April 29, 2021

Canadian Environmental Assessment Agency

Re: Comments on EIS Reports Proposed 15 Mile Stream Gold Mine, NS

Herein are my comments and concerns regarding the EIS reports:

1. It is stated in the reports that "no water treatment facility will be constructed unless needed" and that the "current modeling does not predict the need for water treatment during the closure phase." It is stated though that "ARD can begin in 6-15 years," which is obviously during the post closure period. As the buffering capacity is depleted, the concentrations of dissolved metals will increase as the pH progressively lowers. The proponent needs to stay committed (in writing) beyond the 15-20 years they are currently committed to post-closure in the EIS documents, to ensuring that any required treatment and monitoring stays in place for decades following mine closure. As well, if the proponent's company is sold in the future, the purchaser must assume and uphold the regulatory imposed conditions for this site.
2. In Section 6.4.4, it is stated that the "predicted residual effects of the Project are assessed to be adverse but not significant", considering there will be treatment of water and erosion / sediment controls in place if required. Better clarification of this statement is required, in my opinion, as to Proponent's definition of "adverse" and "significant", particularly since the word significant is subjective.
3. The method of water discharge treatment to the receiving environment is not provided, nor is the timeframe to construct/install and begin to operate once it is known that treatment is required, which in my opinion is highly likely. Hopefully lime treatment with settling ponds is not proposed, as acidic heavy rainfall events can solubilize the treated carbonated slurry and convey the fine metal laden material far downstream along the receiving water courses.
4. It is acknowledged that aluminum and arsenic are already elevated above referenced guidelines in streams and lakes in the region, which is common across the Nova Scotia in areas of the Meguma Formation, coupled with low buffering capacity demonstrated by low hardness and alkalinity. As the pH lowers, metals concentrations will increase exponentially. Aluminum needs to be focused on in addition to other metals, considering the adverse toxic affects that aluminum can have on brook trout, as demonstrated in past studies conducted in the Province.
5. Due to the sensitivity of the receiving environment, the frequency of surface water sampling during and post mine closure needs to be committed to and quarterly sampling may not be sufficient. Visual inspections and field measurements (eg. pH, temp, conductivity, DO and turbidity) should be conducted daily or every few days during mine operations and the closure phase, especially considering the sediment laden discharges / runoff experienced last year at the Touquoy Mine and at least monthly following mine closure for many years to follow. The receiving water courses are already acidic (pH 4.7-6.2) with elevated aluminum and arsenic and low alkalinity, making them more prone to impacts from runoff and shallow groundwater discharge from the mine site.
6. Closure plans for the waste rock piles need to consider the high probability of ARD generation over time, unless the piles are capped properly. At locations with permeable caps, I have seen argillite/slate waste rock piles disintegrate into powder as the calcite cement solubilizes due to low pH infiltrating precipitation, thereby speeding up the neutralization depletion, along with essentially exposing 100% of pyrrhotite and asenopyrite surfaces to oxygen and moisture. This situation will create a favourable environment for Thiobacillus microbes to munch on these minerals under oxidizing conditions, resulting in

ARD conditions. As the pH drops further and oxygen is depleted by the microbes, anaerobic chemical reactions will kick in, further lowering the pH and exponentially increasing metal concentrations in the water. Once this final stage begins, ARD generation is unstoppable. Considering the overburden is sandy and gravelly, with lesser silt and minimal clay (<5%) content, the waste rock piles should be covered with impermeable membranes followed by overburden capping at mine closure, to essentially cut off infiltration of precipitation and oxygen. This will help to stave off bacterial oxidation from starting. This will also prevent elevated arsenic, lead and mercury contained within the overburden (above referenced guidelines, as stated in the Phase II ESA) from infiltrating the waste rock piles and eventually travelling into the shallow groundwater beneath the piles.

7. The open pit will undoubtedly receive groundwater discharge that is acidic and metal laiden, considering the blasting will create / open existing fractures thereby exposing mineralized surfaces. There is no mention of potential impacts associated with the "blast halo" that will be created around the open pit. This could very well become problematic after the mine closes and the pit fills with water. The reports indicate the "steady state of groundwater dewatering is 80m outward from the open pit" and that the 160m deep open pit will fill in approximately 3-4 years, which will "immerse sulphide mineralization in the walls of pit, limiting the potential for acid generation." Immersing the mineralized fractures will help, however, bacterial oxidation will in all likelihood have already begun, possibly followed by anaerobic chemical reactions (as indicated in Comment 6 above) that will continue to produce ARD over the long term. I question whether the prediction of water table lowering extending 80m outward from the pit is accurate, considering it appears the affects of a blast halo have not been discussed in relation to exposing minerals and lowering the water table.
8. It appears that once the pit fills with water, the overflow will be directed to Seloam Brook. This water could very well require treatment for a very long time (several decades) in my opinion. It would be helpful to have the proponent provide data from other relevant sites as examples of what can be anticipated at this site, particularly since the EIS states that based on geochemistry model predictions, open pit water will not require treatment post closure.
9. It is stated that that the groundwater table will rise about 16m at the TMF and the extent of groundwater rise is predicted to extend approximately 100m outward beyond the perimeter berms. The shallow groundwater is anticipated to reach East Lake to the southeast and the west flowing stream to the north. Numerical modeling indicates that approximately 15% of the liquid seepage in the TMF will be allowed to enter the groundwater system. The EIS indicates that the lowering of the groundwater table to baseline levels will take over 100 years. All in all, this indicates that groundwater monitoring will be required for decades, with provisions for addressing any impacts to the stream and East Lake.
10. Monitoring wells should also be placed at two locations along the access road south of the TMF and plant site to monitor water levels to assist with verifying groundwater flow direction (deep and shallow) and to ensure any movement of impacted groundwater towards Anti-Dam Flowage will not occur or is caught earlier than later.

In summary, there is a lot of material to review on-line, so there may be issues I have addressed that are covered elsewhere in the EIS supporting documents, however, I feel my comments are important considerations that need to be addressed.

Respectfully submitted,

<ORIGINAL SIGNED BY>

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