



June 29, 2015

ISSUED FOR USE FILE: 704-K13103109-07 Via Email: awilson@rdck.bc.ca

The Regional District of Central Kootenay Box 590, 202 Lakeside Drive Nelson BC, V1L 5R4

Attention: Amy Wilson, B.Sc., AScT HB Tailings Facility Technologist

Dear Ms. Wilson,

Subject: HB Tailings Facility – Letter of Assurance

## 1.0 INTRODUCTION

Tetra Tech EBA Inc. (Tetra Tech EBA) has been retained by the Regional District of Central Kootenay (RDCK) to prepare this Letter of Assurance for three components of the HB Tailings Facility. The need for this letter results from a Memorandum issued by the Chief Inspector of Mines on February 3, 2015 (attached as Appendix B).

The information provided and opinions expressed are based on a review of the available data, refer to the attached Table 1, and Tetra Tech EBA's experience.

### 2.0 ITEM 1 - UNDRAINED SHEAR FAILURE OF SILT AND CLAY FOUNDATION

The information available regarding the foundation material is included in the February 5, 2002 BGC Engineering Inc. report "H.B. Mine Tailings Pond and Dyke Decommissioning Plan" and the May 28, 2014 Tetra Tech EBA Inc. report "Dam Safety Review of HB Tailings Storage Facility Salmo BC".

There are logs of five boreholes and eight testpits within, or near, the footprint of the embankment. These test holes confirm that the foundation includes a zone of soft to stiff glaciolacustrine clayey or sandy SILT overlying compact to dense till. Therefore a shear failure through the foundation must be considered in the dam design.

BGC Engineering Inc. completed stability analyses using strength parameters derived from SPT results and other index tests. (Sandy SILT c' = 0 kPa and  $\emptyset'$  = 35°. Silty CLAY Su = 150 kPa). The Factor of Safety was estimated to be 1.2 and a recommendation made to construct a berm at the downstream toe. This berm was subsequently constructed.

Tetra Tech EBA also did a stability analysis utilizing a drained strength for the glaciolacustrine deposit of c' = 1 kPa and  $\emptyset' = 35^{\circ}$ . The estimated Factors of Safety were above the required levels. It is noted that there has been no direct measurement of the strength parameters of the glaciolacustrine material.

There has been no indication of movement of the foundation documented, however there are no slope inclinometers installed at this facility to measure horizontal deformation.

The specific question posed by the Ministry of Energy and Mines references an 'undrained shear failure'. The last raise of the embankment at this facility was competed in 1977, more than 37 years ago. The pore pressures induced by that loading, which were not likely very large as the raise was only 4.6 m, will have long ago dissipated. As there are no plans for additional fill to be placed, it is unlikely that, for steady state conditions, an 'undrained shear failure' will occur. However, a seismic event could create conditions where an undrained shear failure may be possible.

The strength parameters used in the stability analysis to date have been developed from correlations as opposed to direct measurement.

In order to provide a better estimate of these parameters, it is recommended that a site investigation program be completed to obtain "undisturbed" samples of the glaciolacustrine materials. Selected samples should be subjected to laboratory testing to establish the drained and undrained parameters. Although the program has not been finalized, it is anticipated that two to four boreholes will be advanced from the embankment surface to the underlying bedrock.

We understand that the RDCK has committed to undertaking this work in 2015.

# 3.0 ITEM 2 - WATER BALANCE ADEQUACY

Since 1981, no tailings have been added/placed at the HB Dam. Decommissioning efforts (such as the construction of a downstream stabilization berm, construction of a spillway cut into rock on the right abutment, placement of erosion protection on the upstream face, and installation of piezometers within the foundation and fill), undertaken by the RDCK have occurred in 2005. Management of the dam followed the Operation, Maintenance, and Surveillance (OMS) Manual developed by Conestoga-Rovers & Associates (CRA) and subsequently revised by Tetra Tech EBA.

As no further mining or tailings related activities have been carried out at the HB Dam since 1981, the primary source of water recharge to the tailings pond is surface runoff. It is Tetra Tech's understanding that the facility will remain inactive indefinitely with no further tailings placement or storage of surplus mine site water.

As detailed in the Dam Safety Review completed by Tetra Tech and submitted to the RDCK on May 28, 2014, the consequence classification for HB Dam was raised to "Very High", based on the results of the dam breach analysis. With the "Very High" classification, the Inflow Design Flood (IDF) was estimated to be 2/3 of the way between a 1,000-year flood and the Probable Maximum Flood (PMF). As concluded in the same report, the available freeboard is sufficient to meet the minimum requirement for the higher IDF event, and the dam will not be overtopped by waves from a 1,000 year wind event under normal reservoir conditions.

Specific to the spillway, Tetra Tech has determined that the peak inflow during the IDF would be safely conveyed by the spillway; however, part of the riprap protection of the existing spillway was removed and used for emergency repairs during the 2012 embankment slough event. Following the completion of the emergency repair works, Tetra Tech recommended to reinstate the riprap protection along the spillway. In 2014, RDCK commissioned Tetra Tech to complete the detailed design.

The proposed the spillway repair works were tendered in March 2015, and the construction is scheduled to be completed by September 2015.

# 4.0 ITEM 3 - FILTER ADEQUACY

The 2014 Dam Safety Review looked at the piping potential and concluded:

- The filter compatibility assessment indicated that the current dam filter probably does not meet modern filter design criteria; and
- The filter does not extend above the maximum pond level and critical hydraulic gradients could develop near the crest of the dam.

The following recommendation was provided:

 A feasibility engineering study should be undertaken to assess various modifications that could be made to the embankment to reduce its vulnerability to internal erosion. Depending on the outcome of this study, it is possible that a geotechnical investigation would be required during detailed design to confirm the geotechnical properties of the existing dam filter and core materials.

There has been no additional information collected or made available since this study.

Subsequent to the Dam Safety Review, discussions between Tetra Tech EBA and RDCK concluded that it would be prudent to proceed with a geotechnical investigation as the feasibility study was unlikely to be conclusive. As stated earlier, the RDCK intends to have a geotechnical site investigation completed in 2015 and this study will include sampling and laboratory testing of the fill and foundation materials. Filter compatibility will be assessed based on the data obtained.

## 5.0 LIMITATIONS OF REPORT

This letter and its contents are intended for the sole use of the Regional District of Central Kootenay and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the Regional District of Central Kootenay, or for any Project other than the proposed development at the subject site. During the performance of the work and the preparation of the report, Tetra Tech EBA relied on information provided by persons other than the Client. While Tetra Tech EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

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The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, options, and recommendations contained in the Report are the result of the application of professional judgement to such limited data and are therefore not free from risk. While Tetra Tech EBA has taken care to reasonably minimize such risk, it is incumbent upon the Client, and any Authorized Party, to be aware of the level of risk that has been incorporated into the Report and any associated designs.

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# 6.0 CLOSURE

Based on a review of available information, it is Tetra Tech EBA's opinion that the Regional District of Central Kootenay should undertake studies regarding the strength parameters of the foundation overburden and the internal erosion potential at the HB Tailings Facility.

We trust this letter meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted, Tetra Tech EBA Inc.

29 2015

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Reviewed by: Bob Patrick, M.Sc., P.Eng. Principal Geotechnical Engineer Direct Line: 250.756.2256 x243 Bob.Patrick@tetratech.com

#### /dr

Attachments: Table 1 – Review of Available Data Appendix A - Tetra Tech EBA's General Conditions – Geotechnical Report Appendix B - Memorandum issued by the Chief Inspector of Mines on February 3, 2015



# TABLE

Table 1 Review of Available Data



# **BACKGROUND INFORMATION REVIEW**

The following documentation contained within the Regional District of Central Kootenay file was reviewed to obtain relevant background information on the HB Mine Tailings Storage Facility.

- 1972 June 22 Report to Cominco Ltd. Re: HB Tailing Dam near Salmo, BC Golder Brawner Associates\_1
- 1972 June 22 Report to Cominco Ltd. Re: HB Tailing Dam near Salmo, BC Golder Brawner Associates\_2
- 1972 June 22 Report to Cominco Ltd. Re: HB Tailing Dam near Salmo, BC Golder Brawner Associates\_3
- 1972 March 5 Memo to Minister of Dept Mines and Petroleum Ref. Section 11 Mines Regulation Act Cominco Ltd, HB Mine
- 1973 to 1983 correspondence and memoranda related to mining
- 1974 January Report to Cominco Ltd. on Site Investigation at Existing HB Mines Tailings Pond Golder Brawner Associates
- 1974 January Report to Cominco Ltd. on Site Investigation at Existing HB Mines Tailings Pond Golder Brawner Associates (duplicate)
- 1974 June HB Mine Tailing Dike Extension Instructions to Tenders Cominco Ltd.
- 1976 January 27– Letter and Progress report to Department of Mines and Petroleum Resources Cominco Ltd.
- 1976 March 25 PCB File No 0262100–PE–1853 Stability of Tailings Dam HB Mine correspondence and reports
- 1976 December Report to Cominco Ltd on Proposed dam Extension 1976 HB Mine Golder Associates
- 1977 February Cominco Ltd. HB Tailing Dike Extension
- 1977 March 29 Letter to Cominco re HB Tailing Dike Extension propsal and Specification
- 1977 May 5 Dept. Mines and Petroleum Resources letter HB Tailings Pond Extension 1977 Stability of Dam
- 1977 June 9 Letter from Senior Reclamation Inspector to Cominco HB Mine Taiing Dam Spillway
- 1977 July 22 Letter to Cominco Re HB Mine Tailings Dam Spillway
- 1978 April 20 Letter to Cominco Ltd. ref. Effluent Quality Survey October 1977 BC Environmental Protection
- 1981 November 27 Tailings Disposal Scheme, HB Mill Salmo, BC David Minerals Ltd.
- 1981 November 27 Tailings Disposal Scheme, HB Mill Salmo, BC David Minerals Ltd. (duplicate)
- 1982 February 8 Cominco cover letter ref HY Mine Surface Work Permit M–85





- 1982 March Stage 1 Submission for Reactivation of the HB Mill Located at Salmo\_BC International Environmental Consultants Ltd.
- 1982 March 15 Letter from Reclamation Inspector to David Minerals
- 1982 May 11 BCEMPR Memo HB Gold Project
- 1982 June 21 BCMEMPR Memo \_Re Safe storage level of tailings
- 1982 July 13 David Minerals Letter Ref Reclamation Hy Tailings Pond
- 1982 November 12 Letter from David Minerals to BCMEMPR Ref Reclamation Permit for the HB Mine
- 1982 November 18 BCMEPR Letter HB Property
- 1982 November 23 Letter from BCEMPR to David Minerals Ltd Ref Reclamation Permits M–85 HB Mine
- 1982 December 8 File Not M–85 David /Cominco HB Mine
- 1983 January 25 Letter from BCEMPR to David Minerals Ltd Ref Reclamation Permits M–85 HB Mine
- 1983 August 31 Cominco letter and Attachments to Registrar of Securities
- 1982 October 24 BCEMPR Letter to David Miners procedure for making application for reclamation permit HB property
- 1986 October 23 Report of Inspector of Mines Crushing and Concentrating works BC Ministry of Energy, Mines and Petroleum Resources
- 1987 1997 Inspection Reports Historical pictures from 1951 to 1993
- 1987 October 16– Letter to Nor–Quest Resources Ltd and attached inspection report dated 28 Sep 1987 BC Ministry of Energy, Mines and Petroleum Resources
- 1988 April 13 Letter and Questionnaire to Ministry of Energy of Energy, Mines and Petroleum Nor–Quest Resources
- 1989 January 11 Annual Reclamation Report Reclamation Permit M–85
- 1990 August 10 Bank of Montreal letter to MEMPR
- 1993 February 25 Memo Re HB Mill Reclamation and HB Tailings Pond
- 1993 February 26 Memo Re HB Mill Reclamation and HB Tailings Pond
- 1993 March 3 BCMEMPR Letter to Nor–Quest
- 1993 March 5 Notice of work and Reclamation Program on a Mineral Property
- 1993 March 5 Notice of work and Reclamation Program on a Mineral Property and fax cover
- 1993 March 4 File note from Dr. JC Errington re HB Mine





- 1993 March 17 Memo from MEMPR to Inspector of Mines Re Acid Generation Potential at the HB Mine site
- 1993 April 06 BCMEMPR Amendment to Reclamation Permit
- 1993 April 29 BC Energy Mines and Petroleum Resources Inspection Report
- 1994 May 27 Letter to Nu–Dawn Resources and Inspection Report BC Ministry of Energy Mines and Petroleum Resources
- 1997 April 4 Geological Survey Report and Production Report
- 1997 April 15 Internal Memo re HB Mine M–85
- 1997 June 10 BC MEI Inspection Report
- 1997 June 17 Letter to RDCK ref HB Mine Tailings Impoundment Ministry of Employment and Investment
- 1997 June 17 Letter to RDCK ref HB Mine Tailing Impoundment and responses
- 1997 Aug 6 Interoffice Memo to T Eaton Employment and Investment Re HB Tailing Dam Discharge
- 1997 Aug 11 Letter to C Evans MLA of Nelson
- 1997 October 30 Letter to Nu–Dawn Resources and to Cominco Ltd. and inspection reports date June 1997 and April 1993
- 1997 October 30 Letter to Cominco and attached inspection reports date June 1997 and April 1993 BC Ministry of Employment and Investment
- 2002 HB Mine Tailings Pond and Dyke Decommissioning Plan BGC Engineering Inc.
- 2007 Formal Inspection Report Conestoga–Rovers Associates
- 2008 Operation, Maintenance and Surveillance Manual Conestoga–Rovers Associates
- 2008 Final Draft Emergency Preparedness Plan Conestoga–Rovers Associates
- 2009 Annual Reclamation Report for 2008 Conestoga–Rovers Associates
- 2011 HB Dam Formal Annual Dam Inspection Report 2010 EBA
- 2011 HB Dam Formal Annual Dam Inspection Report EBA
- 2012 HB Mine Tailings Storage Facility Embankment Dam Slough Response EBA
- 2012 HB Mine Tailings Storage Facility Assessment of Embankment Dam Sloughing EBA



# **APPENDIX A** TETRA TECH EBA'S GENERAL CONDITIONS



### **GEOTECHNICAL REPORT**

This report incorporates and is subject to these "General Conditions".

#### 1.0 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of Tetra Tech EBA's Client. Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than Tetra Tech EBA's Client unless otherwise authorized in writing by Tetra Tech EBA. Any unauthorized use of the report is at the sole risk of the user.

This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Tetra Tech EBA. Additional copies of the report, if required, may be obtained upon request.

#### 2.0 ALTERNATE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Tetra Tech EBA's instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of Tetra Tech EBA's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Tetra Tech EBA. Tetra Tech EBA's instruments of professional service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems. Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

#### 3.0 ENVIRONMENTAL AND REGULATORY ISSUES

Unless stipulated in the report, Tetra Tech EBA has not been retained to investigate, address or consider and has not investigated, addressed or considered any environmental or regulatory issues associated with development on the subject site.

#### 4.0 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. Tetra Tech EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

#### 5.0 LOGS OF TESTHOLES

The testhole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance which requires precise definition of soil or rock zone transition elevations may require further investigation and review.

#### 6.0 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of testholes and/or soil/rock exposures. Stratigraphy is known only at the locations of the testhole or exposure. Actual geology and stratigraphy between testholes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. Tetra Tech EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

1

#### 7.0 PROTECTION OF EXPOSED GROUND

Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance which can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

#### 8.0 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

#### 9.0 INFLUENCE OF CONSTRUCTION ACTIVITY

There is a direct correlation between construction activity and structural performance of adjacent buildings and other installations. The influence of all anticipated construction activities should be considered by the contractor, owner, architect and prime engineer in consultation with a geotechnical engineer when the final design and construction techniques are known.

#### **10.0 OBSERVATIONS DURING CONSTRUCTION**

Because of the nature of geological deposits, the judgmental nature of geotechnical engineering, as well as the potential of adverse circumstances arising from construction activity, observations during site preparation, excavation and construction should be carried out by a geotechnical engineer. These observations may then serve as the basis for confirmation and/or alteration of geotechnical recommendations or design guidelines presented herein.

#### **11.0 DRAINAGE SYSTEMS**

Where temporary or permanent drainage systems are installed within or around a structure, the systems which will be installed must protect the structure from loss of ground due to internal erosion and must be designed so as to assure continued performance of the drains. Specific design detail of such systems should be developed or reviewed by the geotechnical engineer. Unless otherwise specified, it is a condition of this report that effective temporary and permanent drainage systems are required and that they must be considered in relation to project purpose and function.

#### **12.0 BEARING CAPACITY**

Design bearing capacities, loads and allowable stresses quoted in this report relate to a specific soil or rock type and condition. Construction activity and environmental circumstances can materially change the condition of soil or rock. The elevation at which a soil or rock type occurs is variable. It is a requirement of this report that structural elements be founded in and/or upon geological materials of the type and in the condition assumed. Sufficient observations should be made by qualified geotechnical personnel during construction to assure that the soil and/or rock conditions assumed in this report in fact exist at the site.

#### 13.0 SAMPLES

Tetra Tech EBA will retain all soil and rock samples for 30 days after this report is issued. Further storage or transfer of samples can be made at the Client's expense upon written request, otherwise samples will be discarded.

#### 14.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of the report, Tetra Tech EBA may rely on information provided by persons other than the Client. While Tetra Tech EBA endeavours to verify the accuracy of such information when instructed to do so by the Client, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information which may affect the report.



# **APPENDIX B**

MEMORANDUM ISSUED BY THE CHIEF INSPECTOR OF MINES ON FEBRUARY 3, 2015





Ministry of Energy and Mines

Mines and Mineral Resources Division

# MEMORANDUM

February 3, 2015

#### To: Uli Wolf, Mine Manager - HB - Regional District of Central Kootenay

As you know, the Expert Panel that was convened to examine the Mount Polley tailings dam breach has issued a report on their findings. This report has been made public and you may already be familiar with the conclusions of this report. Chief among these was the determination that the failure at Mount Polley was related to the presence of weak glacio-lacustrine soils in the dam foundation. The Panel also indicated that the severity of the consequence of failure was in large part owing to the quantity of stored water and the proximity of this water to the dam embankment (i.e. lack of beach). The Ministry of Energy and Mines (MEM) requires confirmation that the conditions that lead to the incident at Mount Polley are not present at other mines in B.C.

More specifically, you are required to undertake an assessment to determine if the dam(s) associated with your tailings storage facility/facilities may be at risk due to:

- 1. Undrained shear failure of silt and clay foundations;
  - a. Including a determination with respect to whether or not similar foundation conditions exist below the dams on your site,
  - b. Whether or not sufficient site investigation (drill holes, etc.) has been completed to have confidence in this determination,
  - c. If present, whether or not the dam design properly accounts for these materials, and
  - d. If any gaps have been identified, a plan and schedule for additional subsurface investigation.
- 2. Water balance adequacy;
  - a. Including the total volume of surplus mine site water (if any) stored in the tailings storage facility,
  - b. The volume of surplus mine water that has been added to the facility over each of the past five years,
  - c. Any plans that are in place or that are under development to release surplus mine water to the environment,
  - d. Recommended beach width(s), and the ability of the mine to maintain these widths,
  - e. The ability of the TSF embankments to undergo deformation without the release of water (i.e. the adequacy of the recommended beach width),
  - f. Provisions and contingencies that are in place to account for wet years, and
  - g. If any gaps have been identified, a plan and schedule for addressing these issues.

**Ministry of Energy and Mines** 

- 3. Filter adequacy;
  - a. Including the beach width and filter specifications necessary to prevent potential piping,
  - b. Whether or not the filter has been constructed in accordance with the design, and
  - c. If any gaps have been identified, a plan and schedule for addressing these issues.

The Ministry is cognizant of the demands that were placed on your company by the Chief Inspector's Orders of August 18, 2014, and does not wish to place any additional undue burdens on your company. However, the previous Orders were issued before the mechanism of failure was known. Consequently, you are asked to provide a letter of assurance to respond to the items listed above. The letter is to be prepared and sealed by a qualified professional engineer, and is to be submitted to the Chief Inspector of Mines by June 30, 2015. To facilitate MEM's review, you are asked to maintain the above numbering system in your response to each item.

It is envisioned that the above items would best be addressed through a fulsome review of existing information. Where this information has not been compiled, it will be necessary to conduct a review of historical information to determine if any gaps remain in the understanding of the relevant conditions for the tailings storage facility dams on your site. Where appropriate, follow-up actions shall be identified that will be taken to address any opportunities for improvement.

Documents supporting the letter of assurance shall be maintained on-site and shall be made available to any Inspector of Mines upon request.

It should be noted that the Panel made a number of additional recommendations in Chapters 9 and 11 of their January 30, 2015 *Report on Mount Polley Tailings Storage Facility Breach*. MEM is in general agreement with all of the recommendations, and will be examining each of them to determine how they can be implemented over the coming weeks and months. You are asked to do the same.

Thank you for your prompt attention to these matters,

Regards,

Al Hoffman, P. Eng. Chief Inspector of Mines Ministry of Energy and Mines

Cc: Diane Howe, Deputy Chief Inspector, Reclamation and Permitting, MEM George Warnock, Manager, Geotechnical Engineering, MEM Heather Narynski, Sr. Geotechnical Inspector, MEM