TETRA TECH EBA

OQM | Organizational Quality Management Program

November 27, 2014

ISSUED FOR USE
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KGHM Ajax Mining Inc.
Ajax Project
Suite 200 - 124 Seymour Street
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Attention: Kate Parsons, P.Eng.
Environmental Manager

Subject: Review of the Afton Tailings Storage Facility
2014 Annual Inspection Report

1.0 INTRODUCTION

KGHM Ajax Mining Inc. (KGHM) retained Tetra Tech EBA Inc. (Tetra Tech EBA) to undertake this review of the Afton Tailings Storage Facility (TSF) 2014 Annual Inspection Report. The review was undertaken to meet the requirements of the orders issued by the Chief Inspector of Mines of British Columbia on August 18, 2014. The orders include a requirement for Third Party Review of a Dam Safety Inspection (DSI) report and the dam consequence classification. The review is to be undertaken by an "independent qualified third party professional engineer from a firm that has not been associated with the tailings dam."

The intent of the review is to look for gaps in the DSI and assess whether the recommendations in the report are consistent with current engineering best practices.

The Afton TSF, situated approximately 12 km west of Kamloops, BC has been under care and maintenance since 1997.

2.0 SCOPE

The scope of this review was established by KGHM in their Request for Proposal # KA39-KGHM-PRP-000040–2014.

The scope involved a 'desk top' review of a DSI report prepared by others (Knight-Piésold). The scope includes review of the dam consequence classification undertaken as part of the DSI.

Specifically, the DSI was assessed in comparison to the requirements of the 2013 BC Ministry of Energy and Mines (MEM) guidelines and the 2007 Dam Safety Guidelines of the Canadian Dam Association (CDA).

The scope did not include a site visit nor engineering assessments of geotechnical stability, hydrology or hydraulics.

3.0 INFORMATION PROVIDED

KGHM provided the following documents for the review:

- *Report on 2014 Annual Inspection, KGHM Mining Inc., Afton Tailings Storage Facility.* Report prepared for KGHM Ajax Mining Inc. by Knight Piésold Ltd. October 1, 2014. Report ID: Rev 0, VA101-246/39-1;

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- *Emergency Response Procedure. Operation, Maintenance, and Surveillance Plan. Historic Afton TSF, Kamloops, British Columbia.* Report prepared by KGHM International Inc. Original Draft November 27, 2013. Report ID: Rev 04, April 25, 2014.

4.0 DOCUMENT REVIEW

Table 1 provides a summary of the 2014 Afton TSF Annual DSI report content in relation to the requirements of the 2013 BC MEM Guidelines for Annual Dam Safety Inspection Reports. The DSI report compliance with CDA guidelines is addressed in the text of this section of the letter report.

Table 1: Summary of Report Compliance with 2013 BC Guidelines for Annual DSI Reports

No	Item	Compliance (Yes/No/Partial)	Comment
1a	Dam Classification (CDA, 2007)	Yes	East Dam to be reassessed as per recommendations
1b	Instrumentation/Visual Monitoring changes	Partial	Summary of KGHM staff visual inspections not included. However, new instrumentation installations noted and displacement data appended.
1c	Dam stability and/or surface water control changes	Yes	West Dam stability and spillway capacity analyses referenced and recommendations for updates provided as required.
1d	OMS manual latest revision date	Yes	To be updated with instrumentation monitoring schedule.
1e	EPP manual latest revision date	Yes	Updates as recommended.
1f	Date for next DSR	Yes	No comment.
2	Recent construction	Yes	No comment.
3	Plan and cross sections	Yes	No comment.
4	Photographs	Yes	No comment.
5	Climate data review	Partial	Climate data not referenced, but pond levels discussed in relation to 2010 water balance and historical levels.
6	Water balance review	Yes	Referenced recent work by others.
7	Freeboard and storage availability	Yes	No comment.
8	Water discharge system	Yes	Spillway status discussed and recommendations provided.
9	Seepage occurrence and water quality	Partial	Water quality status not included, but monitoring program described and permit referenced.
10	Surface water control and surface erosion	Yes	No comment.
11a	Instrumentation review - piezometers	Yes	As per Item 1b. Recommendation to include monitoring plan in OMS included.
11b	Instrumentation review - settlement	Yes	No comment.
11c	Instrumentation review - lateral movement	Yes	No comment.

4.1 Tailings Storage Facility Description

The following description of the tailings storage facility was obtained from the 2014 Annual DSI report.

The facility was originally constructed in 1976 - 1977 by Teck Resources who operated it for 20 years. Ownership transferred from Teck to Abacus Mining Inc. and subsequently to KGHM in 2011. The tailings are contained in a valley between two zoned earthfill/rockfill dams. The two dams were raised in stages by downstream methods and are identified as the West Dam and the East Dam. The West Dam is approximately 1,300 m long and 75 m high at its highest point with a crest width of approximately 100 m. The East Dam is approximately 860 m long and 65 m high at its highest point. The East Dam is buttressed by a large waste rock dump. Both dams were designed to be raised to a higher elevation, but these additions were not constructed because the mine operations finished earlier than planned.

Other features at the Afton TSF include a spillway adjacent to the East Dam, surface water diversion structures for inflow from the south, and two seepage ponds below the West Dam.

Approximately 37 million cubic metres of tailing solids were deposited in the tailings storage facility between 1977 and 1997.

New Gold Inc. (New Gold) commenced production at the adjacent New Afton Copper-Gold Project in 2012. This operation includes underground mining by block-cave methods. Surface displacement and subsidence attributed to block caving has been observed in the area of the Afton TSF.

No information was provided regarding the physical or chemical characteristics of the tailings material. It may be assumed that the tailings from the historical copper operation contain elevated levels of metals and or other constituents. A water quality monitoring program at the Afton TSF including sampling, testing and reporting is undertaken by KGHM but no data or summary of status was included in the report.

4.2 Dam Status

The tailings storage facility is currently inactive. KGHM is now conducting regular surveillance and emergency response is possible based on the facility proximity to mining operations and the community of Kamloops.

The tailings beaches slope towards the centre of the facility and a pond was present at the time of the inspection with approximately 4 m of freeboard up to the spillway channel outlet. The spillway was constructed in 1997 to convey the Probable Maximum Flood (PMF). KP assessed that the current storm storage capacity in the facility would be exceeded by the PMF inflow volume, and the attenuation capacity of the reservoir would be small.

4.3 CDA Dam Classification

The advised hazard classification of the East and West Dams under the Dam Safety Guidelines published by the Canadian Dam Association (CDA, 2007) were:

- West Dam: Extreme consequence; and
- East Dam: High consequence.

These classifications were assigned as part of a Dam Safety Review (DSR) undertaken by KP in 2013. Evaluation of the DSR was not included in the scope of this review. The advised population at risk of more than 100 persons

downstream of the West Dam supports the Extreme consequence classification. The report indicated that the classification for the East Dam will be reviewed following completion of a dam breach study.

4.4 Inspection Standard of Care

The described site inspection scope was adequate and included observations of the accessible crests, toes, and abutments of the TSF. Weather conditions were generally suitable for inspection, although the occurrence of some rainfall at the time of the visit would have limited the ability to note evidence of seepage. It was noted that one of the Alkali Creek Diversion Structures identified as the East Diversion Dam was not inspected in 2014, but that it was observed to be in adequate condition in July 2013.

Key items noted in the report include cracks that were observed in the spillway channel and measurements indicating that subsidence of the East Dam and the spillway had occurred that were attributed to New Gold underground mining activity. It was noted that a portion of the spillway was not accessible for inspection.

The West Dam stability assessment undertaken in 2011 by Klohn Crippen Berger was assessed to be in accordance with the 'extreme' consequence rating. The 'extreme' consequence rating requires that the stability assessment incorporate a design earthquake motion associated with an Annual Exceedance Probability Earthquake of 1:10,000 or the Maximum Credible Earthquake. The stability assessment was not provided for review; however, the Peak Ground Acceleration of 0.34g adopted for the analysis appears to meet or exceed these requirements at this 'Low Hazard' location based on the data available in the 2010 National Building Code.

Hydrotechnical considerations for an 'extreme' consequence rated facility include that the facility be designed to store and/or safely pass a Probable Maximum Flood. The spillway design met those requirements at time of construction in 1997; however, KP recommends the spillway design be reassessed based on updated hydrology information and incorporating changes that may impact the spillway including new infrastructure (New Gold's TSF and roadways) and potential future subsidence.

It is considered common practice to incorporate inspection of a tailings storage facility by operations staff in the 'operational' phase. An inactive facility typically requires less frequent inspection due to the typically slow rate of changes that may occur. There was no reference in the 2014 DSI to the results or frequency of routine visual inspections by KGHM. The '*Emergency Response Procedure. Operation, Maintenance, and Surveillance'* document provided by KGHM indicates that visual inspections are undertaken on a varying schedule and at a minimum of bi-weekly. The requirement for recorded observations (either paper file or digital records) should be considered in the proposed update to the OMS and these should be reviewed by the mine operations staff and summaries or selected records reviewed as part of the annual DSI.

Recent construction activities in the area were described including Alkali Creek diversion channel construction and New Gold construction.

4.5 Review of Recommendations

The list of recommendations provided in the 2014 Annual Dam Safety Inspection are consistent with the gaps identified in the report and relevant guideline requirements.

Selected key recommendations in the report were:

- KP recommends that 'interaction between the block-cave mining activity' and the Afton TSF needs to be monitored closely and protocols for communication between the two operations be established.

- A related recommendation was the dewatering or displacement of the TSF water pond to reduce risks associated with potential water and tailings ingress to New Gold's underground mine.
- Spillway surface cracks and displacement of the East Dam attributed to block cave subsidence were noted as potentially significant and further assessment and ongoing monitoring was recommended. Further, it was recommended that the changed conditions on New Gold's site including a road crossing of the spillway and the New Afton tailings storage facility upstream merit consideration in a spillway design review. It was noted that recent instrumentation programs have been undertaken by both KGHM and New Gold.
- Recommendations for instrumentation of the East and West Dams were made in both 2013 and 2014, and the report and associated cover letter indicates that this work was recently completed.
- The OMS and ERP should be updated to reflect the recent installations and include a monitoring schedule and a trigger level response plan.

The following issues should be considered in conjunction with the recommendations included in the 2014 DSI:

- The East Diversion Dam at Alkali Creek should be inspected since it was not observed in 2014.
- The recommended spillway design review scope should include visual inspection of as much of the spillway as safely possible.
- The proposed update to the OMS should include additional explanation of how and when inspections are carried out, a checklist for the inspections, how maintenance is triggered, etc. The updated OMS should reflect the recommendations for dam surveillance presented in the CDA guidelines.
- The proposed stability assessment of the East Dam (2013 Dam Safety Review recommendation) should include review of block cave subsidence impact and consideration of potential piping failure.
- Consideration of the need for measurement and communication protocols associated with potential discharges from the spillway that would be conveyed to the New Gold site should be included in the updated ERP.

5.0 CONCLUSIONS

A review of the provided documentation indicates that the 2014 Afton TSF DSI was undertaken in general accordance with the requirements of the CDA Dam Safety Guidelines (2007) and the BC MEM Guidelines for Annual Dam Safety Inspection Reports (2013). In addition, the dam consequence classification undertaken as part of the DSI adequately reflects the potential impacts associated with a dam failure.

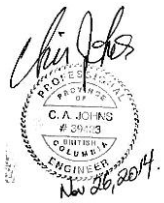
6.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of KGHM Ajax Mining Inc., and their agents. 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 KGHM Ajax Mining Inc., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

7.0 CLOSURE

We trust that this report meets your present requirements. Please contact the undersigned should you have questions or comments.

Respectfully submitted,
Tetra Tech EBA Inc.



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Attachments: Appendix A Tetra Tech EBA's General Conditions

APPENDIX A
TETRA TECH EBA'S GENERAL CONDITIONS

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.

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 test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes 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.

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.