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MOUNT POLLEY MINE

TAILINGS STORAGE FACILITY – STAGE 9
2013 CONSTRUCTION MONITORING MANUAL

Submitted to:

Mount Polley Mining Corporation
Likely, BC

Submitted by:
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IMPORTANT NOTICE

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INTRODUCTION

Project Overview

Mount Polley copper and gold mine is owned by Imperial Metals Corporation and operated by Mount Polley Mining Corporation (MPMC). The site is located 56 km northeast of Williams Lake, British Columbia. The Mount Polley mine began production in 1997 and operated until October 2001, when operations were suspended for economic reasons. In March 2005, the mine restarted production and has been in continuous operation since. Currently, mill throughput is approximately 20,000 tpd. Tailings are deposited as slurry into the tailings storage facility (TSF). The TSF is comprised of one overall embankment that is approximately 4.2 km in length. The embankment, based upon original separate embankments, is subdivided into three (3) sections; referred to as the Main Embankment, Perimeter Embankment and South Embankment. Heights vary along the embankment and are approximately 52 m, 34 m, and 25 m respectively (based upon the Main, Perimeter and South nomenclature). The design and construction monitoring of the TSF embankments through 2010 was completed under the direction of Knight Piésold Limited (KP). AMEC Earth and Environmental, now known as AMEC Environment & Infrastructure, a division AMEC Americas Limited (AMEC), assumed the role of engineer of record for the TSF embankment as of 28 January 2011. The overall embankment has incorporated a staged expansion design utilizing a modified centerline construction methodology up to El. 963.5 m. The latest design (Stage 8A) includes a modification, incorporating a centerline design above El. 963.5 m to an approved permitted elevation of 965 m. The most recent expansion of the TSF was completed in October 2012, which entailed an approximate 3.4 m embankment raise to a minimum crest elevation of 963.5 m.

The next expansion, to a crest elevation of 970 m, is planned for the 2013 construction season. AMEC understands that a new permit will be required for the raise above El. 965 m. As part of the Stage 9 design (El. 970 m), stability analysis of the embankment was carried out, the results presented in Appendix A.

Construction Schedule

The optimal construction season for placement of moisture-sensitive till core material at the Mount Polley Project site typically falls between May and September. The 2013 Stage 9 Embankment raise (6.5 m to crest El. 970 m) is targeted for completion by the end of September 2013.

For the 2013 construction season, as per the 2012 construction season, MPMC will use a contractor to carry out the majority of earthworks associated with the annual raise. Haulage of waste rock and cell construction using tailings will be performed by MPMC.

In addition, MPMC or the contractor will prepare abutment foundations and place the specified blanket materials to the full extent of the Stage 9 embankment design (El. 970 m).

Quality Assurance and Quality Control (QA/QC)

The level of construction monitoring and QA/QC performed in previous years is to be continued. In 2012, MPMC undertook a greater role and responsibility in this regard. Specifically, MPMC engaged its own engineers, technicians, and summer students to provide full-time construction monitoring and field inspection during the construction of the embankment. AMEC provided support as required, which included regular site visits, particularly during key phases of the construction. Overall this arrangement was deemed to be successful; however, minor modifications to the 2012 construction monitoring program will be implemented for 2013 and are documented herein. Mr. Luke Moger of MPMC will oversee the overall construction monitoring and the day-to-day monitoring, and the reporting and instrumentation reading tasks will be the responsibility of the MPMC Field Inspectors and mine technicians.

Upon the commencement of construction, AMEC will provide full-time supervision for approximately fourteen (14) days, to kick-off construction and to verify that proper construction methods are employed during dam construction, material specifications are adhered to and that the monitoring and testing requirements are satisfied. This time will also be used to make certain that daily technical/progress reports are being completed properly, and that MPMC and AMEC responsibilities are thoroughly understood by all parties.

Once AMEC is satisfied that the design intent is being met and that the MPMC Field Inspectors are fully trained and prepared to undertake the construction monitoring role, we will reduce monitoring presence to roughly monthly visits. The monthly visits will be timed around key construction activities such as approval of foundation preparation and till core trench construction.

To be successful, this arrangement will require that the MPMC Field Inspectors are devoted full-time to the dam construction project, with continued support and co-operation from Mt. Polley senior personnel and TSF construction team.

Laura Wiebe, P.Eng, (AMEC Project Manager) and/or Steve Rice, P.Eng (AMEC Principal Engineer), will visit the site during construction activities. The objective of the visit will be to conduct an annual site-visit, and get a “look-ahead” so that any future construction issues can be proactively identified and resolved. This visit will also be used to ensure that a good working relationship is being maintained between AMEC and MPMC project personnel, which will be critical to providing AMEC the requisite confidence to provide as-built report sign off.

Codes and Standards

Work shall be conducted in conformance with the following standards and codes that are part of this specification:

- ASTM C117-04 – Standard Test Method for Material Finer than 75-µm Sieve in Mineral Aggregates by Washing

- ASTM C136-06 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D421-07 – Standard Test Method for Dry Preparation of Soil Samples
- ASTM D422-07 – Standard Test Method for Particle Size Analysis of Soils (Hydrometer test)
- ASTM D698-07 – Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
- ASTM D2216-10 – Standard Test Method for Water (Moisture) Content of Soil and Rock
- ASTM D4220-07– Standard Test Method for Standard Practices for Preserving and Transporting Soil Samples
- ASTM D4318-10 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D4718-07 – Standard Test Method for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
- ASTM D6780-05 – Standard Test Method for Water Content and Density of Soil in Place by Time Domain Reflectometry
- ASTM D6913-04 – Standard Test Method for Particle-Size Distribution (Gradation) of Soils using Sieve analysis
- ASTM D6938-10 – Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Purpose of Manual

AMEC has prepared this manual for use by MPMC's on-site personnel and for AMEC's engineering support personnel, who will maintain close communication with the site throughout the construction season and carry out periodic site visits as required.

The objectives of this manual are as follows:

- Summarize the annual construction activities.
- Define the roles and responsibilities of MPMC and AMEC personnel associated with the 2013 embankment construction activities.
- Detail the technical specifications for the construction of the TSF embankment as presented in the design drawings.
- Outline the requirements for monitoring, sampling, testing and reporting of the TSF embankment construction activities.
- Outline the requirements and performance procedures for instrumentation monitoring within the TSF.

CONSTRUCTION MONITORING

Construction Activities

The 2013 construction of the TSF embankment will include the following activities:

- Foundation preparation of the abutments to an elevation of 970.0 m, including excavation of the cut-off trench;
- Development of glacial till borrow areas;
- Development of non-acid-generating (NAG) rock borrow areas (mine rock);
- Development of the sand and gravel borrow area or production of sand and gravel from mine waste rock via processing; and
- Excavating, hauling, placing, and compacting acceptable structural fills and waste zones to raise the dam core and shell in accordance with design specifications.

The guidelines for quality control testing procedures outlined in this manual are to be observed during construction to satisfy and document that the embankment is constructed in accordance with the design intent.

Monitoring and Testing

The general monitoring and testing requirements for the 2013 construction of the TSF embankment correspond to the construction activities outlined in Section 0; these general requirements are:

- Review and confirm that the prepared foundation areas are acceptable for support of structural fills;
- Review and confirm that the borrow materials are acceptable for use as structural fill;
- Monitor and test (where required) the placement and compaction of accepted structural fill;
- Monitor dam performance by recording instrumentation data from instruments located in the embankment(s) and preparing cumulative change and time plots of the results; and
- Monitor drains performance by measuring flow and inspecting water quality.

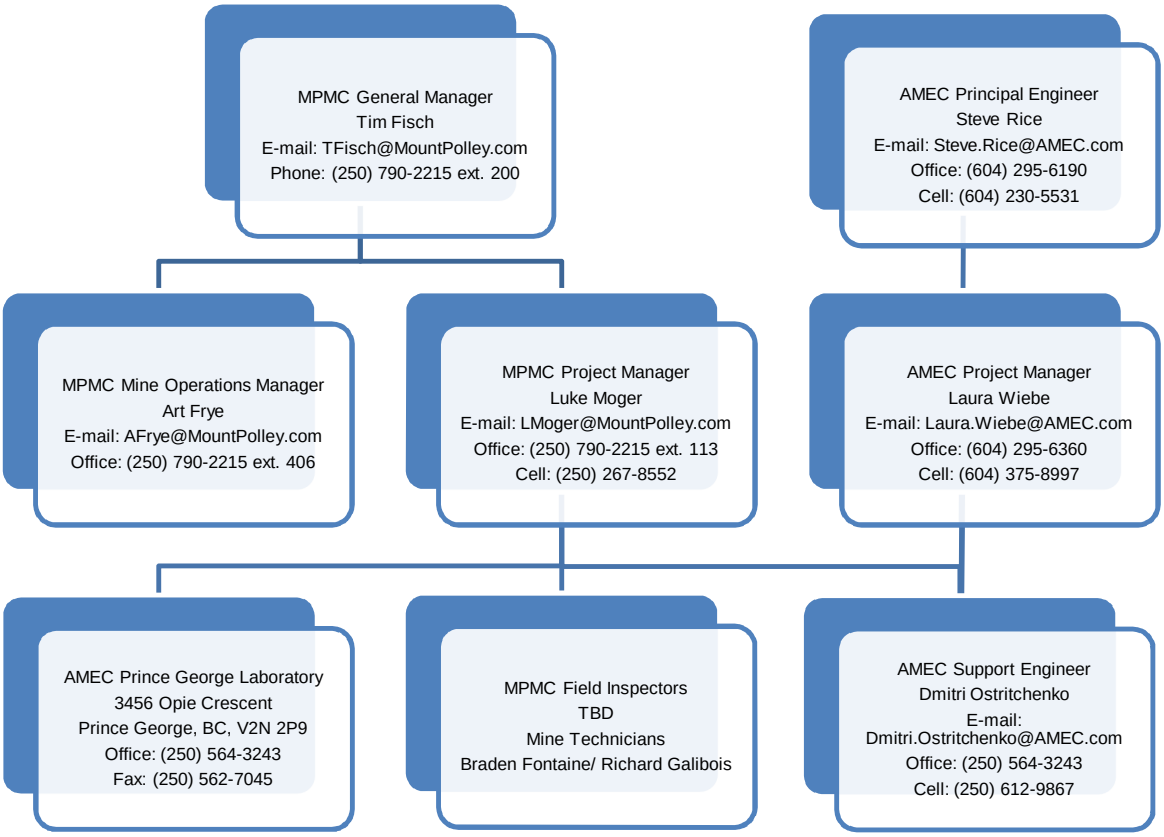
Construction monitoring of activities such as placement of structural fills and foundation preparation will take place on a continuous basis. Schedules based on minimum test frequencies per unit volume of compacted structural fill will be followed for the various field and laboratory tests, with additional tests to be performed as required to reassess out-of-compliance results or at the discretion of AMEC.

The results of the monitoring and testing program will be reported to the appropriate parties (outlined in the subsections below) as they are obtained.

Organization and Responsibilities

As presented below, Figure 2.1 outlines the overall organizational structure for 2013 TSF embankment construction. Responsibilities are summarized in Table 0.1.

Figure 0.1: 2013 Construction Organization Chart



MPMC Field Inspector

MPMC is to provide a full-time field inspector to monitor daily embankment expansion construction. The MPMC Field Inspector is to have support and co-operation from the senior MPMC personnel and construction team.

The responsibilities of MPMC's Field Inspector will be as follows:

- Monitor and maintain photographic record of ongoing construction activities related to the TSF;
- Review borrow pit material to verify material consistency;
- Verify as-placed zone lift thicknesses and widths;
- Perform QC compaction testing of placed Zone S material (as per material placement specifications);
- Collect material samples for QC laboratory testing;
- Prepare and submit daily construction reports (See Appendix B);
- Collect and submit instrumentation data; and
- Report out-of-compliance situations to AMEC's Support Engineer and MPMC project personnel.

Survey control for the embankment construction will be provided by MPMC. The MPMC Field Inspector, with support from Mine Technicians, will be responsible for the following tasks:

- Surveying compacted density test locations;
- Locating cutoff trench limits at the embankment abutments;
- Establishing and maintaining upstream and downstream Zone S slope stakes as required;
- Surveying upstream and downstream toe limits of as-placed Zone S and F material;
- Providing general location and elevation data as required; and
- Collecting as-built survey data (i.e. cutoff trench, embankment crest, and downstream toe extents for Zone S and F).

AMEC Support Engineer

The AMEC Support Engineer will provide full-time construction monitoring at the commencement of 2013 construction. After the MPMC Field Inspector has achieved sufficient confidence and commensurate approval, the AMEC Support Engineer will provide primarily remote assistance by reviewing daily reports and instrumentation data as required. The AMEC Support Engineer will also conduct monthly site visits (actual frequency to be determined by site performance) to verify construction methods and specifications are being followed.

While on site the responsibilities of the AMEC Support Engineer are as follows:

- Monitor, train, and assist MPMC personnel with the requirements of construction monitoring;
- Monitor, sample, and requisition tests of the borrow areas, as required;
- Monitor and perform QA testing of compacted till core soils, as required;

- Review and approval of proposed borrow soils;
- Review and approval of transition and filter material, processing methodology and monitoring practices;
- Monitor and approve the drainage ditch excavation and preparation;
- Monitor and approve abutment preparation;
- Address any concerns or out-of-compliance situations observed and recorded during construction;
- Carry out the quality control field and laboratory testing;
- Direct the MPMC personnel to address the survey requirements, results, etc.; and
- Meet as required with MPMC to review the construction program.

While in the office the responsibilities of AMEC's Support Engineer are as follows:

- Review daily construction reports submitted by MPMC personnel;
- Review compaction results submitted by MPMC personnel;
- Plot and review instrumentation readings submitted by MPMC personnel;
- Address any concerns or out-of-compliance situations noted by MPMC personnel;
- Coordinate with MPMC personnel and AMEC's Project Manager/Principal Engineer;
- Prepare monthly progress reports summarizing construction activities, test results, and milestone achievements; and
- Prepare site As-built/Annual Review Report.

AMEC Project Manager

AMEC's Project Manager will serve as the Engineer of Record and have overall responsibility for AMEC's role with upcoming and future dam raising projects. They will review all monthly construction progress reports and liaise with the AMEC Principal Engineer and MPMC's Project Manager to address any problems that may arise.

The AMEC Project Manager will also liaise with the AMEC Support Engineer and the MPMC's Field Inspector, and will make site visits as deemed necessary during construction. The exact timing and duration of the site visits will be determined in consultation with the MPMC Project Manager so that critical aspects of the construction can be viewed during these visits.

The responsibilities of AMEC's Project Manager will be as follows:

- Review instrumentation interpretations and communicate of any concerns to MPMC's Project Manager and AMEC's Principal Engineer;
- Review monthly progress reports prepared by the AMEC Support Engineer and communicate any concerns arising from these reviews to MPMC's Project Manager and AMEC's Principal Engineer;
- Carry out periodic site visits as appropriate during the construction season, timed to coincide with critical aspects of the construction; and

- Identify, review, and approve any design changes determined to be required by AMEC and/or MPMC.

Table 0.1: Construction Monitoring Tasks

No.	Tasks Description	Responsibility
1.0	**Foundation Preparation**	
1.1	Abutment Extensions: Review of exposed soil and or rock conditions and confirmation that suitable dense, undisturbed, native soil, or sound bedrock conditions are exposed for dam construction.	AMEC
1.2	Core Trench Construction: Review of exposed soil and/or rock conditions, perform test pits as required to confirm the thickness of glacial till over bedrock along the core trench alignment. Review of core trench excavation and confirmation of proper excavation slopes. Direct rock excavation and cleaning work as deemed necessary.	AMEC
1.3	Approval: Review the provided photos of the foundation preparation and provide approval.	AMEC
2.0	**Review of Borrow Areas and Materials**	
2.1	Glacial Till Borrow Pit: • Review cut slopes. • Collect samples of borrow material for testing to assess both suitability of materials and to evaluate the Standard Proctor maximum dry density and optimum moisture content of the material. • Report test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.2	NAG Rock Source (Zone C): • Review the selective borrowing/classification of material for the coarse NAG rockfill. • Visual verification of the material for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.3	NAG Rock Source (Zone T): • Monitoring the selective borrowing/classification/processing of material for the fine NAG rock transition zone. • Collect periodic samples for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.4	NAG Crushing Operation (Zone F): • Monitoring the filter sand and gravel crushing and decking operation. • Collect periodic samples for conformance to the gradation specifications. • Report observation to AMEC and MPMC's Project Manager as they are obtained.	MPMC
2.5	Materials Approval: • Conduct Tests on collected samples. • Approve the materials to be used during construction of the embankment.	AMEC
3.0	**Review of Structural Fill Placement**	
3.1	Zone S: • Review and confirm that the locations of zone interfaces are in their correct locations. • Confirm the width of the core zone is sufficient. • Test the placed and compacted Zone S structural fill for in-place density. • Collect samples for moisture content determinations and density (rock content) corrections. • Collect samples of fill for confirmation index testing. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.2	Zone C: • Review and confirm that the NAG rock is in conformance to the gradation specifications. • Observe and confirm the compaction specification is followed.	MPMC
3.3	Zone T: • Review and confirm that the NAG transition zone rock is in conformance to the gradation specifications. • Observe and confirm the compaction specification is followed. • Collect samples for gradation analysis. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.4	Zone F: • Review and confirm that the zone interfaces are in their correct locations. • Confirm the width of the filter zone is sufficient. • Collect samples for gradation analysis. • Review and confirm that the crushed fine filter material is in conformance to the gradation specifications. • Confirm via hand-excavated test pits that segregation of filter sand and gravel is not occurring. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
3.5	Zone U: • Review and confirm that the zone interface is in the correct location. • Monitor material reworking to ensure proper distribution within the cell. • Report observations and test results to AMEC and MPMC's Project Manager as they are obtained.	MPMC
4.0	**Dam Performance Monitoring**	
4.1	Coordinate biweekly readings of vibrating wire piezometers and slope inclinometers during the construction. Submit the raw data collected to AMEC for review.	MPMC
4.2	Review submitted weekly readings, prepare associated graphs and analyze the collected data. Report monitoring results to AMEC and MPMC's Project Manager as they are obtained.	AMEC
5.0	**Construction Monitoring**	
5.1	Daily meetings between MPMC's Field Inspectors and Contractor to establish and review daily construction plan, identify concerns, and discuss other relevant issues.	MPMC
5.2	Monthly meeting between MPMC's Field Inspector, Project Manager, AMEC Support Engineer and Contractor.	MPMC/AMEC
5.3	Establish and confirm construction boundaries between various zones.	MPMC
5.4	Addressing any concerns or out-of-compliance situations observed and recorded during construction.	MPMC/AMEC
6.0	**Record Keeping**	
6.1	Maintain daily construction site photographic record of construction activities.	MPMC
6.2	Completing daily construction reports, and delivering a copy to MPMC's Project Manager and by email to AMEC's Support Engineer.	MPMC
6.3	Completing monthly construction reports, with copies to MPMC's Project Manager and AMEC's Project Manager and Senior Principal Engineer.	AMEC

AMEC Principal Engineer

AMEC's Principal Engineer will review monthly construction and instrumentation reports as required and review the As-built/Annual Review reports. AMEC's Principal Engineer will make site visits if deemed necessary by the AMEC Project Manager or MPMC Project Manager.

AMEC Soils Laboratory – Prince George

All off-site material testing will be carried out at the AMEC Prince George Laboratory. MPMC will be responsible for collection and shipment of samples as required. AMEC's laboratory technician will be responsible for carrying out the required testing and reporting of results to the AMEC Support Engineer who in turn will convey the results to MPMC's Project Manager.

MPMC Laboratory - Soils Testing

AMEC will conduct the majority of material testing required to support the construction, however the following tests are required to be carried out by Mount Polley personnel at the Mount Polley on-site lab:

- Wash sieve gradation for Zone T and Zone F during production (C136-06/C117-04); and
- Moisture content confirmatory testing of Zone S (D2216-10).

All test results will be compiled by the MPMC Field Inspector or the MPMC laboratory staff, and are to be submitted to AMEC's Support Engineer along with the daily construction reports for review and approval.

MPMC Project Manager

MPMC's Project Manager shall assume overall responsibility for MPMC construction management and MPMC supervision, monitoring, and quality control testing activities when AMEC is not on site. This person shall ensure that the design specifications and the QA/QC requirements as outlined in this manual are followed. In the absence of the MPMC Project Manager, the MPMC Mine Technicians dedicated to the TSF embankment will take responsibility, under the supervision of the Mine Operations Manager.

MPMC's Project Manager shall liaise with AMEC's Support Engineer and AMEC's Project Manager to discuss construction progress, any problems encountered and their resolution, and the timing of site visits by AMEC personnel to view the construction.

The MPMC Project Manager will address any concerns raised by the MPMC Field Inspector/AMEC Support Engineer including, but not limited to:

- Placement of unacceptable dam fill material;
- Unacceptable construction procedures (excessive lift thickness, inadequate compaction, inadequate foundation preparation, inadequate material testing etc.); and

- Non-compliance issues identified by the AMEC Support Engineer and MPMC Field Inspector that are not immediately rectified by the construction forces, be they those of the contractors or MPMC.

MPMC Mine Operations Manager

The MPMC Mine Operations Manager will address any concerns raised by the MPMC Field Inspector and/or AMEC Support Engineer as related to any potential environmental issues or concerns.

CONSTRUCTION MATERIALS

General

All zones of the embankments described herein shall be constructed only with materials meeting the specified requirements for each zone, as listed below and as shown in the drawings. Materials for the various zones of the embankment shall be obtained from stockpiles and from borrow areas approved by the AMEC Support Engineer.

Approval of construction fill materials will generally be based on comparison with the gradation envelope curves presented on Drawing 2013.08. Sections 3.3 through 3.7 provide a brief description of specified material zones.

Estimated Fill Volumes

Table 0.1 summarizes the estimated material quantities from the Stage 8A crest elevation of 965.0 m up to the Stage 9 expansion crest elevation of El. 970.0 m.

Table 0.1: Stage 9 Expansion (El. 970.0 m) Estimated Fill Volumes

SECTION	ESTIMATED FILL VOLUMES (m^3)			
	Zone C	Zone T	Zone F	Zone S
Main Embankment				
Perimeter Embankment				
South Embankment				
Total				

Notes:

1. *Estimated volumes are based on Drawings 2013.04 through 2013.06, and are rounded up to the nearest 100 m^3.*
2. *No settlement allowance has been considered.*
3. *Quantities are based on neat construction lines; with no contingency or allowance for overbuild or waste factors.*

Zone S (Core) – Glacial Till

Zone S comprises the low-permeability central core of the Main, Perimeter and South embankments. Zone S shall be constructed with well graded, unprocessed, unfrozen glacial till obtained from the specified till borrow area that meets the material gradation and moisture content requirements as shown on the design drawings with a minimum fines content of 20% by weight.

Zone F (Filter) – Sand and Gravel

Zone F comprises the downstream filter between Zone S and Zone T fill of the Main, Perimeter and South embankments. Zone F consists of 50 mm (2”) minus well-graded sand and gravel, obtained from mill crushed run-of-mine NAG waste rock.

Zone T (Transition) – Fine NAG Rock Transition

Zone T comprises the downstream transition between Zone F and Zone C fill of the Main, Perimeter and South embankments. Zone T consists of 150 mm (6”) minus material with a maximum fines content of 20% by weight, obtained from mill crushed and/or as-is run-of-mine NAG waste rock.

Zone C (General Rockfill) – Coarse NAG Rock Shell

Zone C comprises the downstream support to the Zone S core. Zone C consists of well graded material with a maximum diameter of 1 m (3’4”), obtained from run-of-mine NAG waste rock.

Zone U (Selected Upstream Fill) – Tailings/NAG

Zone U comprises the upstream support for the Zone S core. Zone U generally consists of end of pipe spigotted tailings, deposited in cells and reworked with a dozer. If required, Zone U may also consist of run-of-mine NAG waste rock with a maximum diameter of 0.5 m (1’8”).

EXECUTION

Borrow Areas

Any proposed borrow pit material to be used as embankment fill will be subjected to sampling, laboratory testing, and approval by AMEC's Support Engineer. During the TSF embankment construction, detailed documentation will be maintained to ensure the source of the material being placed is known and material testing requirements are satisfied.

It is anticipated that the Zone S till volume requirement (refer to Section 3.2) will be obtainable from the area identified on Drawing 2013.02 as the Perimeter Till Borrow Pit. This same area has been used as the source for Zone S in previous construction seasons.

It should be noted that the Perimeter Till Borrow Pit is located directly downstream of the Perimeter embankment downstream toe. Any further encroachment of the borrow pit towards the embankment is not permitted.

AMEC has observed that the material within the Perimeter Till Borrow Pit is generally interbedded with a glaciolacustrine unit. The glaciolacustrine material typically meets the till core material specification, however due to its poor workability this material shall be wasted or whenever possible, intermixed with approved till material in a ratio of one part glaciolacustrine to two parts till.

Prior to utilization of the Perimeter Till Borrow Pit, topsoil and other overburden judged to be unsuitable as structural till fill will be stripped from the borrow pit and hauled to an acceptable location, as directed by the MPMC Project Manager.

The Perimeter Till Borrow Pit shall be developed such that groundwater inflow and precipitation runoff are directed in a controlled manner to designated sump area(s) of the site, and then removed as required. External surface water runoff shall be prevented from flowing into the borrow area by the construction of diversion ditches as required.

The performance of the cut slopes in borrow areas will be inspected and recorded as required by the MPMC Field Inspector for documentation within the construction reports. AMEC's Support Engineer may request modifications to the excavation plan, including flattening of the slopes and altering water control measures, based on the observed performance of the cut slopes.

Excavation

General Foundation Preparation

Foundation preparation is to be conducted when AMEC's Support Engineer is on site. 2013 construction will consist of foundation preparation on the Perimeter and South abutments to the

Stage 9 crest elevation of 970.0 m. Excavation limits and cutoff trench details are shown on Drawing 2013.07.

The foundation preparation will extend to 3 m beyond the upstream and downstream embankment toe limits, or as directed by the AMEC Support Engineer, providing a buffer zone for tie-in capabilities and any material placement inaccuracies.

Foundation excavation will be drained, where required, and will generally consist of clearing and grubbing, and removal of all soft, over wet, and organic bearing soils to expose suitably dense, inorganic native soils (dense to very dense glacial till) or competent bedrock, as defined by the AMEC Support Engineer. The prepared foundation surface is to be proof-rolled with a smooth drum vibratory roller (with vibration turned off if necessary to prevent pumping) prior to fill placement.

Prior to placing any fill materials on excavated surfaces, the surfaces shall be prepared as follows:

- Surfaces shall be kept clean of any loose debris.
- Excavated materials from the foundation shall be removed and hauled to waste areas designated by the MPMC Project Manager. Organic material and topsoil shall be stockpiled in appropriate locations, as directed by the MPMC Project Manager, for potential future use in reclamation activities.
- The exposed excavation and cleared embankment foundation shall be scarified, proof-rolled with a smooth drum vibratory roller (with vibration turned off if necessary to prevent pumping), inspected and approved by the AMEC Support Engineer prior to any material placement.
- Earth foundation surfaces shall be graded to remove surface irregularities, and test pits or other cavities shall be filled with compacted fill, unless otherwise directed by the AMEC Support Engineer.

Zone S Till Core Cutoff Trench Subgrade Preparation

General subgrade preparation for the abutment cutoff trench extensions shall be in accordance with Section 4.2.1 with typical excavation details shown in Drawing 2013.07.

Overburden within the trench excavation zone shall be excavated to a minimum 0.5 m depth into undisturbed native glacial till, as identified by the AMEC Support Engineer, in areas where the native glacial till thickness exceeds 2.0 m or as directed by the AMEC Support Engineer. In areas where the native glacial till is less than 2.0 m thickness, overburden shall be removed until competent bedrock, as identified and approved by the AMEC Support Engineer. The thickness of glacial till at the cutoff trench is to be confirmed by performing test pits at locations adjacent the cutoff trench alignment as directed by the AMEC Support Engineer.

In glacial till the cutoff trench excavation will have a base width of 2.0 m, while in bedrock, the cutoff trench base width maybe to excavated to the full 5.0 m width of the Zone S core, if

directed by the AMEC Support Engineer. Excavation side slopes shall be a maximum of 1 horizontal to 1 vertical (1H:1V). Steeper slopes may be accepted in bedrock at the discretion of the AMEC Support Engineer.

Where bedrock is encountered beneath the embankment Zone S till core, special measures will be required to prepare the bedrock foundation prior to Zone S till fill placement. Loose and weathered rippable bedrock shall be removed to the point where an interlocking rock structure remains, at the discretion of the AMEC Support Engineer who will determine the point at which large-scale excavation can be halted and detailed cleaning commenced. Additional specifications related to bedrock encountered in the cutoff trench are provided in Section 4.2.3 below.

The cutoff trench excavation will be protected from moisture softening due to surface water inflow or excessive precipitation. Water seeping into the cutoff trench excavation will be removed by pumping, and will not be permitted to collect and remain in the excavation.

Prior to placement and compaction of structural fill in the cutoff trench excavation, AMEC's Support Engineer will approve the preparation of the trench. Inspections will occur as foundation areas are prepared and the approval will be documented in the monthly report. Photographic records will be maintained to identify foundation areas that have been inspected and approved, clearly indicating their date of inspection. Areas not approved for placement of structural fill by the AMEC Support Engineer are not to be covered with fill under any circumstances to avoid having to remove/replace materials.

The MPMC Field Inspector will verify that the cutoff trench is founded in the minimum specified depth of glacial till, conducting soil probing as required. Cutoff trench excavation inspections will be performed as required, and inspection dates and results will be tracked by the MPMC Field Inspector on copies of the construction drawings and/or by station number. MPMC Field Inspectors, with support from the mine technicians, will provide a survey pick-up of the cutoff trenches and maintain a project database for use in the as-built documentation.

Zone S Till Core Cutoff Trench Subgrade Preparation (to Bedrock)

If bedrock is encountered in the dam foundation cutoff trench, special considerations exist and special bedrock treatment measures may be required. Guidelines and procedures for dealing with bedrock exposed in the cutoff trenches are as follows:

Weathered or fractured bedrock is defined as bedrock that can be readily excavated by a dozer or a hoe excavator equipped with a digging bucket and that, based on visual assessment, is highly pervious to groundwater flow due to the presence of fractures/joints/faults. Sound (competent) bedrock, is defined as bedrock that can be excavated only with significant difficulty (or not at all) by a hoe excavator equipped with a digging bucket. When excavating in bedrock, frequent communication with AMEC's Project Manager/Principal Engineer and transmission of photographs is to be carried out.

If shear/fault zones are encountered within the bedrock exposed in the core to abutment contacts, the following information should be collected and passed on to AMEC's Project Manager/Principal Engineer:

- ***Photographs of the shear zone*** from a variety of vantage points (both close-ups and photos giving an overall perspective);
- ***Orientation*** (strike & dip) of the feature and its orientation relative to that of the core zone (i.e. does it provide a potential upstream-downstream seepage pathway?).
- ***Thickness and continuity***; and
- ***Infilling material*** (i.e. clayey gouge, granular material) The infilling material should be sampled and sent to the AMEC Prince George soils laboratory for grain size and Atterberg limits testing.

AMEC's Project Manager/Principal Engineer, upon analysis of the information provided, will determine what (if any) special treatment is required for the shear/fault zone. Such treatment may include hand excavation a few centimeters into the shear zone, followed by placement of bentonite powder in advance of till placement.

Once sound bedrock is encountered, the surface should be cleaned of loose materials using an excavator equipped with a narrow cleaning bucket, followed by pressure washing using either air or water. Where the slope of the cleaned and approved sound bedrock surface, along the axis of the dam (i.e. up the abutment), is flatter than 1H:1V, then Zone S structural fill placement may proceed. Good compaction of the Zone S fill against the bedrock surface is required. If the undulations in the bedrock surface along the bottom of the trench are such that this cannot be achieved using dozers and the compactor, then such undulations (i.e. rock protrusions) should be removed if possible. If this is not possible, then compaction of thin till lifts with a walk-behind or plate-tamping compactor, or with tamping with an excavator bucket, will be required to fill in the undulations. Once this is done, then normal spreading and compaction procedures can be undertaken.

Where the slope of the sound bedrock surface is steeper (overall) than 1H:1V, but flatter than 0.5H:1V, then the AMEC Project Manager/Principal Engineer should be consulted for a decision on the need for any further treatment measures. Photographs illustrating the bedrock surface should be sent to the AMEC Project Manager/Principal Engineer. If the roughness of the rock surface is such that it is judged that effective compaction of till fill against the bedrock on the base of the trench cannot be achieved, then additional (small scale) bedrock excavation (removal of protrusions) should be attempted to attain a surface against which it is judged till fill can be effectively compacted. If the execution of this measure is unsuccessful, then one of the following additional measures will be required:

(a) Additional (large scale) bedrock excavation should be undertaken to achieve a maximum 1H:1V overall slope for the bedrock surface. This can be achieved by mechanical means (dozers, excavators), or by small scale, controlled drilling and blasting.

(b) Dental concrete or shotcrete application will be required to fill in the undulations in the bedrock surface, and yield a maximum slope of 0.5H:1V, against which till fill can be effectively compacted.

Where the bedrock surface is steeper than 0.5H:1V, the same two measures outlined above will apply.

Where dental concrete is required against steep bedrock faces, it will likely be necessary to use formwork. Dental concrete, if used, will conform to the following specifications:

- 28 day strength – minimum 25 MPa (if flyash included in mix), otherwise minimum 30 MPa.
- Water to cement ratio: 0.45:1 by mass.
- Air entrainment: to provide for 5% to 7% air entrainment.
- Cement to flyash ratio (if flyash used): 4:1 by mass, which would allow overall water:cement:flyash ratio of 0.45:0.8:0.2.

The dental concrete need not be of high strength. It does, however, need to be sufficiently fluid that it will fill in irregularities in the bedrock surface to a reasonable extent. Addition of flyash to the mix would achieve that objective, as well as reducing cement costs.

Should shotcrete be selected, MPMC will prepare a mix design for review and approval by AMEC.

Prior to placement and compaction of structural fill in the cutoff trench excavation, AMEC's Support Engineer will approve the preparation of the trench. Inspections will occur as foundation areas are prepared and the approval will be documented in the monthly report. Photographic records will be maintained to identify foundation areas that have been inspected and approved, clearly indicating their date of inspection. Areas not approved for placement of structural fill by the AMEC Support Engineer are not to be covered with fill under any circumstances to avoid having to remove/replace materials.

The MPMC Field Inspector will verify that the cutoff trench is founded on sound bedrock. Cutoff trench excavation inspections will be performed as required, and inspection dates and results will be tracked by the MPMC Field Inspector on copies of the construction drawings or by station number. MPMC Field Inspectors, with support from the mine technicians, will provide a survey pick-up of the cutoff trenches and maintain a project database for use in the as-built documentation.

Zone S Till Core Subgrade Preparation outside of Cutoff Trench

General subgrade preparation for the abutment areas outside of cutoff trench extensions shall be in accordance with Section 4.2.1. Outside of the cutoff trenches, the Zone S till core fills will traverse areas where subsoil generally comprises glacial till overlying bedrock. Following stripping of loose/organic soils, the AMEC Support Engineer will determine whether or not the subsoils for the portion of the core upstream of the cutoff trench are deemed to be pervious, directing additional excavation to remove such soils to reach less pervious soils if required.

Where bedrock is encountered beneath the Zone S till core, outside the limits of the cutoff trench, loose and weathered rippable bedrock shall be removed, as directed by the AMEC Support Engineer, who will determine the point at which large-scale excavation can be halted.

Detailed cleaning of the bedrock foundation will not be required unless specifically requested by the AMEC Support Engineer in localized areas where significant shear/fracture zones are indicated.

Placement, Compaction and Testing of Granular Fill Materials

The following subsections provide a description of the placement, compaction and testing requirements for each of the granular fill material zones. A detailed summary is also provided in Drawing 2013.08.

Requirements for placement of material within the embankment foundation drainage ditch and drainage blanket areas (Zone F) are outlined in Section 4.3.2.

Zone S (Core) – Glacial Till

The glacial till borrow materials approved for construction are to be well graded, organic-free, mineral soils, having moisture contents near their optimum for compaction. The optimum moisture content range of the borrow soils is to be determined by Standard Proctor moisture-density relationship testing. A general guideline for allowable moisture contents for the Zone S structural fill is ±1% of the optimum moisture content as determined by the Standard Proctor test.

The proposed till borrow soils are to be visually inspected for consistency on a daily basis by MPMC Field Inspectors. Any material not meeting specification shall not be placed within the embankment. The till borrow pit is to be sampled bi-weekly or every 10,000 m^3 removed, whichever is less, and shipped to the AMEC Prince George Laboratory for testing. Samples are to be collected and shipped according to ASTM standard: Standard Practices for Preserving and Transporting Soil Samples (D4220-07); and shall consist of two (2) three-quarter (3/4) full 5-gallon buckets, void of any oversized rocks (>75 mm in diameter). If the representative sample contains oversized rocks, they are to be collected, weighed, and noted as being removed from the collected sample.

Prior to placement of glacial till, the previous lift or prepared abutment is to be scarified. Scarification should only be carried out for the areas that will be immediately covered (during the work day). Moisture conditioning may be required between successive lifts in the event of significant drying to achieve adequate bonding between lifts.

A sample of as-placed glacial till is to be collected from the embankment bi-weekly (offset from the borrow pit sample) or every 6,500 linear meters, whichever is less, and shipped to the AMEC Prince George Laboratory for laboratory testing. The samples are to be collected and shipped as described above.

The approved glacial till is to be spread in loose 0.3 m thick lifts and compacted by a 10-ton vibratory smooth drum compactor. A minimum of 95% compaction of the Standard Proctor maximum dry density is to be achieved.

Placed and compacted glacial till is to be tested for compaction at least once (1) per 100 linear meters per lift to confirm that specified compaction of 95% has been achieved. Compaction testing will be carried out with a nuclear densometer (ND). The compaction testing should be conducted in accordance with ASTM standards D6938-10. The compaction test locations are to be surveyed and identified by three dimensions (elevation, northing and easting), and submitted to AMEC Support Engineer on a daily basis.

In addition to the density tests, a confirmatory in-situ moisture content sample is to be collected once (1) per 1,000 linear meters per lift or once (1) per day per lift, whichever is less. The moisture content testing should be conducted in accordance with ASTM standards: Water (Moisture) Content of Soil and Rock (D2216-10) and Correction of Unit Weight and Water Content for Soils Containing Oversize Particles (D4718-07). The confirmatory moisture test will identify the accuracy of ND density testing. If there is a greater than 10% difference between the ND and laboratory sample a secondary test is to be conducted, and if the issue persists AMEC's Support Engineer is to be informed immediately.

Upon receiving collected samples, AMEC's Prince George Laboratory will perform the following tests utilizing ASTM standards: Particle Size Analysis of Soils (D422-07) and (D6913-09), Laboratory Compaction Characteristics of Soil Using Standard Effort (D698-07), Liquid Limit, Plastic Limit, and Plasticity Index of Soils (D4318-10).

Zone F (Filter) – Sand and Gravel

The filter material is to be well graded, sand and gravel. Routine testing of the crushed material is to be carried out prior to its transportation to the TSF. The test program will determine if the manufacturing process is consistent, and if the produced material is within the design specification. After transportation of the aggregate to the TSF, regular representative samples from the stockpiles are be collected. On-site testing of the collected samples will consist of a minimum of one (1) sample per 5,000 m^3 per stockpile or as deemed to be representative of the stockpile. Off-site testing of the collected samples will consist of a minimum of one (1) sample per stockpile.

Zone F material is to be placed in a trench excavated at the downstream limit of the Zone S till core zone, extending through the over-built Zone T transition zone and into the underlying sand and gravel filter layer. A minimum trench width of 1.5 m is required at the base of the trench in order to fully expose the previous lift of filter and allow for an adequate amount of tie-in with the previous lift.

Experience gained from similar dam construction at other mine sites show that to minimize the width of the filter trench at the top and obtain the minimum 1.5 m width at the base, the optimum depth of the trench for each lift of Zone F filter material is a depth of XXX m, which in turn controls the lift thickness for the Zone T transition and Zone C material placed downstream of the Zone F. That lift thickness also enables identification of any oversize materials that can be removed from the Zone F/T interface and thus achieve the required filter compatibility at that interface.

Care will be taken during handling and placement of the material to minimize segregation and to avoid cross contamination of the zones. If cross contamination of the zones occurs the contaminated material is to be removed. MPMC's Field Inspector is to visually inspect the as-placed Zone F material to ensure that the material is well graded and is placed to the specified widths. Zone F is to be compacted a minimum of four (4) passes with a 10-ton vibratory smooth drum. Compaction is typically completed concurrently on both Zone F and Zone T material. Visual inspection after compaction will be carried out and approved by the MPMC Field Inspector. (Is compaction necessary?)

Zone F placement and compaction in the drainage ditch and drainage blanket??

On-site testing of Zone F during placement will include visual determination of upper and lower bound grain sizes, suitability of rock hardness, and sieve analysis (C117-04/C136-06) once (1) per placement event or once (1) per 2,500 linear meter of placed material. Off-site testing of this material during placement will consist of sieve analysis (C117-04/C136-06) once (1) per 5,000 linear meters of placed material.

Samples are to be collected and shipped according to ASTM standard D4220-07; each sample consisting of one (1) three-quarter (3/4) full 5-gal buckets, void of any oversized rocks (<75 mm in diameter). If the representative sample is to contain oversized rocks, they are to be collected, weighed, and noted as being removed from the collected sample.

Zone T (Transition) – Fine NAG Rock Transition

Fine NAG rock transition material shall be confirmed to be non acid generating by MPMC prior to use as fill on the embankments. On site testing of this material includes visual determination of upper and lower bound grain sizes, suitability of rock hardness, and sieve analysis (C117-04/C136-06) once (1) per 5,000 m^3. Off site testing of this material, will consist of sieve analysis (C117-04/C136-06) once (1) per 10,000 m^3. Special care shall be taken during sampling to ensure that representative samples are obtained. Photographs of this material when exposed in the excavated filter trenches are to be taken frequently, as the best means of assessing the

ability of Zone T to serve as a filter for Zone F is through visual means. Samples are to be collected and shipped to the AMEC Prince George Laboratory according to ASTM D4220-07; each sample consist is to consist of three (3) three-quarter (3/4) full 5-gal buckets.

The fine NAG rock transition zone serves as filter protection for the adjacent Zone F filter sand and gravel which in turn serves as filter protection for the Zone S core. The importance of conformance with gradation specifications for both of these filter zones cannot be over-emphasized. Photographs of this material are to be taken frequently during placement.

Zone T material is to be placed in maximum (can this max be increased?) lift thicknesses of 0.6 m. Care will be taken during handling and placement of the material to minimize segregation. Zone T lifts will be compacted by uniform routing of haul trucks and spreading equipment. Visual inspection after compaction will be carried out and approved by the MPMC Field Inspector.

Zone C (General Rockfill) – Coarse NAG Rock Shell

Coarse NAG rockfill shall be confirmed to be non acid generating by MPMC prior to use as fill on the embankments. Routine visual inspections shall be completed in order to confirm the specified maximum particle size of 1 m.

The rockfill shell will be placed in lift thicknesses of 0.6 m (based on Zone T lift as noted above?) or less. Care should be taken when placing Zone C material adjacent to the Zone C/Zone T interface. The material is to be placed so as to minimize the possibility for openwork areas created by concentrations of larger size rocks. Removal of openwork areas will be carried out prior to placement of Zone T. The lifts will be compacted by uniform routing of haul trucks and spreading equipment. Well graded NAG rockfill with a maximum particle size of 0.5 m will be placed adjacent the Zone T to reduce the potential for particle migration from the transition zone into large voids within the rockfill shell. Some degree of compaction of Zone C is required nearer Zone T although excessive settlement of the rockfill could disrupt the continuity of the overlying transition and fine filter materials (Zones T and F respectively). If the Zone C material contains appreciable quantities of fines, and the compacted lift surfaces assume a ‘pavement’ type appearance that might impede vertical drainage, lift surfaces may require scarification prior to placement of a subsequent lift.

Zone U (Selected Upstream Fill) – Tailings/NAG

Zone U fill will generally consist of end of pipe spigotted tailings, deposited in cells and reworked with a dozer. The cells are constructed by confining the discharged tailings with berms along four sides. The confining berms are designed with a culvert running perpendicular to the berms to allow for the water and finer materials to drain into the TSF. The coarse tailings sand that settles out into the cells is to be reworked with the help of a dozer to achieve proper distribution within the cells, provide compaction and to expedite the excess water drainage. This construction method has been used and proven effective by MPMC in previous TSF embankment raises.

In areas of the embankment (along the Main Embankment) where there is not sufficient tailings line pressure to deposit tailings using the cell method, NAG run-of-mine waste rock will be used. Care will be taken during construction of the downstream berm (Zone U/Zone S interface) to ensure the NAG rock is well graded and free of boulders larger than 0.5 m in diameter.

Criteria for Suspension of Work

Construction work on the embankment may be temporarily suspended at any time, at the direction of the AMEC Support Engineer and/or MPMC Project Manager. Work suspension is based on the following criteria:

- **Saturated Till Borrow**

The till borrow material is highly sensitive to moisture in terms of its compaction characteristics and workability. Consequently, during periods of wet weather, construction of the core zone will be suspended. Adequate slopes will be maintained on till fill surfaces, and they will be sealed with a smooth drum vibratory roller to promote surface water runoff and prevent excessive softening of compacted fill. Moisture-softened lifts must be removed or scarified, dried to acceptable moisture content and re-compacted.

- **Instrumentation Triggers**

Embankment construction will be suspended if the inclinometers or piezometers fall under the yellow or red condition as described in Table 4.1, and/or if embankment foundation piezometer data indicates a significant increasing trend.

Table 0.1: Instrumentation Trigger Levels

Condition	Inclinometer Movement Rate		Main Embankment Foundation Piezometer	
	(mm/day)	(bi-weekly)	Elevation (m)	Above original ground (m)
RED	> 1 mm/day	>14mm	> 925 m	>13 m
YELLOW	0.5 mm/day to 1.0 mm/day	7 mm to 14 mm	921 m to 925 m	9 m to 13 m
GREEN	< 0.5 mm/day	7 mm	< 921 m	< 9 m

- **Freezing Temperatures**

Embankment construction work will be halted for the season when freezing weather temperatures prevent acceptable fill placement and compaction.

TESTING AND SAMPLING PROCEDURES

General

Testing of embankment fill materials shall be completed as outlined above and in Drawing 2013.08.

Additional testing may be completed upon recommendations by the AMEC Support Engineer. Determinations of specific gravity (ASTM D854-10) for the approved glacial till and borrow soils may be required if significant material changes are observed. These tests will be conducted at the AMEC Prince George laboratory, following the sample collection procedures in Section 5.2. Typically, two or three specific gravity determinations are required for each soil type.

Sample Collection Procedures

Samples are to be transported to the AMEC Prince George laboratory for field laboratory verification testing will be sealed to minimize soil moisture losses, and shipped in an expedient manner. The shipping address is as follows:

Attn: Dmitri Ostritchenko (Mt. Polley)
AMEC Environment and Infrastructure
3456 Opie Crescent
Prince George, BC
V2N 2P9

The MPMC Field Inspector shall include transmittals with the samples outlining the tests to be carried out for each respective sample. These transmittals are to be emailed to AMEC's Support Engineer in advance of the shipment and are to be included in the daily construction report. The AMEC Prince George laboratory will check that the label information attached to each sample is incorporated onto the corresponding test sheets, and that copies of the test sheets and results are forwarded to AMEC's Support Engineer as the tests are completed. AMEC's Support Engineer will review the test results and submit them in the monthly report, or sooner if immediate actions are needed.

Samples collected by the Field Inspectors for the scheduled tests during the 2013 construction will be identified by a detailed labelling scheme. For example:

SAMPLE LABEL	
Project name :	Mt. Polley Mines Project
Construction :	Stage 9 Raise – 2013
Material :	*Glacial Till (Zone S)*
Source :	*Main Embankment*
Location :	*Elev. 965.0, 1.0 m d/s of CL, station 21+00*
Date :	*June 20, 2013*
Sample Number :	*ZS1-Jun6,2013*
Sample Destination:	AMEC Prince George Laboratory
Test Type(s):	*Standard Proctor, Gradation*

Sample locations, material descriptions, and other relevant notes will be recorded by the MPMC Field Inspectors. The sample label information, accompanying field notes, and test results will be included in the construction reports as part of the permanent record of the 2013 construction program.

Samples will be collected and preserved in a manner consistent with their scheduled tests, such as the placing and sealing of samples for natural moisture content determinations in plastic bags.

REPORTING

Construction Documentation

MPMC's Field Inspectors will document the 2013 embankment construction activities by means of daily construction reports, field and laboratory test sheets, survey reports, photographs and notes from relevant on-site meetings and discussions. Other documents, such as borrow area excavation diagrams or dam construction progress maps, may also be included within the construction documents. A photographic record will be maintained and illustrated with select photographs captioned, dated, and included in daily construction reports as well as the as-built report.

Daily Construction Reports

MPMC Field Inspectors will be responsible for submitting a daily construction report. A sample of a daily construction report is attached in Appendix B. The information to be provided in these reports includes but is not limited to the following:

- ***Construction Activities*** – Foundation preparation, preparation activities prior to fill placement, material placement (location, method, equipment) and compaction efforts;
- ***Material Laboratory Testing*** – Sample collection (date, material, location), testing required;
- ***Compaction Testing*** – Method of test, location (offset, Northing, Easting, elevation), comparative laboratory moisture content sampled (location, elevation);
- ***Instrumentation Readings*** – Piezometer or Inclinometer data collection;
- ***Non-compliance Issue****s* and ***Mitigating Actions*** to be taken.
- ***Daily Activities Photographs*** – Photographs depicting various activities performed in relation to TSF embankment construction. A minimum of six (6) high quality photographs are generally appropriate per daily report.

Daily reports are to be signed and submitted via email by 10:00 am of the following day to AMEC's Support Engineer and MPMC's Project Manager for review.

Monthly Progress Reports

Monthly progress reports will be prepared by the AMEC Support Engineer for those periods when active construction is ongoing. The report will summarize the monthly construction activities, material testing results, instrumentation readings and compliance with the design specifications. These reports will be issued to the MPMC Project Manager, AMEC's Project Manager and AMEC's Principal Engineer.

In addition to the monthly reports, a formal monthly meeting during active construction is to be conducted between the AMEC Support Engineer, MPMC Project Manager and MPMC Field

Inspector\Mine Technicians. The purpose of this meeting is to address any concerns, and determine if the specifications and standards for construction and testing are followed.

As-Built Report/Annual Review

AMEC will prepare a report summarizing the construction methodology followed and documenting the as-built conditions for the 2013 construction season. This as-built report will be combined with the 2013 annual review report. The report will be confirmation that the embankment was raised in conformance with design intent, and will serve as a guide for construction of TSF embankment in subsequent years.

The as-built report will also outline any modifications made in the field to the initial methods of foundation preparation, borrow soils excavation, hauling, placement, compaction or other relevant work. Documentation of any such refinements made during construction will be of benefit for subsequent embankment raises. The as-built report will also include recommendations pertinent to the construction and QA/QC monitoring of future construction.

MPMC will mark-up the construction drawings based on as-built surveys of the raised dam. These marked-up drawings will be used by AMEC to produce CADD as-built drawings for the report.

Instrumentation & monitoring

General

Instrumentation in the TSF consists of slope inclinometers (SI) and vibrating wire piezometers (VW). During 2012, two (2) SI's were installed within the TSF (SI13-01 and SI13-02). One SI was installed to replace an existing defective instrument and the other, to enable monitoring in an additional location along the Perimeter Embankment. Currently, there is no additional instrumentation installation planned for 2013.

The locations of the instruments are illustrated in plan view on Drawing 2013.09.

Vibrating Wire Piezometers

A total of eighty (80) functioning VW's have been installed along the embankment. The VW's monitor pore pressures in the embankment fill and within the embankment foundation. The data collected provides the pore pressure parameters that are used for limit equilibrium stability analyses. This information will continue to be required for monitoring the short and long term performance of the structure and for design optimization of future raises.

During active construction, piezometers are to be read, recorded, and submitted to the AMEC Support Engineer bi-weekly. The MPMC Field Inspector shall carry out these readings and indicate on data plots (making reference to the setting out line (S.O.L)) when construction activities have taken place within 100 m of the piezometers. This is required so that changes in piezometric pressures and measured displacements can be correlated with construction activities. During non-active construction the data should be read, recorded, and submitted monthly. The AMEC Support Engineer shall be responsible for interpreting and analyzing data collected. Based on embankment performance, the reading frequency may be increased or decreased at the sole discretion of the AMEC Principal Engineer.

Inclinometers

Overall, eight (8) inclinometers have been installed and are functioning in the TSF; six (6) along the main embankment and two (2) along the perimeter embankment. Slope inclinometers are installed to measure the displacement of the embankment.

During active construction, the slope inclinometers are to be read, downloaded and then submitted to the AMEC Support Engineer on a bi-weekly basis. During non-active construction the data should be read, downloaded and submitted on a monthly basis. The AMEC Support Engineer shall be responsible for interpreting and analyzing data collected. Based on embankment performance, the reading frequency may be increased or decreased at the sole discretion of the AMEC Senior Geotechnical Engineer.

Closure

This report has been prepared for the exclusive use of MPMC for specific application to the area within this report. Any use which a third party makes of this report, or any reliance on or decisions made 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 report. It has been prepared in accordance with generally accepted engineering geology and geotechnical engineering practices. No other warranty, expressed or implied, is made.

If you have any questions about the content of this manual, please do not hesitate to call.

Respectfully submitted,

AMEC Environment & Infrastructure,
a Division of AMEC Americas Limited

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DRAWINGS

APPENDIX A

Stability Analysis

APPENDIX B

Sample Daily Construction Report