HAMMOND REEF GOLD PROJECT
RESPONSE TO COMMENTS ON FINAL EIS/EA

COMMENT – T-46

Source: Canadian Environmental Assessment Agency

Summary of Comment

Differences between Worst Case Predictions and Anticipated Operations Conditions:

It is not agreed that using a 15% evaporation loss is conservative, the Hydrology TSD version 1 (page 45), refers to the actual evapotranspiration in the local watersheds used in the assessment report can be converted to evaporation rate: 60% - 75% of precipitation.

A concentration (C) is given by a certain amount of mass (M) in a given volume of (V) and can be described by C=M/V. In the case of a waste rock pile, if all of the precipitation (P) falling on a waste rock pile translates to seepage and surface drainage then V=P*A (A=area). It is prudent to compare two scenarios, the assumption that 15% is "assumed to be lost to the system" and evaporation at 60%.

(a) 15%: C=M/(100-15%)PA =M/(.85)PA =1.18(M/PA). Hence C=1.18(M/PA)

(b) 60%: C=M/(100-60%)PA =M/(.4)PA=2.5(M/PA). Hence C=2.5(M/PA).

Therefore if we compare (b) to (a) we can see that C=2.5(M/PA) > C=1.18(M/PA).

The Proponent has made conclusions based on comparisons of predicted concentrations of parameters to CWQG and PWQO guidelines for the protection of aquatic life should the water bypass the collection systems.

This information is necessary to have a clear understanding of water quality effects from the project.

Proposed Action

Provide revised water quality modeling that factors realistic precipitation values. Perform Sensitivity analyses to determine the sensitivity of the modelling results to variations in precipitation and evaporation..

Reference to EIS

Hammond Reef Gold Project Hydrogeology TSD Hydrology TSD (Version 1, Page 45)

Response

For the Project, the materials to be mined, stockpiled and/or deposited in the TMF are expected to be non-acid generating with low potential for metal leaching based on the mineralogy, acid base accounting (ABA) testing, net acid generation (NAG) testing, and short term leach test results, therefore results used for water quality prediction are expressed in terms of leachate quality (mass released / unit leachate volume) for the pile, and are considered to be equilibrium controlled. Following this approach, the runoff concentration from the site facilities is assumed to be constant regardless of runoff volume and total mass inflow is tracked.

In the water quality assessment, the total mass introduced into the system for the two evaporation scenarios noted in the comment would be calculated as follows (where concentration (C) is a constant for each parameter from each facility):

(a) 15%: $M_a=V_aC$ = (0.85)PAC

(b) 60%: $M_b=V_bC$ = (0.4)PAC

Therefore if we compare (b) to (a) we can see that M_a = (0.85/0.4)M_b = 2.125M_b.

As mass loading decreases with increasing evaporation, a 15% evaporation rate is considered a reasonable and conservative assumption for the purpose of evaluating water quality impacts given that measured evaporation rates from rock piles at other Canadian Shield mine sites (Macroline, 2008 as cited in Areva, 2011) indicate that evaporation from the top of the pile can be as high as 60% of rainfall, and that evaporation in other natural areas of the Canadian Shield is several hundred mm (>20 % of rainfall) (Singer and Cheng (2002).

A sensitivity analysis in relation to flows and water quality is provided in both the Site Water Quality TSD (Section 4.3) and the Lake Water Quality TSD (Section 4.2 and 4.3.2). In these cases a range of flow conditions ranging from 100-year dry to 100-year wet is provided and an “average” case and “upper bound” case water quality is provided (using 75th percentile values for chemistry inputs). It is considered that the sensitivity model runs as provided are appropriate since they are based on measured and modelled data developed following standard procedures such as those provided in MEND 2009 and GARD, 2012.