



5 August 2011  
VM00560.2011

Mount Polley Mining Corporation  
Vancouver BC

Attention: Luke Moger

**RE: QUALITY ASSURANCE SUMMARY No. 1  
STAGE 7 TAILING STORAGE FACILITY RAISE  
MAY to 31 July 2011**

## 1.0 INTRODUCTION

The following is a summary of site activities, instrumentation monitoring, testing and as-requested services related to AMEC Earth & Environmental (AMEC) project services for geotechnical engineering and testing in support of the Mount Polley Mining Corporation (MPMC) Tailing Storage Facility (TSF) 2011 stage 7 raise.

Reference documentation used for the purposes of the geotechnical work is as follows:

- AMEC report, "*Tailing Storage Facility – Stage 7 Construction Monitoring Manual*" dated 20 April 2011
- AMEC report, "*Tailings Storage Facility Instrumentation Review and Recommendations*" dated 14 June 2011

To prepare this memo, daily reports submitted by MPMC Field Inspectors have been utilized and incorporated with firsthand accounts of AMEC representatives.

## 2.0 CONSTRUCTION RESPONSABILITIES

Peterson Contracting Ltd. (Contractor) has been retained by MPMC to carry out construction activities associated with Stage 7 TSF raise and placement of Zone S and Zone F. MPMC will utilize in-house equipment for placement of Zone U, Zone T and Zone C.

AMEC was on site to kick-off the project and approve construction procedures and materials being utilized by the Contractor. Daily monitoring of construction activities, compaction testing, material quality control, zone delineations, instrumentation readings are the responsibility of MPMC field inspectors.

### 2.1 AMEC SITE VISITS

As requested by MPMC, AMEC mobilized on site 31 May, and conducted a short (2 day) site visit. During the visit AMEC:

- Got orientated with mine safety, tailings dam and MPMC staff

- Reviewed the Zone U preparations
- Collected material samples of Zone S and Zone F for further lab testing
- Discussed timing and construction approach with the Contractor
- Trained MPMC field inspector to conduct slope inclinometer measurements
- Test pits were carried out near the existing barge

AMEC mobilized again on site 13 June till 28 June, with weekends being offsite. During the visit AMEC:

- Established confidence with MPMC field inspectors
- Established confidence with MDI testing relative to Nuclear Densometer testing
- Review and monitor placement, compaction, and testing of Zone S and Zone T along the south dam to elevation of 958.6m
- Trained MPMC field inspector to collect Vibrating Wire Piezometer readings
- Collected material samples of Zone S, Zone T and Zone F
- AMEC Dam Engineer on record conducted a brief review of the dam
- Reviewed instrumentation placements and modified the instrumentation program to suite actual dam configuration

AMEC mobilized again on site 25 July till 28 July. During the visit AMEC

- Review and monitor placement, compaction, and testing of Zone S and Zone T along the south dam to elevation of 958.6m
- Established the location of boreholes for the instrumentation program to be conducted this year.
- AMEC Project Manager visited the site.
- Fixed and renamed piezometers along the main dam.

AMEC next site visit is scheduled for August 19<sup>th</sup>. During which Construction procedures will be reviewed, renaming and verification of piezometers will be completed, abutment tie-ins will be reviewed and placed.

## **2.2 AMEC DESTOP REVIEW**

While AMEC is not present on site, AMEC reviews daily construction reports and associated files with regard to the construction and ongoing monitoring of the dam. In addition, as AMEC is taking over “Knight Piésold Consulting” (KP) as the Engineer of record and ongoing monitoring of instrumentation, data manipulation of the existing records was needed. Data associated with slope inclinometers (SI) has been organized and presented in Appendix A, data organization for vibratory wire piezometers (VW) is still ongoing.

## **3.0 CONSTRUCTION MONITORING**

Construction of the embankment by the Contractor began on 20 June 2011 with work being carried out on the south embankment. Due to the freeboard requirement a 0.6m raise was elected to be placed around the entire length of the embankment. On 26 July 2011 the contractor placed till core material around the entire embankment. The tie-in to the abutments at corner 5 and corner 4 will be completed directly by MPMC under AMEC supervision during the



next site visit. Due to the wet conditions experienced in June and July construction progress has been relatively slow. Table 1, below summarizes to work completed up to August 1.

**Table 1: Material Placement**

Elevation	Corner 5 to 1				Corner 1 to 2				Corner 2 to 3				Corner 3 to 4			
	S	F	T	C	S	F	T	C	S	F	T	C	S	F	T	C
958.6	X	X	X		X	X	X		X	X	X	W	X	X	X	X
958.9													W			

X – Completed  
 W – In Progress

### 3.1 UPSTREAM FILL (ZONE U)

Upstream fill is a responsibility of MPMC, consisting of sand cells, and selective Nag rock fill was utilized mainly along the Main Embankment where the placement of tailings cannot be achieved to the lack of head pressure currently utilized by the mine. The upstream fill was placed to the full extent of this years raise and interface between Zone U and Zone S has an approximate slope of 1H:1V. Access paths to the upstream side of the dam were left unfilled and are being filled in on as needed basis by MPMC utilizing selective Nag rock.

Prior to initialization of till core construction, the selective Nag rock fill was inspected along the interface; unacceptable sections (concentration of large boulders, without any fines) were identified and replaced by suitable selective material.

### 3.2 CORE TILL (ZONE S)

Placement of core till is the responsibility of the Contractor. The Core Till is placed in the following matter:

- The existing core till material is scarified to approximately 1” below the existing grade utilizing a grader forks.
- The existing core till material is watered, if required.
- New core till material is placed using scrapers.
- New core till material is spread out to a minimum width of 5m, and a maximum loose lift thickness of 300mm using grader and/or bladed excavator.
- A 10 ton vibratory smooth drum compactor is utilized to compact the core till.
- Compaction testing is conducted at minimum every 150m, utilizing MDI apparatus, and if needed the area is re-compacted if the compaction is not achieved.

This process is repeated, and the following construction controls procedures were established to be utilized for the 2011 embankment raise:

- The first lift or the 3 lift series is staked at the toe of the lift utilizing 25m intervals. A ribbon is placed establishing 300mm elevation above the existing core till.
- The second lift is staked at the toe of the first lift utilizing 25m interval establishing 300mm elevation above the compacted first lift.



- The third lift is staked at the toe of the first lift utilizing 25m interval and establishing the lesser of a maximum 3 set lift thickness of 600mm or 300mm above second lift.

When the series is completed a continuous mark is established identifying the tow of the first lift, and if necessary and requested crest of the third lift. An excavator is utilized to cut the core till over build and expose the filter material for tie in.

**Gradation testing of the material is to be done every 4000 linear meters of material placed per lift (utilized 250 mm compacted lift thicknesses) per source. The results to date are presented in the**

Table 2 below, while the graphical material gradations for all controlled units is presented in Appendix B.

**Table 2: Zone S Material Testing Results**

Sample ID	Atterberg Limits			Particle Size Distribution (%Retained)				Standard Proctor				MC (%)	Deviation from Optimum
	LL (%)	PL (%)	PI (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	UnCorr. MAX D. D.	UnCorr. Opt. MC	Corr MAX D. D.	Corr. Opt. MC		
S-01-11	-	-	-	11	40	34	15	-	-	-	-	10.4	-
S-02-11	26	13	13	19	34	33	14	1992	11.5	2029	11	10.8	-0.2
S-03-11	25	13	12	17	34	35	14	2030	10.5	2056	10	11.7	1.7
S-04-11*	26	14	12	1	34	48	17	1967	12	1967	12	10.3	-1.7
S-05-11*	-	-	-	7	34	47	12	-	-	-	-	-	-
S-06-11	23	12	11	12	34	41	14	1988	11.5	2070	10	11.3	1.3
<b>MEAN</b>	25	13	12	15	34	34	14	1992	11.5	2056	10	11.05	1.3
<b>MAXIMUM</b>	26	13	13	19	40	41	15	2030	11.5	2070	11	11.7	1.7
<b>MINIMUM</b>	23	12	11	11	34	33	14	1988	10.5	2029	10	10.4	-0.2

\* ignored from the average (Test Pitting sample near Barge)

This procedure is to be repeated for the full extent of the 2011 construction.

### 3.3 FILTER (ZONE F)

Placement of filter material is the responsibility of the Contractor. The filter placed in the following matter:

- Prior to placement of the filter the existing filter boundary is identified, cleaned, and marked.
- Dump trucks with a custom blade placed inside the box restricting the width of the dump are utilized for placement of filter material.
- A loader and grader are utilized to shape the filter material placed.
- The filter material is placed to approximate elevation of the core till with a minimum 1.8m horizontal width.
- MPMC embankment field monitor verified the top of the placed filter to ensure the minimum width of 1.8m is established.

- A sample of the filter material is to be collected for gradation analysis every 1000 linear meters per stockpile. Gradation tests conducted and reported thus far are presented in Appendix B

This procedure is to be repeated for the full extent of the 2011 construction.

### **3.4 TRANSITION (ZONE T) AND GENERAL ROCK FILL (ZONE C)**

Placement of transition material and general rock fill is the responsibility of MPMC. The materials are placed in the following manner:

- If needed the existing transition and rock fill zones are scarified to ensure the material does not have a 'pavement' type appearance that would potentially impede vertical drainage.
- Transition material is placed by excavator, and care is taken to ensure concentration of large rocks is not present.
- The transition zone is placed to match placed filter lifts (0.6m lifts)
- The transition zone is visually inspected to ensure the minimum width of 1.8m is achieved.
- After the transition zone is verified general rock fill is placed utilizing a dozer. Rock fill is placed to match transition lifts (0.6m lifts)

See Appendix B for material gradations conducted and presented to date.

## **4.0 INSTRUMENTATION MONITORING**

### **4.1 SLOPE INCLINOMETERS**

Inclinometer readings are collected on a biweekly basis by MPMC. Cumulative plots and time displacement plots are shown for the 4 working inclinometers (SI01-02, SI06-01, SI06-02, and SI06-03) and for their relative axis (A-axis and B-axis) in Appendix A.

SI01-02 indicates slight perpendicular (A-axis) total creep of 10mm to the main embankment since 15 September 2007 at a rate of roughly 2.5mm in a year. The parallel (B-axis) shows a slight total creep movement of 4mm at a rate of about 1mm per year.

SI06-01 and SI06-02 show minor fluctuations in data due to reading errors, and do not show any movement.

SI06-03 indicates slight perpendicular (A-axis) total creep of 5mm to the main embankment since 5 August 2006 at a rate of roughly 1mm in a year. The parallel (B-axis) shows no creep, however an unusual reading was recorded during the July 29<sup>th</sup> reading. This reading indicates a movement of approximately 20 mm in 2 weeks; however as no evidence of an existing failure plane and a high verification variance was observed during the recording of this inclinometer data set, this is most likely due to a reading error. This will be verified and addressed if needed immediately during the next scheduled reading which is to be collected on August 10<sup>th</sup>.

The movements observed in the inclinometers are minor and are of no immediate concern. However regular monitoring should be conducted during construction and off season, to ensure the movement is not increasing.



## **4.2 PIEZOMETERS**

Piezometers are collected on a biweekly basis staggered from the slope inclinometer readings. Data organization of the piezometric readings is ongoing and only Plane B is presented in Appendix C. To date, data recorded for all planes does not show any unusual records.

## **5.0 CLOSURE**

This letter has been prepared for the exclusive use of Mount Polley Mine Corporation. Any use which a third party makes of this letter, or any reliance on or decisions based on it are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this letter.

Please do not hesitate to contact the undersigned at (250) 564-3243 should you have any questions or comments.

Respectfully submitted,

**AMEC Earth & Environmental**  
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