



**SteveJan Consultants Inc.**  
192 Werra Road  
Victoria, BC V9B 1N4  
CANADA  
Mobile: 250-850-9002

## TECHNICAL MEMORANDUM

**Date:** June 23, 2020

**Subject:** SJCI Comments on Stantec's *Technical Memorandum on Exposed Tailings Preliminary Cover Design* for the Lupin Mine as Requested by Nunavut Water Board in Part E, Item 27 of Lupin Mine Water Licence 2AM-LUP2032

---

### Introduction

SteveJan Consultants Inc (SJCI) has undertaken a review of the Stantec Technical Memorandum (STM) at the request of the Kitikmeot Inuit Association (KIA), a stakeholder in the current Lupin closure review process. SJCI has been retained by the KIA to assist in the review of several documents recently prepared for Lupin Mines Incorporated (LMI) as had been requested by the Nunavut Water Board (NWB) in a new Water Licence for the Lupin site. Mr. Januszewski, Principal Engineer at SJCI undertook this review. Mr. Januszewski is an Environmental Engineer with a degree in Mineral Processing Engineering and significant experience in mine environmental issues and mine closures. He is not a geo-technical or geo-chemical engineer and has had no advanced training in these areas and therefore this review is of a more general high-level nature.

Part E, Item 27 of the new NWB Water Licence 2AM-LUP2032 requested:

*"...a Technical Memorandum that provides rationale and detailed designs of cover construction for tailings that becomes exposed, including but not limited to the following:*

- a. Further rationale supporting in-situ cover as a contingency measure;*
- b. Preliminary detail designs;*
- c. Typical cross sections; and*
- d. Long-term erosion control measures"*

The Water Licence received ministerial approval on April 9, 2020 and the requirement for the supporting technical memorandum was to be received by the NWB within 60 days. The resultant Stantec Technical Memorandum was dated June 8, 2020.

The NWB issued out an invitation to stakeholders to make comments on the STM by e-mail on June 10, 2020. Comments are to be submitted by June 24, 2020.

## **Background**

The Lupin Tailings Containment Area (TCA) has been undergoing progressive reclamation for a period of time already, notably with placement of covers over a significant portion of the tailings surface. The FCRP (Sec 4.3.2.8) states that to the end of the 2017 construction season 1,311,500 m<sup>2</sup> of exposed tailings have been covered with a 1.0 m thick esker material. Approximately 123,500 m<sup>2</sup> of exposed tailings remained to be covered at that time.

Section 2.0 of the 2019 Tailings Area Inspection Report by Stantec Consultants states that:

“...Cells 1 and 2 are completely reclaimed, while Cell 3 is approximately 80% covered and Cell 5 is approximately 70% covered. About 84% of the entire tailings area is reclaimed with at least 1m of sand/gravel cover...”

Thus the area of previously identified exposed tailings that requires covering remains at 123,500 m<sup>2</sup>.

The post-closure plan for the facility is to have a number of esker covered tailings cells and a series of water covered ponds that will move water passively from pond to pond across a good portion of the TCA and discharge water to the environment at one location. Two spillways will be constructed to accomplish this, through internal Dam J, and perimeter Dam 1A which will be the final point of discharge from the TCA.

## **Reference Documents**

The following documents were also utilized in the preparation of this Technical Memorandum:

- Lupin Mine Site Final Closure and Reclamation Plan, by Golder Associates, July 2018;
- Water Licence 2AM-LUP2032, April 2020; and
- 2019 Lupin Mine tailings Area Inspection Report, by Stantec Consultants, October 24, 2019

## **Summary Comments**

The Stantec Technical Memorandum (June 8, 2020) addresses the conditions stated in Part E, Item 27 in the new Water Licence, but focuses on what to do with exposed tailings in one corner of Cell 4. A section towards the end of the STM provides general criteria to be used when covering exposed tailings.

Several areas within the TCA still have exposed tailings and/or will have exposed tailings when the water levels in the ponds or cells are lowered to facilitate passive water flows across the TCA as is the goal of the approved TCA closure plan. Cells 3, 4 and 5 (and possibly others) will have additional tailings beaches exposed. Details of proposed excavated channels to drain surface water currently over areas of tailings in Cells 3 and 5 which will then become exposed, are provided in drawings (Nos. 002 - 009) provided by Stantec in response to the NWB WL Condition Part E, Item 26.

The Stantec Technical Memorandum was not stamped by the Engineer who prepared it.

## **Specific Comments**

**1. Comments on the rationale provided in the STM (to answer NWB request 27a.) include;**

Bullets 1 & 2 – The text suggests the window for oxidation of the tailings is quite short due to the significant period over which the esker cover will be partially frozen. However, there is no information provided in the STM describing the range of weather scenarios (wet year, dry year, etc.) that are possible and their impacts on water levels in the TCA cells and ponds and resultant effects on state of permafrost and % saturation of the esker covers.

Bullet 3 – The text suggests that leaving material up against the dam toes makes them more secure. This is correct; however, the alternative to leaving the tailings in place, and covering them in-situ is only one possible solution. The tailings could be excavated and relocated elsewhere (using conventional excavation, dredging or hydraulic monitoring and relocation to deeper pond areas) and then the dams could be lowered. This would make for lower dams to monitor in the long term and it also has the benefit of providing immediately nearby cover material.

Bullet 4 – The text suggests small pockets of tailings cannot be practically removed from bedrock outcrops. An alternative to covering perched tailings sitting on bedrock is to excavate or hydraulically monitor them and relocate them to deeper areas of the cells or ponds.

Bullet 5 – The author agrees with the STM text that it is better to leave thick tailings in place; unless a more aggressive removal program has been selected.

Bullet 6 – Dealing with sludge like consistency tailings, possibly mixed with lime treatment sludges and/or lakebed sediments is a problem. An alternative to trying to get access onto these areas to place a cover (which maybe very difficult if not impossible if the area is not frozen) is to remove the tailings entirely (by conventional excavation, by dredging or hydraulic monitoring) and relocating them to a better location, possibly to below grade where they will freeze or will be below a water cover.

Bullet 7 – The text suggests the plan is already in place, and a contract has been let to have the TCA remediation work done. This is not considered to be a valid rationale when another better plan may be available. A contract can be broken. The best long-term solution should be the goal.

**2. Comments on STM response to item 27b), request for “Preliminary detail designs” include;**

The STM contains several photographs of the exposed tailings and a number of drawings describing the “Preliminary Design” it has for cover placement over the small area of exposed tailings in the north-west corner of Cell 4. The information provided is adequate to deal with what is to be done in that location. Interestingly, neither the volume nor surface area of that tailings beach is mentioned in the text. However, the NWB request was likely asking about various areas where tailings will become exposed when water levels are dropped (i.e., “...cover construction for tailings that becomes exposed...”).

The last text paragraph in the Preliminary Design section provides “...general criteria to be used to cover encountered exposed tailings...” No criteria have been provided for the minimum (i.e., surface area or volume) of tailings that are to have a cover placed over them. Further work on determining location-specific plans appears to be left to the field engineer once the TCA remediation work is underway.

**3. Comments on STM response Item 27c) “Typical cross sections” include;**

The STM provides the necessary sections for the proposed cover over the exposed tailings in Cell 4.

However, it is unclear how the cover and erosion protection materials are to be placed on the exposed tailings where the toe extends out and under a water cover. And the drawings show the water level as being at 485m., whereas the water level will likely be closer to the current (i.e., deeper) level of 488.0m +/-.

**4. Comments on STM response to Item 27d. “Long-term erosion control measures” include:**

The text in the section on the Preliminary Design states the “...the cover shoreline will be armored with boulders to prevent wave erosion...”. There is no specification provided on the boulder/rip rap armoring (possibly it will be as per the Spec provided in Dwg. 001 in the Stantec Technical Memorandum responding to Condition 26., but it should be so stated).

Is there a requirement to have bedding material placed on either side of the geotextile to limit it being torn by the coarse rip rap or the esker material placed and compacted up against it? And would a filter material layer outside of the geotextile assist in limiting erosive forces wearing away the protection materials (i.e., the riprap, geotextile, and esker) and eventually expose the tailings to erosion?

Steve Januszewski, P. Eng. (BC)

Principal Engineer

SteveJan Consultants Inc.

Mobile: 1-250-850-9002