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QZ08-083

Memorandum

Date: February 25, 2009
To: Kelly Boutilier, Yukon Water Board
From: Kai Woloshyn
Project Number: 80407
Subject: Additional Information for Water Use Application QZ08-083 (amend. to QZ99-046), Tom Valley Property

Distribution: Hudson Bay Mining and Smelting Co., Limited

On behalf of our client, Hudson Bay Mining and Smelting Co., Limited, we are pleased to provide this response to the Yukon Water Board letter dated February 23, 2009; Water Use application QZ08-083 (amend. to QZ99-046), Tom Valley Property. The additional information is provided below as bolded text.

1. Please confirm and explain in detail whether any environmental testing has been conducted to confirm the assumption that the iron precipitate sludge is stable under reducing (anoxic) conditions. If no testing has been conducted, do you have any existing samples of the sludge that may be potentially used for geochemical testwork?

No, environmental testing has not been conducted to confirm the assumption that the iron precipitate sludge is stable under reducing (anoxic) conditions. A sludge sample from May 31, 2008 is available for potential geochemical test work. Although the objective of plugging the adit workings is to reduce the oxidation of the underground workings, it is anticipated that the adit water will contain oxygen and will not be anoxic due to the continuous recharge of groundwater into the underground workings.

2. In review of your proposed sampling plan, there is a potential gap in data between November 2009 and June 2010.

a) Since your proposed sampling plan is based on monthly sampling for two months (weather dependency), please explain how you plan to adequately characterize effluent chemistry during the initial flushing phase given the uncertainty over its duration and its occurrence during the latter stages of the open flow season.

The duration and timing of the flushing period is uncertain; two monitoring events (weather permitting) have been proposed to characterize the adit water quality during the flushing period in fall 2009. Sampling of the adit was not proposed for the winter of 2009/2010 due to site access limitations and safety issues. Additional monitoring of the South Macmillan River stations in December 2009 and March 2010 is being proposed to address the potential data gap identified. The mouth of Sekie Creek #2 at monitoring station W8 will be inspected for flow during the winter monitoring events and a sample will be taken if possible.

b) Please provide details of consideration given to additional winter sampling at sites with safe access and year-round flow and if this is possible provide an updated sampling plan and monitoring locations.

Winter sampling was not included in the monitoring plan for the Sekie Creek #2 watershed due to limitations associated with site access and most sites being located in unsafe avalanche terrain. Monitoring stations W11, W12, and W13 on the South Macmillan River have safe access during the winter and flow year round and sampling of these stations is being proposed for December 2009 and March 2010.

c) If the stations differ from the monitoring stations already identified in the licence, please provide the station #, location, description, easting and northing coordinates for the Board to consider.

The locations in part b) do not differ from the monitoring stations identified in the licence.

3. What consideration has been given to the potential for ferric oxidation to occur within the flooded workings given the low drainage pH?

The potential for ferric oxidation to occur between low drainage pH and the adit workings was considered and evaluated using metal leaching analysis of adit wall rock samples with adit discharge water. Following the flushing period the pH of the adit water is anticipated to improve to the range of water quality observed in the flooded adit decline. The pH of the adit decline was 6.09 and 5.89 in July and September 2008, respectively.

Seven adit wall rock samples and adit discharge water were collected for metal leaching analysis on July 17, 2007. Table 5-9 of the Project Proposal outlines the adit metal leaching results. Metal leach tests are used to determine the potential for metal release from the material. It should be noted that laboratory metals leach testing were conducted using adit water to be representative of dissolution rates encountered under low pH conditions, as found from the adit discharge. These conditions will most likely simulate initial flooding concentrations during initial flushing of the underground workings following installation of the adit plug.

Typically, metal leaching concentrations observed in the samples collected from the adit walls are greater than those observed in the adit discharge water, when loading from the adit water used as leachate is accounted. This increase in metal concentration is most likely due to the elevated acidity of the adit discharge water and the high mineralization (e.g. pyrite and

sphalerite) in the adit wall rock. All samples collected from the adit had high metal concentrations from the leachate extraction tests using the adit discharge water with an average and maximum dissolved zinc concentration of 26.6 and 31.4 mg/L, respectively. The results of the predicted water quality during the flooding period are presented in Table 7-2 of the Project Proposal.

4. Does the proposed Adaptive Management Plan (AMP) (section 3.14.2) contain plans to address potential periods of non-compliance during the flushing and short term period, especially given access conditions to the site during these periods?

The conceptual adaptive management plan that will be developed following the issuance of the water licence amendment will address potential periods during the flushing and short term phases when the water quality does not meet the predicted water quality outlined in section 4.1, using the AMP methodology outlined in section 3.14.2.

5. The current timelines and methodology proposed for the AMP indicates an evaluation and review and mitigation process for periods of non-compliance that would be at least 90+ days. The application outlines an approach to evaluate exceedances of water quality thresholds but does not appear to be able to respond to potential periods of non-compliance during initial flushing period. The 30 day timeline for submission of the conceptual AMP does not allow for much consideration of the contents in advance of the start of construction. Please explain whether an earlier submission of this information is possible.

An earlier submission of the conceptual AMP would be possible by April 30, 2009 rather than May 31, 2009 if the amendment to the licence is issued by April 15, 2009.

6. Has consideration been given to the effects of exposure of the concrete aggregate to acidic conditions, as part of the design process?

Due to the potential for acid water and the presence of sulphates in the tunnel water, sulphate resistant cement (type 50), conforming to National Standards of Canada CAN/CSA-A5 is required and is being used in this project. (BGC, 2008)

7. The location of the sludge pond is within an area identified as being affected by avalanches.

a) Since the contents of the sludge pond are proposed to remain in situ for 2 years prior to capping, has the potential for avalanche activity influencing the sludge pond contents been considered in the design of this structure?

The potential for avalanche activity in the vicinity of the sludge pond is low. Avalanches have not been observed to hit the proposed location of the sludge containment pond and have been confined to the gullies of Sekie Creek #2 during late winter and early spring. If an avalanche occurred on the slopes above the sludge containment pond the

containment pond and frozen sludge would be covered by deep snow and the avalanche would carry over the pond.

b) Does the AMP contain details on monitoring of the sludge pond and its contents?

The conceptual AMP that will be developed following the issuance of the water licence amendment will contain details for monitoring of the sludge pond and its contents using the AMP methodology outlined in section 3.14.2 of the amendment application. Potential AMP monitoring trigger thresholds may include sludge depth, sludge density, volume of water in the pond and presence of seepage.

c) Is there potential for sludge mobilization as a result of avalanche activity in the spring or during snowmelt due to potential additional snow within the facility?

The potential for sludge mobilization due to avalanche activity or during snowmelt is minimal as the sludge containment pond will be designed to facilitate the settling of metal-laden sludge to the bottom of the pond to inhibit the loss of sludge during snowmelt events. The pond will be sized to 1575m³ covering an area of 30 x 35 m (1,050 m²) with side berms 1.5 m high. Clarified water will be pumped off each year during the fall to ensure adequate storage of spring melt water in the pond. Pumping will occur until the freeze dried sludge is solidified over a minimum of two winter seasons. The volume of sludge to be contained within the pond is estimated to be less than 500m³ with an expected sludge depth of 0.5m, which will allow for 1.0m of freeboard after being pumped dry.

References

BGC Engineering Inc., June 5, 2008:
Tom Property - Tunnel Plug Construction and Grouting