

4 December, 2014

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Attn: Carl Schulze, BSc, PGeo, APEGBC, APGO  
Mine Manager, Yellowjacket Mine

**Re: Yellowjacket Mine  
Independent Third Party Review of Dam Safety Inspection**

## **1. INTRODUCTION**

This letter presents the observations and conclusions of a third party review of the dam safety inspection (DSI) of the Yellowjacket tailings storage facilities (TSFs). The third party review was carried out in accordance with e-mail authorization from Carl Schulze on 2 December 2014. The review was mandated by the British Columbia Ministry of Energy and Mines (MEM), Chief Inspector's Orders, dated August 18, 2014, which stipulated that a DSI be carried out to cover all dam structures for all tailings storage facilities in British Columbia, and that the DSI must be reviewed by an independent qualified engineer from a firm that has not been associated with the tailings dam. The Independent Third Party Review must include a review of the dam consequence classification.

The DSI of the Yellowjacket Mine TSFs was prepared by Tetra Tech EBA, dated November 28, 2014. This third party review is based on that DSI. No site visit was made for the third party review.

## **2. BACKGROUND**

Yellowjacket Mine is located about 9km east of Atlin, BC alongside Pine Creek. It was last operated in 2009 by Yellow Jacket Resources Ltd., and has been in care and maintenance since then. Tetra Tech EBA (2014) reported that no previous Dam Safety Inspections (DSI) were available for review.

There are three tailings storage facilities, TSF 1, TSF 2 and TSF 3 at the site. Slurry tailings were contained within generally rectangular earthfill embankments. The TSFs are relatively small structures, the largest of which was estimated at about 35m by 75m. TSF 1 and TSF 2 are contiguous, separated by a low berm. TSF 3 is on the opposite side of Pine Creek. Tetra Tech EBA (2014) stated that TSF 1 and TSF 2 are believed to contain tailings from 2008 and earlier, while TSF 3 contains the most recent tailings from 2009.

No construction records were available for review. The Engineer of Record is unknown. No regular monitoring is being carried out. There are no instrumentation installations.

The Yellowjacket TSF has not been previously assigned a consequence classification in accordance with CDA (2007).

### **3. 2014 DAM SAFETY INSPECTION**

Richard Trimble of Tetra Tech EBA and Carl Schulze of All Terrane Mineral Exploration Services visited the site on November 14, 2014 to carry out the dam safety inspection. They were accompanied by local resident Lloyd Brown.

Significant findings of the 2014 DSI included:

#### **TSF 1 and TSF 2**

- There was no ponded water in either of TSF 1 or TSF 2. It was estimated by Lloyd Brown that there was a depth of about 1.5m to 2.0m of tailings in TSF 2, and an unknown, but significantly smaller depth in TSF 1. Interior and exterior embankment slopes were stable at about 1.5 horizontal :1 vertical.
- There was at least 2.5m of freeboard in TSF 1 and 1.5m in TSF 2.
- The toes of the berms were away from and armoured against erosion from Pine Creek
- There was no inflow of water to either TSF 1 or TSF 2 other than rainfall and snowmelt
- There were no outlets or overflow spillways from either pond.

#### **TSF 3**

- The pond was noted to be dry and stable at the time of the inspection. There were two small piles of tailings noted at the north end of the structure, and some tailings on the base. The main use of this facility appears to have been for the temporary storage of water pumped from the open pit, providing time for solids to settle out before decanting to Pine Creek through a 300mm steel pipe.
- TSF 3 is significantly (~6m) higher than Pine Creek and located well back from the Pine Creek channel.

### **4. CONCLUSIONS AND RECOMMENDATIONS OF THE 2014 DSI**

- There were no stability issues observed during the Dam Safety Inspection, and no recommendations for either maintenance or improvement were considered necessary.
- The failure consequence category of LOW was recommended, per the Canadian Dam Association (CDA) Guidelines (2007, rev. 2013), by Tetra Tech EBA. Should a failure or breach of any of the tailings storage facilities occur, there is no population at risk, minimal short term and no long term losses, and low economic losses.
- No Dam Safety Reviews (DSR) existed, but a DSR is not required for a low consequence dam, per CDA Guidelines.

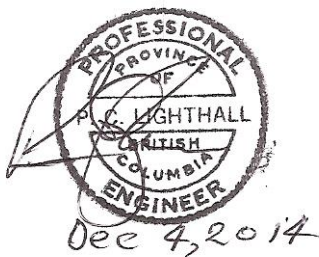
## 5. CONCLUSIONS AND RECOMMENDATIONS OF 3RD PARTY REVIEW

- 4.1 The 2014 DSI provides a good summary of the status of the Yellowjacket Mine TSF and has addressed the key issues as per the Ministry of Energy and Mines Guidelines for Annual Dam Safety Inspection Reports.
- 4.2 The low embankments as described by Tetra Tech EBA are apparently in good condition and there appears to be a low risk of any mode of failure.
- 4.3 The writer agrees with the conclusion that the TSF be assigned a CDA consequence classification of LOW. The facility is very small and appears stable five years after operations ceased. The small amount of tailing was produced through gravity separation, with no chemicals added, so is not hazardous. Should failure of any one of the three separate facilities occur, there is no population at risk, there would be insignificant economic consequence and minor, if any, short term environmental consequence.

## 6. CLOSURE

Thank you for the opportunity to undertake this 3<sup>rd</sup> party review of the Yellowjacket Mine tailings storage facility DSI. I would be pleased to provide any additional information or clarification you may require.

Yours truly,



Peter C. Lighthall, P.Eng.  
Consulting Geotechnical Engineer

c. Richard Trimble (Tetra Tech EBA)

## **REFERENCES**

British Columbia Ministry of Energy and Mines, August 2013. Guidelines for Annual Dam Safety Inspection Reports.

Canadian Dam Association, 2007. Dam Safety Guidelines.

Canadian Dam Association, 2014. Mining Dams Technical Bulletin.

Tetra Tech EBA, 2014. Report on Dam Safety Inspection of Tailings Storage Facilities – Yellowjacket Gold Mine. Report prepared for Athabaska Nuclear Corporation, November 28, 2014.