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

COMMENT – T-37

Source: Canadian Environmental Assessment Agency

Summary of Comment

In the Site Water Quality TSD, the Proponent provides a value for Evaporation, seepage & spillage losses denoted as E&S in Figure 3.3 as 0.08 m^3/hour equally for the "waste rock, overburden and ore". It is assumed in this case the "ore" to represent low-grade ore stockpile. In Appendix 3.II Site Wide Water Balance, the rates of seepage losses for all of the mine components modeled in the water balance are all given as zero (0).

The combined rate for evaporation, seepage and spillage of 0.08 m^3/hour, which represents 1.9 m^3/d, does not seem plausible and the assignment of zero (0) seepage losses in the water balance model is questionable. The footprints (surface area) and volumes for the stockpiles of waste rock, overburden and low-grade ore are all different and hence the assigned singular value does not seem appropriate. Moreover, the 1.9 m^3/d in Figure 3-3 is not consistent with the zero (0) value given in the water balance.

Proposed Action

Provide an explanation and rationale for the values of 1.9 m^3/d for E&S as well as for the zero (0) value. It is recommended that a sensitivity analysis be conducted on the quantity and quality of seepage as it relates to the predictions of water quality for the site and ultimately for the receiver.

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

Reference to EIS

Hammond Reef Gold Project Site Water Quality TSD Figure 3-3: String Diagram Ultimate Mine Configuration Appendix 3.II Site Wide Water Balance

Response

In Figure 3.3, the 'Evaporation, seepage and spillage losses' are from the ponds located at the water collection pumping stations. Seepage rates from all facilities will be controlled and is assumed to be zero, as noted in Section 3.3.5 of the Site Water Quality TSD. Spillage losses are also assumed to be negligible. Therefore, with the exception of the Plant Site, the 'Evaporation, seepage and spillage losses' shown on Figure 3.3 are comprised only of evaporation from pumping station ponds. Each pumping station pond is assumed to have the same surface area and the WRMF, overburden stockpile and low-grade ore stockpile each have 3 pumping station ponds in their denoted watershed areas. Therefore the evaporation losses from the WRMF, overburden stockpile and low-grade ore stockpile watersheds are equal and are estimated to be 0.08 m^3/hr. The values presented in Figure 3.3 are consistent with the evaporation estimates in the Appendix 3.II Site Wide Water Balance.

Evaporation and losses to groundwater from the surfaces of the WRMF, overburden stockpile and low-grade ore stockpile are implicitly accounted for in the assigned runoff coefficients for each area. For these facilities, 15 % of precipitation is assumed to be lost to the system due to evaporation, reduction in snow accumulation due to the height of the piles and/or losses to the groundwater system. As discussed during the April 28, 2014 water

quality workshop with the Government Review Team, this is considered a reasonable and conservative assumption for the purpose of evaluating water quality impacts given that:

- All runoff concentrations from the mining facilities are assumed to be constant (i.e., more runoff equals more mass loading into the site water inventory); and, 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).
- 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 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.

References

Areva, 2011; Hydrology of Waste Rock Piles in Cold Climates; Technical Appendix 5I of the Kiggavik Project Environmental Impact Statement. December 2011.

Macroline, J., 2008. Investigations of water and tracer movement in covered and uncovered unsaturated waste rock, PhD. Dissertation, University of British Columbia, Vancouver, Canada.