Issued for approval

BAKER MILL TSF, TOODOGGONE, BC

2015 Spring Freshette Overtopping Contingency Plan

Baker Mill Tailings Storage Facilities

Issued for approval: January 15, 2015

COPY #: _____ ASSIGNED TO:_____

1.0 Introduction

The Baker mill Tailings Storage Facility ("TSF") is a small side-hill impoundment measuring approximately 300m by 150m, with a maximum height of 20m, located in northern British Columbia. Lack of maintenance to diversion ditches above the TSF since 2012, and incomplete construction of the emergency drainage channel and spillway within the facility increase the risk of an overtopping event caused by increased surface waters entering the facility during the Spring freshette. While the likelihood of an overtopping event capable of compromising the integrity of the facility is very low based on the 35 year operating history of the facility, mitigating a low frequency high-runoff, high-rainfall event is required.

2.0 Scope

This plan was developed by Sable Resources Ltd to prevent an overtopping event at the Baker mill TSF during the 2015 Spring freshette. A two man crew capable of operating the available equipment at the Baker site, measuring supernatant levels, and environmental monitoring are required for the implementation of this plan.

3.0 Contingency Plan

The 2015 spring freshette overtopping contingency plan (the "Plan") for Baker TSF will be implemented by Sable Resources Limited ("Sable" "SRL") to ensure that an overtopping event during the freshette (expected to occur sometime between end of April and mid-June) that could compromise the geotechnical integrity and result in catastrophic failure of the facility does not occur. Sable will have a site presence and sufficient labour to carry out the work outlined in this plan. The plan will be comprised of the following elements:

- Monitoring of supernatant levels within the TSF;
- Maintenance of diversion channels to ensure surface runoff directed away from TSF; and
- Emergency decant procedure to reduce supernatant levels and chance of overtopping event.

3.1 TSF Monitoring during freshette

Staff gauges will be established to monitor the supernatant level within the TSF for the duration of the Plan, with freeboard measured and recorded daily. The gauges will be installed near: the emergency drainage swale on the southwest end of TSF#1; the lowest section near the north end of TSF#1; and, the lowest section of TSF#2.

3.2 Diversion ditch maintenance

The diversion ditch channels upslope of TSF#1 were excavated in 2011/2012. Minimal armouring and upslope grading were completed at this time. Sufficient work was not completed to allow these to be considered effective engineered structures. Further, no maintenance has occurred since they were originally excavated, and it is likely that sloughing and fluvial/colluvial deposition has taken place within in the channels, possibly rendering sections of the channels ineffective. Despite the above, the diversion channels will comprise an important part of the 2015 spring freshette overtopping contingency plan.

Figure 1 - TSF#1 Aerial view diversion channels

Upon arrival in late April, the diversion channels shall be cleared of debris (ice/snow/sediment/vegetation etc.) and maintained in such a manner for the duration of this Plan. The work will be carried out with hand tools and available heavy machinery (anticipated to comprise a bucket-loader, and D6 dozer) as required. Where possible, the channels shall be widened and deepened to accommodate a larger flow volume along the entire path of the channel. The channels shall be inspected daily and maintained free of debris. Pictures and written logs shall be recorded of the channel’s status and work performed.


Figure 2&3 - diversion channels above tsf#1

3.3 Emergency Decant Procedure

In the event that pond supernatant water reaches the level of the emergency spillway, or any point of the embankment crest, it will be necessary to begin decanting the pond water to the receiving environment to ensure that an ‘overtopping event’ or use of the spillway (until such time as it has been completed to the satisfaction of the Engineer of Record (EoR) and the MEM geotechnical inspector) does not occur. Such overtopping events would cause erosion on the downstream face of the embankment, and could lead to failure of the facility.

While decanting supernatant water directly to the receiving environment is not a permitted activity, it is SRL’s responsibility to ensure that no uncontrolled overtopping event occur until sufficient engineered structures have been designed and implemented, to the EoR and inspector’s satisfaction, to safely accomodate a controlled overtopping event through an emergency spillway.

Table 1 (below) details the estimated parameters of the emergency decant system, which will comprise twin 4” pipes operating a siphon from the TSF#1 supernatant to the northwest drainage ditch. While no historical data exists for the net inflow rate into the TSF during the peak of the spring freshette, the anecdotal evidence suggests that the supernatant only rises “a couple of inches per day” during an “average year” peak inflow. This observed inflow is consistent with the rate of discharge outlined in the Emergency Decant Procedure.

Estimate of decant siphon head - 7m
Estimate of flow rate from 4” discharge - 12.5 l/s
Estimate of flow rate from a 3/4” hose - 0.5 l/s
Length of decant “open loop” pipe - 120m
Volume of decant piping - 4000 l
Estimated time to fill decant piping - 2 - 2.5 hours (using 3/4” siphon hose)
Area of pond - 20,000 m3
Estimated Rate of Reduction of Static Supernatant Water Level - 4.5 mm/hour (90,000 l/h)

Table 1 - Emergency siphon estimated parameters

A number of factors should be considered when determining the level of supernatant water with respect to the lowest path across the dam crest at which the Emergency Decant Procedure should be activated. It is important that the operator does not initiate the procedure unnecessarily, although more important is ensuring that no overtopping event occurs. Snowpack, rainfall, and temperature will all have a large impact on peak freshette inflow rates, such that the procedure should be initiated earlier (at a lower supernatant level) if heavy rainfall and/or warm temperatures with heavy prevailing snowpack are forecast. Similarly, if the snowpack is low, and cool dry temperatures are forecast, then the peak freshette inflow will be lower and the procedure can be activated at higher supernatant levels. Assuming no extreme conditions, or ‘an average freshette’, the Emergency Decant Procedure should be activated at a supernatant level of 30 cm below lowest dam crest path.

3.3.1 Emergency Decant Procedure

Preparing the Emergency Decant Siphon:

- Collect approximately 120 m of 4” plastic tailings discharge pipe and couplers;
- Lay out the pipe near the northwest corner in an open loop, with the two open ends on the TSF berm with approximately 10 metres extra (to later be placed as intakes into the pond supernatant), and a bottom of the loop with a coupler in the drainage channel;
- Prepare to two dewatering socks/bags/tubes in the drainage channel near the coupler located at the bottom of the loop.

Priming the Emergency Decant Siphon - Manual

- Collect an approximately 50’ length of 3/4” hose for use as a ‘priming siphon’;
- Coil the ‘priming siphon’ hose and submerge in the supernatant water near one of the open ends of the 4” plastic line so that the ‘priming siphon’ line fills with water;
- Plug one end of the ‘priming siphon’ hose while underwater, and feed the other end down an open end of the 4” line to a depth where the ‘priming siphon’ line is below the supernatant water level;
- Remove plug from the ‘priming siphon’ line while underwater;
- Allow ‘priming siphon’ to fill the 4” line (no flow will be felt at the intake end of the ‘priming siphon’ hose, and the 4” line will be heavy/full) and remove ‘priming siphon’ hose;

Repeat as necessary.

Priming the Emergency Decant Siphon - Power

- Set up a battery/inverter and electric sump pump; or
- Setup a diesel/gas water pump; and
- Fill 4” line loop with supernatant water until flow returns out one of the open loop ends.

Initiating the Emergency Decant Siphon

- Remove the coupler from the bottom of the 4” line loop;
- Place silt sock/bag/tubes over the two discharging ends of the siphon and secure with couplers/clamps;
- Proceed with section 3.3.2 Notification during emergency decant procedure, and 3.3.3 Monitoring during emergency decant procedure;
- Continue siphoning (reprime/restart and move intake as needed) until supernatant waters have dropped to 40 cm below the lowest path on the dam crest;
- Continue to monitor level after siphoning has been discontinued, and restart procedure as required.

3.3.2 Notification during emergency decant procedure

In the event the emergency decanting procedure is implemented and unauthorized discharge to the environment therefore occurs, the following shall be contacted and notified of said discharge:

George Warnock, P.Eng	**Ministry of Energy and Mines**	**250-565-4240**
	Ministry of Environment	**250-565-6135**
Provincial Emergency Program (PEP)		**800-663-3456**

3.3.3 Monitoring during emergency decant procedure

As discharge of supernatant waters from the TSF to the receiving environment is not a permitted activity, it is important that sufficient data be collected on the amount and nature of the discharge, and on the effects it has on the receiving environment. As such a daily monitoring program as listed in Table 2, with locations depicted in Figure 4 shall be implemented for the duration for the duration of the Emergancy Siphon Decant. In addition, estimates of the volume of discharge, photos of the discharge, and time intervals of the discharge shall all be recorded. All data shall be forwarded to MEM and MOE, and any other party that requests the data.

Table 2 - Water Quality Monitoring During Emergency Decant

Location	Water sample frequency	Analyzed For	Field Parameter frequency	Field Parameters
5809-2 (before discharge) Galen Cr. d/s of Adit Cr.	daily (8 hour interval composite)	Cyanide, total and WAD Ammonia, Nitrite, Nitrate Total Phosphorus, OrthoPhosphorus pH, Sp. Conductance, Alkalinity, Hardness, Total Susp Solids, Total Metals ICPMS, Dissolved Metals ICPMS	daily	Flow, Diss. O2, pH, Sp. Conductance, Temp., Turbidity
5809-9 (after discharge) Galen Cr. d/s of TSF	daily (8 hour interval composite)	Cyanide, total and WAD Ammonia, Nitrite, Nitrate Total Phosphorus, OrthoPhosphorus pH, Sp. Conductance, Alkalinity, Hardness, Total Susp Solids, Total Metals ICPMS, Dissolved Metals ICPMS	daily	Flow, Diss. O2, pH, Sp. Conductance, Temp., Turbidity
Discharge of supernatant	daily (8 hour interval composite)	Cyanide, total and WAD Ammonia, Nitrite, Nitrate Total Phosphorus, OrthoPhosphorus pH, Sp. Conductance, Alkalinity, Hardness, Total Susp Solids, Total Metals ICPMS, Dissolved Metals ICPMS	daily	Flow, Diss. O2, pH, Sp. Conductance, Temp., Turbidity

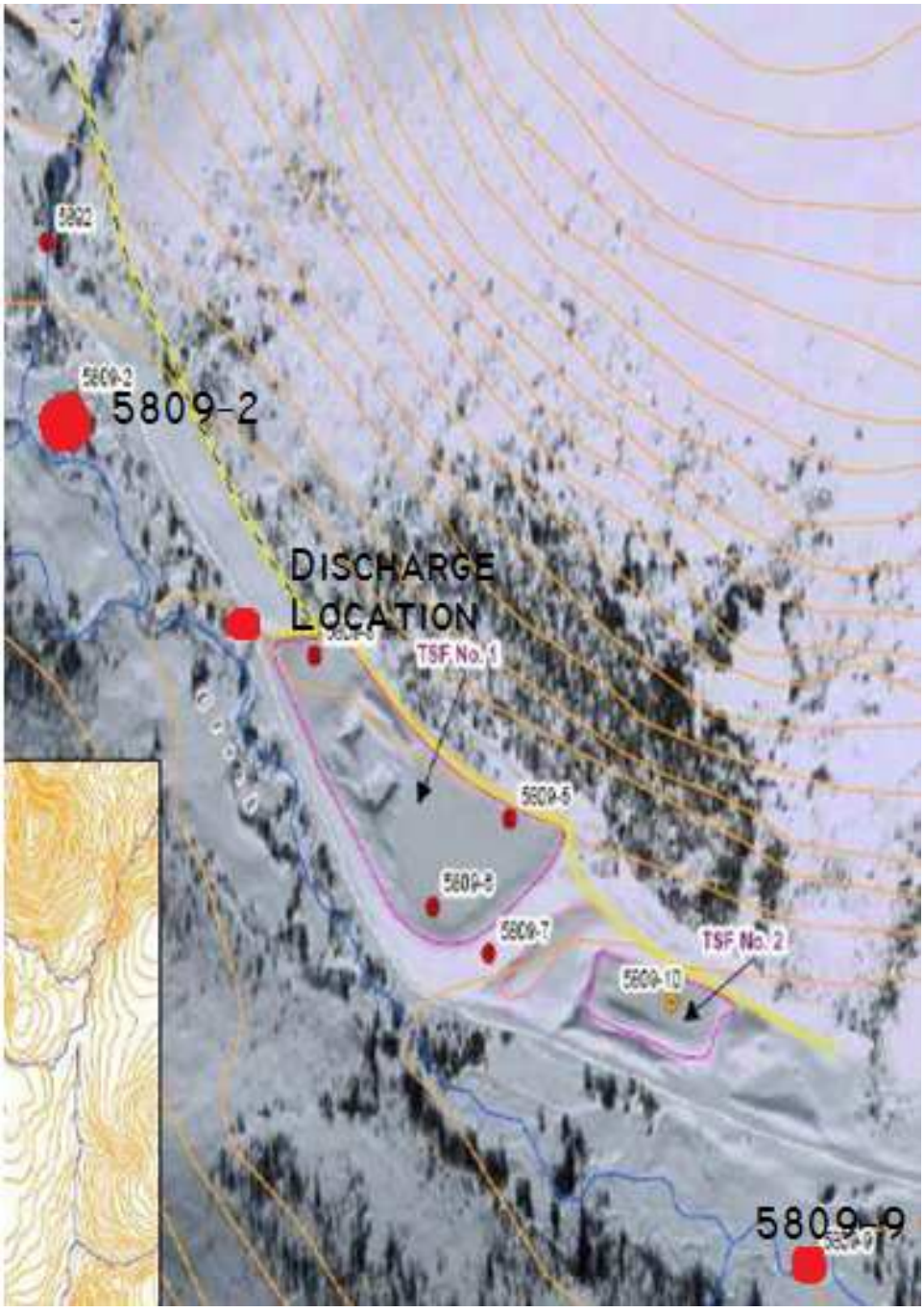

Figure 4 - Water quality monitoring locations during Emergency Decant Siphoning