July 25, 2013

Covers West PAG Stockpile (I assume this is the Temporary Northwest PAG Stockpile), High Grade Ore Stockpile and South Haul Road

Condition B.1(a)(i) The permit approves construction of the West PAG Stockpile to 1150 m elevation. The permit condition requires that stability assessments be completed and submitted to the Ministry prior to expansion above 1200 m elevation so we should check the dump height. Condition B.1(b) Confirm that an Updated Dump Monitoring Procedure was prepared. Condition B.2(b) Confirm that a geotechnical assessment for the High Grade Ore Stockpile was submitted to the Ministry prior to start of construction.

It would probably be a good idea for you to check the above so that you will be better informed when the permit conditions are being developed for the mine restart. Let me know if you want me to follow up.

Regards,

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

s.22

From:	<u>Chris Carr</u>
To:	"Luke Moger"
Cc:	"Don Parsons"; Beattie, Brent C MEM:EX; Demchuk, Tania MEM:EX
Subject:	RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion
Date:	Monday, March 30, 2015 1:43:07 PM

Hi Luke,

I have reviewed the report prepared by Golder Associates dated March 27, 2015. The report indicates minimum factors of safety of 1.53 for the various pond water levels analysed at elevation 940 m, 945 m and 949 m. The analyses assume that the cut-off wall has been constructed.

Since the cut-off wall is only partially completed (50 m length completed by March 25, 2015) the stability of the remaining ~300 m without a cut-off wall should be determined for the various pond water levels and related phreatic surfaces.

Please discuss this issue with your consultant.

Regards,

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

s.22

 From: Luke Moger [mailto:Imoger@mountpolley.com]

 Sent: March-27-15 7:35 PM

 To: Demchuk, Tania MEM:EX

 Cc: Don Parsons; Chris Carr
 s.22

 Beattie, Brent C MEM:EX; Eldridge, Terry; Haynes, Andy (Andy_Haynes@golder.com)

 Subject: RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

Hi Tania;

As discussed, please find attached a copy of a document prepared by Golder in response to MEM's questions arising from the March 11, 2015 site visit.

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

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

 Sent: March-24-15 11:24 AM

 To: Luke Moger

 Cc: Don Parsons; Chris Carr
 s.22

 Beattie, Brent C MEM:EX

 Subject: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

 Importance: High

Hi Luke,

I wanted to follow-up on the information discussed during our close-out meeting following the site visit on March 11. Chris Carr raised up a concern regarding the delay in construction of the CSM wall and the impact that this may have on embankment stability and seepage if the TSF was required to store the 2015 Freshet prior to completion of embankment construction. It was suggested at the wrap-up meeting that analyses be carried out (by Golder Associates) to determine the pond water level limits at various stages of embankment/CSM wall construction.

We have not seen the results of this analysis. Given that this could be a significant concern, it should be addressed without delay. Please let me know when you will be able to share this analysis with MEM.

As always, please don't hesitate to call if you have any questions.

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 Pages 267 through 271 redacted for the following reasons: s.14

From:	<u>Chris Carr</u>
To:	<u>"Luke Moger"</u>
Cc:	Demchuk, Tania MEM:EX; "Don Parsons"; "Jim Kuipers"
Subject:	RE: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]
Date:	Monday, March 30, 2015 8:32:04 PM
Attachments:	image001.png

Hi Luke,

I have downloaded the report successfully.

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

From: Luke Moger [mailto:Imoger@mountpolley.com]
Sent: March-30-15 7:07 PM
To: Jim Kuipers (jkuipers@kuipersassoc.com); 'Chris Carr' (s.22
Cc: Demchuk, Tania EMNG:EX (Tania.Demchuk@gov.bc.ca); Don Parsons
Subject: FW: Design Update [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]

Dear Chris and Jim;

As per the below e-mail, I will be transferring you a copy of the Design Update for the 2015 Freshet Embankment prepared by Golder for MPMC.

Confirmation of receipt and successful download would be 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

From: Luke Moger
Sent: March-30-15 7:03 PM
To: Howe, Diane J EMNG:EX (<u>Diane.Howe@gov.bc.ca</u>)
Cc: Demchuk, Tania EMNG:EX (<u>Tania.Demchuk@gov.bc.ca</u>); <u>rick.adams@gov.bc.ca</u>; 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 three (3), 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 additional information in the final report of the Expert Review Panel 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. I will also be providing a copy, under separate cover, to MEM Geotechnical Reviewer Chris Carr and First Nations Technical Advisor Jim Kuipers, on which I will copy Tania Demchuk.

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

From:	Chris Carr
To:	"Luke Moger"
Cc:	"Don Parsons"; Beattie, Brent C MEM:EX; "Eldridge, Terry"; "Haynes, Andy"; Demchuk, Tania MEM:EX
Subject:	RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion
Date:	Thursday, April 2, 2015 8:33:29 AM

Hi Luke,

The information from Golder provides a satisfactory response to my question.

Regards,

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

s.22

From: Luke Moger [mailto:Imoger@mountpolley.com]
Sent: March-30-15 6:13 PM
To: Demchuk, Tania MEM:EX; Chris Carr
Cc: Don Parsons; Beattie, Brent C MEM:EX; Eldridge, Terry; Haynes, Andy (Andy_Haynes@golder.com)
Subject: RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

Hi Tania;

As per Chris Carr's request, we have followed up with Golder. Please see the attached e-mail from Terry with an explanation; please let me know if you would still like to discuss on the Thursday call and I will try and have Terry join us for part of it.

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

From: Demchuk, Tania MEM:EX [mailto:Tania.Demchuk@gov.bc.ca]
Sent: March-30-15 3:40 PM
To: Chris Carr; Luke Moger
Cc: Don Parsons; Beattie, Brent C MEM:EX
Subject: RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

Hi Luke, Please include this as a topic for discussion at the Thursday update call. Thank-you, Tania

From: Chris Cars.22Sent: Monday, March 30, 2015 1:43 PMTo: 'Luke Moger'Cc: 'Don Parsons'; Beattie, Brent C MEM:EX; Demchuk, Tania MEM:EXSubject: RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

Hi Luke,

I have reviewed the report prepared by Golder Associates dated March 27, 2015. The report indicates minimum factors of safety of 1.53 for the various pond water levels analysed at elevation 940 m, 945 m and 949 m. The analyses assume that the cut-off wall has been constructed.

Since the cut-off wall is only partially completed (50 m length completed by March 25, 2015) the stability of the remaining ~300 m without a cut-off wall should be determined for the various pond water levels and related phreatic surfaces.

Please discuss this issue with your consultant.

Regards,

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

s.22

 From: Luke Moger [mailto:Imoger@mountpolley.com]

 Sent: March-27-15 7:35 PM

 To: Demchuk, Tania MEM:EX

 Cc: Don Parsons; Chris Carr
 s.22

 Andy (Andy Haynes@golder.com)

 Subject: RE: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

Hi Tania;

As discussed, please find attached a copy of a document prepared by Golder in response to MEM's questions arising from the March 11, 2015 site visit.

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

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

 Sent: March-24-15 11:24 AM

 To: Luke Moger

 Cc: Don Parsons; Chris Carr
 s.22

 Beattie, Brent C MEM:EX

 Subject: Mt Polley TSF 2015 Freshet Embankment - follow-up to March 11 site visit discussion

 Importance: High

Hi Luke,

I wanted to follow-up on the information discussed during our close-out meeting following the site visit on March 11. Chris Carr raised up a concern regarding the delay in construction of the CSM wall and the impact that this may have on embankment stability and seepage if the TSF was required to store the 2015 Freshet prior to completion of embankment construction. It was suggested at the wrap-up meeting that analyses be carried out (by Golder Associates) to determine the pond water level limits at various stages of embankment/CSM wall construction.

We have not seen the results of this analysis. Given that this could be a significant concern, it should be addressed without delay. Please let me know when you will be able to share this analysis with MEM.

As always, please don't hesitate to call if you have any questions.

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:	<u>Chris Carr</u>
To:	Demchuk, Tania MEM:EX
Cc:	Adams, Rick MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EX; Beattie, Brent C MEM:EX
Subject:	RE: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter Embankment Buttress Design for 2015 Embankment]
Date:	Thursday, April 9, 2015 9:48:19 AM
Attachments:	image001.png

Hi Tania,

I have reviewed the IERP report dated April 2, 2015 and provide the following comments:

• 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.

I have interpreted the comment by IERP to "resume mining operations" as being full operations involving the TSF and not restricted restart.

Regards,

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

s.22

To: Chris Carrs.22eattie, Brent C MEM:EXCc: Adams, Rick MEM:EX; Warnock, George MEM:EX; Narynski, Heather M MEM:EXSubject: FW: IERP Report #1 [M-200 Permit - Approving the TSF Breach Repair and Perimeter
Embankment Buttress Design for 2015 Embankment]

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:Imoger@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

From:	<u>Chris Carr</u>
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]
Date:	Tuesday, April 14, 2015 3:16:22 PM
Attachments:	image001.png

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

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 Car
 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:Imoger@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