



Date: September 30, 2015

To: Greg Brouwer, General Manager
Teck Highland Valley Copper Partnership, Highland Valley Copper

Cc: Diane Howe, Deputy Chief Inspector, Reclamation and Permitting, MEM
Heather Narynski, A/ Manager, Geotechnical Engineering, MEM

Re: **Review of Letter of Assurance Submission from June 30, 2015**

The Ministry of Energy and Mines (MEM) has engaged a consulting firm to evaluate the consistency and compliance of your letter of assurance in response to the Chief Inspector's orders issued on February 3, 2015. This review has determined that your submission satisfies the requirements of the order.

Below is a summary of the assessment made by your Qualified Professional Engineer (QPE) with associated plans/schedule to address the gaps identified:

Highland TSF: LL Dam

Status of Foundation Condition

"Lacustrine and glacio-lacustrine silt and clay layers within the foundations of the L-L and H-H Dam have been identified and addressed in the design since the 1970's" and are "subject to ongoing surveillance, monitoring, drilling, laboratory testing and investigations."

Nevertheless the mine has committed to:

- *"As per recommendation KCB 2014 DSI-LL-06 (KCB 2014b), and recommendations in our 2010 Design Update Report (KGB, 2010) additional drilling and lab testing is underway for the foundations of in the Valley Buttress Berm (VBB), North Buttress Berm (NBB) and North Abutment. A drilling program is planned for 2015. This is an ongoing task that spans multiple construction seasons; a progress update will be provided in the 2015 Dam Safety Inspection Report (DS I)." (Ongoing)*
- *"Update stability analyses, as new strength data is acquired. This is an ongoing task that is updated annually. This task will be reported in the 2015 Annual Performance Review report." (Ongoing – updated annually)*
- *"It is also necessary to understand the stresses, deformations, and generation of pore pressures in the glacio-lacustrine layers under the loading from current and predicted construction stages. This should be accomplished using a stress-deformation model (such*

as Settle 20, or Similar) based on updated definitions of material extents and characteristics (from #1, above) and a review of inclinometer performance data as per recommendation KGB 2014 DSI-LL-08 (2014b). Progress update given in the 2015 DSI.” (Initiated following the planned 2015 drilling program, to be completed by end of 2016.)

Status of Water Balance Adequacy

“There is currently no spillway so the TSF is designed to store the Probable Maximum Flood (PMF) plus the operating pond. The crest of the LL Dam is maintained a minimum 2 m above the design PMF pond level.”

Status of Filter Adequacy

“The L-L Dam has adequate filters in place and there is a low risk of failure due to internal erosion (piping) under current operational conditions.”

Highland TSF: HH Dam

Status of Foundation Condition

“Layers of silt or clay were identified in several drill holes. The most recent dam design and annual review stability accounts for two layers of “foundation silt” at elevations 1110 m and 1150 m (KCB 2010), but does not consider a deeper silt and clay layer at El. 1067m.”

The mine has committed to:

- *“The deep foundation silt and clay layers are not well characterized; however, these do not represent potential critical slip surfaces even assuming conservative properties and undrained conditions. Nevertheless, a deep inclinometer installation would confirm the stratigraphy and provide monitoring to confirm the design assumptions. This will be installed in 2016. Additional characterization of strength, index, and piezometric levels of the deep foundation silt/clay layers is ongoing per recommendation KCB 2014 DSI-HH-02 (KCB 2014b). This is an ongoing commitment spanning multiple construction seasons and a progress report will be provided in the 2015 DSI.” (Ongoing)*

Status of Water Balance Adequacy

“There is currently no spillway so the TSF is designed to store the PMF plus the operating pond. A freeboard is maintained at H-H Dam of minimum 2 m above the tailings surface to dam crest level.”

Status of Filter Adequacy

“The H-H Dam has a zone with inadequate filters but as there is an 8 km long beach and therefore a low gradient there is low risk of internal erosion under current operational conditions.”

The mine however has stated that:

- *“There is limited piezometric information upstream and downstream of the H-H Dam core. It has been recommended per KCB 2014 DSIHH- 02 (KCB 2014b) that additional instruments are installed in the tailings beach and downstream shell in order to estimate and monitor the gradient across the core, and alert levels should be updated to include a threshold gradient across the core. This is an ongoing commitment spanning multiple construction seasons; a progress report will be provided in the 2015 DSI.” (Ongoing)*

Highland TSF: 24 Mile Lake

Status of Foundation Condition

“The 24 Mile Lake is a natural lake impoundment surrounded by waste dumps. No indications of weak lacustrine and glacio-lacustrine soils” were noted during the review of documents related to the design or construction of the road or dump foundations.

Status of Water Balance Adequacy

“24 Mile Lake has the capacity to store approximately 6 times PMF at typical normal water levels. No gaps have been identified concerning water balance adequacy at Highland TSF or the 24 Mile Lake.”

Status of Filter Adequacy

“The 24 Mile Lake does not have a discernible dam structure and therefore no filters. However, piping is not considered a credible failure mechanism for the 24 Mile Lake due to the long distance to the open face of the Valley Pit, the irregular topography and stratigraphy between the lake and the pit and the low gradient over 1.8 km distance to Valley Pit.”

Bethlehem No 1 TSF: No 1 Dam & Bose Lake Dam

Status of Foundation Condition

At Dam No 1, “Two glacio-lacustrine clay layers in 4 boreholes were identified in the foundation footprint”. While, “there is no evidence in the design reports or investigations of glacio-lacustrine or lacustrine soils” at Bose Lake Dam. For Dam No 1 the “design assumed a competent till foundation and did not initially allow for a soft surficial layer.”

The mine has committed to:

- *“There is limited information on material properties and extent of the clay layer identified at 15 to 17 m depth below Dam No 1. We recommend a site investigation of (initially) one drill hole to sample and carry out laboratory testing on the layer.” (Completed by end of 2016)*
- *“Once the drill hole data is available and the properties of the glacio-lacustrine layer are better understood, the properties should be incorporated into the stability and seismic deformation review per recommendation KCB 2014 DSI-BM-02 (2014). This work has been initiated.” (Completed by end of 2016)*

Status of Water Balance Adequacy

“The Bethlehem TSF is at low risk of failure due to water balance issues since it does not receive water from the mining operations and there is a closure spillway in place, at Bose Lake Dam abutment, with adequate freeboard to manage the design flood.”

Status of Filter Adequacy

“Filter specifications and as-built gradations are not available for Dam No 1. However, potential for piping is reduced by maintaining low hydraulic gradients across the dam. The records are not sufficient to determine if the filter was constructed in accordance with the design” for the Bose Lake Dam. “Although there is potential for locally higher gradients, the dam has a long performance record with no signs of piping such as sediment in the seepage or deformation of the glacial till embankment. These indications are signs of low risk of piping.”

To assess the gradients across the dam, the mine has committed to:

- *“Update instrumentation alert levels at both dams as per recommendation KCB 2014 DSI-BTSF1-04 (2014).” (Completed by end of 2016)*

Bethlehem No 2 TSF: Trojan Dam

Status of Foundation Condition

“There is inconclusive evidence of glacio-lacustrine soils beneath the Trojan Dam”, but “A stability analysis assuming continuous weak layers at elevations 1371 m and 1361 m has shown that even with silt or clay layers under the Trojan Dam, the dam will meet stability criteria.”

However the mine has committed to:

- *“Drill at least one hole to verify presence or absence of a silt or clay layer and collect undisturbed samples for laboratory strength testing.” (Completed by end of 2016)*
- *“We are currently conducting seismic stability and deformation analyses for the new consequence classification for Trojan Dam per recommendation KCB 2014 DSI-TD-08 (2014). This will later be modified to incorporate information from the proposed drilling (in 2016). These analyses will include a review of whether higher pore water pressures (and undrained conditions) could be induced by seismic loading.” (Ongoing)*

Status of Water Balance Adequacy

“The Trojan Dam has not had new tailings placed or construction raise after 1989. The Bethlehem No. 2 TSF is at low risk of failure due to water balance issues since it does not receive water from the mining operations and there is a closure spillway in place with adequate freeboard to manage the design flood.”

Status of Filter Adequacy

“The Bethlehem No. 2 TSF is at low risk of failure due to filter adequacy issues (piping). Filter specifications and as-built gradations are not available but are not relevant since the dam design now incorporates a large upstream cycloned sand raise, and a long tailings beach.”

Regardless, the mine is committed to:

- *“A performance review of instrumentation including updating alert levels at Trojan Dam is ongoing, per recommendations KCB 2014 DSI-TD-05 (2014), scheduled for completion in November 2016 and KCB 2014 DSI-TD-06 (2014), scheduled for completion in December 2015.” (Ongoing)*
- *“A monitoring point for observations of seepage is being established at the downstream location of the decommissioned culvert, as per recommendation KCB 2014 DSI-TD-12 (2014).” (Planned for completion by end of 2016)*

Highmont Tailings Storage Facility (TSF)

Status of Foundation Condition

“Based on our review of the original design similar foundation conditions to Mount Polley are not present at the North or East Dam. At the South Dam, a lacustrine layer 1.5 m to 3 m thick, about 23 m below the ground surface was identified. The design report indicates that the silt is not extensive and only present in a “pocket” at the bottom of the valley.” The factor of safety from preliminary analyses assuming a continuous weak silt layer has satisfied the criteria for undrained residual strength analyses.

Status of Water Balance Adequacy

“The Highmont TSF is at low risk of failure due to water balance issues since it does not receive water from the mining operations and there is a closure spillway in place with adequate freeboard to manage the design flood.”

Status of Filter Adequacy

“The Highmont TSF is at low risk of failure due to filter adequacy issues (piping). Filter design and construction records and performance records indicate the dams are adequately protected against piping.”

MEM supports the proposed plan of action. Please ensure that all work as outlined above is completed within the specified timeframe. MEM will be following-up by January 15, 2016 and 2017 to obtain a status update with respect to the work completed and commitments made.

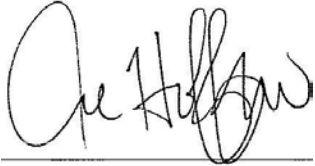
The orders issued on February 3, 2015 have been requested to provide assurance the conditions at the Mount Polley dam do not exist in other facilities. Please ensure that you are meeting your other ongoing requirements to ensure Tailings Storage Facility safety with respect to the following:

- Satisfying any outstanding orders from previous Ministry inspection reports.
- Satisfying any outstanding recommendations from previous Dam Safety Inspections (DSI) or Dam Safety Reviews (DSR).

It is expected that you will ensure dam safety management is continuously reviewed, improved and refined throughout the life of mine.

Thank you for your submission to the orders of February 3, 2015.

Sincerely,

A handwritten signature in black ink, appearing to read "Al Hoffman", written over a horizontal line.

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