November 21, 2014 475.0161

Thompson Creek Metals Company
26 West Dry Creek Circle, Suite 810
Littleton, CO 80120

Attention: **S. Scott Shellhaas**
President & Chief Operating Officer

Subject: **Endako Mine, Independent Third Party Review of Dam Safety and Consequence Classification**

Dear Mr. Shellhaas

NewFields has completed an independent review of dam safety and consequence classifications for the tailing ponds located at the Endako Mine Site. This review has been completed in accordance with the British Columbia Ministry of Energy and Mines, Notification of Chief Inspector's Orders issued August 18, 2014.

1. INDEPENDENT REVIEW OF DAM SAFETY AND CONSEQUENCE CLASSIFICATION

1.1. Independent (NewFields) Site Inspection of Endako Tailings Ponds

Keith Williams with NewFields, who is a Professional Engineer in British Columbia, completed a site inspection of the Endako mine site on October 2, 2014. Mr. Williams and NewFields have not been at the Endako Mine prior to this assignment.

1.2. Independent (NewFields) Review of Dam Safety Inspection (DSI) by Golder

The most recent Dam Safety Inspection (DSI) for the Tailings Ponds at the Endako Mine Site is titled "2014 Annual Tailing Dam Performance Review Endako Mine", dated November 14, 2014 by Golder Associates Ltd. (Golder). This report is referred to as the 2014 DSI Report for remainder of this letter report.

NewFields has completed our independent third party review of this document and notes the following:

- **Section 3.4.3**

The tabulated PGA for the 1:1000 year event is listed as 0.028g for Tailings Ponds 1 and 3 and is different than previous reports and text that follows. This is likely a typographic error as previous reports indicate 0.035g.

- **Section 3.4.3**

There is discussion of updating the seismic hazard for Tailings Pond 2 to be compliant with the 2007 CDA guidelines/risk consequences. It is our understanding this has not been completed. According to the 1999 CDA guidelines Tailings Pond 2 is classified as "low" risk consequence which correlates to a 1:100 – 1:1000 probabilistic seismic hazard. NewFields is unsure what return period was actually used in the most recent engineering analysis. The current classification is "high" according to the 2007 CDA which correlates to a 2,500 year return.

Although we believe pseudo-static stability is acceptable, we would recommend updating the stability models for Tailing Pond 2 to consider the 2,500 year return event (PGA = 0.044g).

- **Section 5.2**

Golder states the following regarding Tailings Pond 2 "There was no dam survey data available for 2013 and 2014". NewFields recommends that a survey of the crest and toe (as a minimum) is completed annually.

- **Section 6**

Stability evaluation material properties:

A portion of the coarse tailings are saturated based on the facility geometry and current understanding of the phreatic surface; these materials are modeled with drained strength and 20% reduction to account for cyclic softening during seismic loadings. This methodology has its roots in classic geotechnical literature. For example, Makdisi and Seed (1977, 1978) recommend a 20 percent reduction in static strength for all materials used in pseudostatic stability evaluation. More recent research on the shear strength of soils during cyclic loadings has indicated that softening is limited to more fine-grained soils with a plasticity index greater than 7 (Idriss and Boulanger, 2008). Based on the presented particle size distributions of the tailings, the coarse tailings materials do not contain sufficient fines such that they control the overall behavior, and thus we do not see the need to reduce the drained shear strength in the stability evaluation. In addition, any potential softening and subsequent reduction in strength during seismic loadings are likely offset by the higher loading rates as compared to the loading rates used in the laboratory to estimate the static strength. The 2010 Golder report indicates that the coarse tailings are dilatant and not compressive and thus not susceptible to liquefaction. NewFields recommends the strength of the coarse tailings be modeled with drained strength above the piezometric surface and undrained strength below the piezometric surface with no arbitrary strength reductions.

Piezometers should be installed in the dams around Tailings Pond 3. Golder has requested this since their 2009 design report, but this has not been completed. NewFields agrees that these are needed and a wise decision to track the continued functionality of the facility.

Survey Prisms: There was 2 feet of movement shown on Tailings Pond 1 by prism NDS2-u in late 2008 and early 2009; and an additional 0.5 feet of movement in February 2014 that was not discussed by Golder. NewFields would like additional information related to this movement to confirm whether or not this is considered to be an issue.

NewFields agrees that survey prisms should be installed around Tailing Pond 3 as recommend by Golder.

Beach Width: Golder noted that there are times during operation when the minimum acceptable beach width (500') is not achieved. ***In our opinion, this situation has the highest risk for significant erosion of the embankment and loss of process solution to the environment.*** The OMS manual should consider these situations, and an action plan should be developed which specifies varying levels of response depending on how close the supernatant pond gets to the outside edge of the bench (embankment face). In addition, more frequent field inspections of these areas and monitoring of piezometers (frequency to be determined by EOR) should occur.

1.3. Independent (NewFields) Review of Consequence Classification by Golder

The following table is an excerpt from the 2014 DSI Report by Golder and provides a summary of the consequence classifications for the tailings ponds.

3.4.1 Consequence Classification

As required by the Health Safety and Reclamation Code of BC (HSRC), the tailings dams at the Endako Mine are designed, constructed, and maintained in accordance with CDA (2007), which provides a classification of dams in terms of the consequence of failure.

The dam classifications of Tailings Ponds 1, 2, and 3 are provided in Table 2. The ultimate crest elevations of 3,215 ft. (980 m) were used in the assessment of the consequence classifications.

Table 2: Consequence Classifications of Dams, Endako Mine

Dam	Population at Risk	Incremental Losses			Dam Classification
		Loss of Life	Environmental and Cultural Values	Infrastructure and Economics	
Tailings Pond 1	Temporary	10 or fewer	Loss of marginal habitat only / Restoration or compensation in kind highly possible	Limited infrastructure or services	Significant
Tailings Pond 2	Permanent	10 or fewer	Loss of marginal habitat only / Restoration or compensation in kind highly possible	Limited infrastructure or services	High
Tailings Pond 3	Temporary	10 or fewer	Loss of marginal habitat only / Restoration or compensation in kind highly possible	Limited infrastructure or services	Significant

Notes:
Source: CDA (2007).

The consequence classifications provided in Table 2 are based on estimates of the incremental losses. In particular, the location of Tailings Pond 2 above a slope down to Francois Lake raises the potential consequences in terms of the population at risk and the potential environmental and economic losses, as there are permanent residents along the lakeshore intersecting the main flood path. Estimated velocities are as high as 7.7 m/s, with flood depths of up to 9.5 m within inhabited areas. The wave front would reach the inhabited areas and the Lake within 6 minutes after initiation of the breach (Golder 2013b).

NewFields has reviewed the dam consequence classifications listed above and agrees with Golder regarding these classifications.

2. SUMMARY OF RECOMMENDATIONS AND ACTION ITEMS

The following is a list of Key Recommended Actions as presented in the 2014 DSI Report by Golder.

Deficiency or Non-Conformance	Applicable Regulation or OMS Ref.	Potential Dam Safety Impact or Risk	Recommended Action	Recommended Timing for Completion
TAILINGS POND 1 AND 3				
Update EPP emergency contact details	Schedule 2 of B.C. Reg. 44/2000	Potential delay of emergency responses.	Update emergency contact details in EPP.	Q4 2014
Weekly site surveillance along toe and crest of dams	Schedule 2 of B.C. Reg. 44/2000 / CDA Section 3.6.2	Potential to miss signs of instability, uncontrolled tailings deposition and other dam safety issues.	Review responsibilities for weekly inspection. Document each inspection. Control minimum beach length and freeboard	Ongoing execution
Lack of seepage quantity measurement	HSRC 10.1.5 / CDA Section 3.6.3	Unknown potential changes of seepage quantity from the North Dam below overflow I.	Install V-Notch weir at downstream toe area of North Dam.	Q2 2015
Localized erosion of tailings surface toe of North Dam (vicinity Section N-1)	N/A	Potentially change the geometry of North Dam and therefore affect its stability.	Evaluate need for major repair erosion area based on results from V-Notch weir.	Q2 2015
Realignment of the west abutment of the North Dam and of the southwest abutment of Dam 1A	N/A	Potential lack of tailings deposition control and therefore occurrence of dam safety issues.	Follow tailings deposition plan and construction for 2014/2015 prepared by mine staff and design report prepared by Golder 2010.	Q3 2015
Eroded zone in North Dam (vicinity Section N-8) that resulted from a tailings spill in March 27, 2014	N/A	Loss of sand mass may affect dam stability.	Maintain more than minimum beach width and freeboard in this area. Repair should be conducted as part of the construction of the north infill	Q2/Q3 2015
Geotechnical instrumentation for Tailings Pond 3	CDA Section 3.6.3	Lack of control and monitoring of tailings pond	Install vibrating wire piezometers and survey prisms	Q4 2014, and ongoing execution
TAILINGS POND 2				
Update EPP emergency contact details	Schedule 2 of B.C. Reg. 44/2000	Potential delay of emergency responses.	Update emergency contact details in EPP.	Q4 2014
SEEPAGE COLLECTION PONDS				
Debris and beaver dams	CDA Section 3.5.5	Blockage of water flow through the spillway during a storm event	Control and remove debris	Ongoing execution
Lack of pumps in Seepage Collection Pond WD-2	N/A	Potential lack of water management control and discharge into environment	Mobilize pumps to WD-2	Q4 2014

NewFields has reviewed this list of items and agrees with Golder. In addition, NewFields has listed items below based on our independent review that are not included above. Each of our recommendations includes a priority ranking as described below:

Description of Priority Rankings

Priority	Description
1	A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant regulatory concern.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact or significant regulatory action; or, a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice as a suggestion for continuous improvement towards industry best practices that could further reduce potential risks. This typically includes ongoing construction items within the appropriate construction cycle.

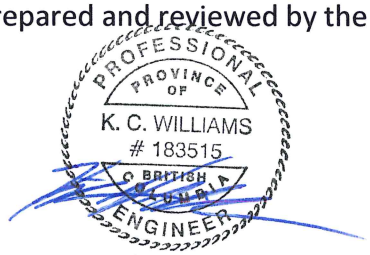
These recommendations are summarized in a tabular form so that the Endako Mine Manager can use this information to prepare a separate letter outlining the commitments and schedule to complete the work.

Independent (NewFields) Review Recommendations for Endako Mine Site Tailings Ponds 1, 2, and 3

Structure	Recommendation	Priority
Tailings Ponds 1 and 3	Maintain a minimum beach width of 500 feet (distance from supernatant pond to outside edge of embankment) during operation of the tailings ponds. Provide action plan for situations when the beach width is less. This plan should have varying levels of response depending on how close the supernatant pond get to the outside edge of the bench.	2
	Endako to Install automated level controls and flow measurement devices for N-1, A-1 and WD-2 Seepage Ponds	4
	Endako to complete yearly surveys of embankment	4
	EOR to evaluate the undrained shear strength of the saturated coarse tailings and update stability if necessary.	4
	EOR to check/confirm PGA as listed in Section 3.4.3 of Performance Review Report	4
	EOR to provide clarification for movement shown by prism NDS2-u in Tailings Pond 1	4
	Endako to confirm that adequate back-up generator power exists for power outage	4
Tailings Pond 2	EOR to complete pseudo-static stability based on 2007 CDA guidelines	4
	Endako to complete yearly surveys of embankment	4
General Tailings Management	EOR to review piezometer reading quarterly and Endako staff to be trained by EOR (if not competed already) to understand if a problem exists with the readings	4
	EOR to complete training sessions with Endako Tailings Supervisors regarding the OMS and ERP (if not completed already)	4

3. CERTIFICATION

This report was prepared and reviewed by the undersigned.



Prepared by: Nov. 21, 2014

Keith C. Williams, P. Eng.
Principal Engineer

Reviewed By: R. Michael Smith

R. Michael Smith
Principal Engineer

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