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

COMMENT – T-39

Source: Canadian Environmental Assessment Agency

Summary of Comment

An essential component of all numerical hydrogeological models is a sensitivity analysis. Such an assessment of the proponent's water balance model is absent, but presumably could be conducted in order to assess the sensitivity of the water balance model to variations in input parameters. All models, including the one utilized by the proponent are subject to error.

The proponent states in the response to NRCan-8 that "In the water balance model all runoff and seepage is captured and the mass is therefore included in the final discharge water quality…" indicating that in order for model results to be valid, all seepage must be collected. In order to collect all seepage, the proponent will need to quantify seepage beneath the TMF and determine the proportion of seepage below the TMF versus through dams. This information will be needed in order to develop an appropriate seepage collection system at the detailed design phase. For example, if a significant amount of seepage occurs beneath the TMF, then the proponent will need to take measures to reduce seepage beneath the TMF (e.g. liner) and/or collect seepage via pumping wells that intercept this flow.

In the proponent's response to MOE's comment, it is noted that 10% of the seepage reporting to the collection system along the east side of the TMF would likely report to Lizard Lake (a total of 227 m^3/day of seepage). However it is not clear what impact this would have on Lizard Lake.

This information will be necessary to have a clear understanding of what the effects of seepage will be on water quality in the receiving environment, as well as inform the design of mitigation to intercept seepage, and any monitoring networks.

Proposed Action

Provide an evaluation of the accuracy of the water balance model used to evaluate potential for near surface versus groundwater water quality influence, including a sensitivity analysis of the model to varied input parameters.

Provide clarification on the seepage collection system. Specifically, will pumping wells be utilized to collect seepage from underneath the TMF? If not, please provide justification for this decision.

Estimate seepage losses from the TMF, WRMF, PPCP and overburden storage using the groundwater model. Assess the effectiveness of the proposed seepage control measures, and assess the potential impact of seepage discharge to receptors.

Provide a determination of seepage below the TMF versus seepage through dams.

Identify contingency plans and mitigation measures if seepage beneath the TMF is greater than initially predicted.

Provide a more detailed assessment of the impacts to Lizard Lake, which should be based on a more suitable and defensible estimate of seepage from the TMF to Lizard Lake.

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Reference to EIS

Hydrogeology TSD, Part A Introduction, Part B Supplemental Information Package, Tech. Memo (Dec 2013), Sections 2.0-4.0;

Site Water Quality TSD, Part A Introduction, Part B Supplemental Information Package; Conceptual Closure and Rehabilitation Plan TSD, Part A Introduction, Part B Supplemental Information Package;

EIS, Appendix 1.IV Information Requests.

Response

In response to comments received on the Final EIS/EA Report, Canadian Malartic Corporation hosted a water quality workshop on April 28, 2014 with the Government Review Team. We also initiated communications with the Regional Groundwater Group Leader for MOE's Northern Region who stated on May 15, 2014 that upon further clarification he is "satisfied at this time with the estimates of seepage to Lizard Lake."

Measures to limit, prevent and collect seepage from the TMF, WRMA, ore, low-grade ore, and overburden stockpiles have been developed at the conceptual level only at this time and consist of a series of collection ditches, and pumping stations. There are many proven ways to intercept seepage from a given site. During the detailed design stage for the Project additional drilling will be undertaken along the dam alignments, ditch alignments and near the edges of proposed stockpiles, and at that time it will be appropriate to further specify the details of the seepage collection system design. Considerations during detailed design will include bedrock and depth of overburden conditions, and use of pumping; however it is not possible for Canadian Malartic Corporation to fully define these measures at a detailed design level without appropriate funding and Project EIS/EA approval.

As all incident water is accounted for in the receiving waters, it is immaterial whether the water flows through the dams or beneath the TMF. Further detail regarding the conservativeness of the water quality modelling approach is in the *attached* memorandum entitled 'Water Quality Background Information', *which is also* provided *in Part D of the Addendum to the Version 3 EIS/EA* ~~as Attachment 4 of the Final EIS/EA Report Addendum~~.

The water quality of seepage has been predicted and assessed in the Final EIS/EA Report. All infiltration from Project facilities was assigned a water quality (as identified and discussed in the responses to information requests from the Draft EIS/EA Report) and direct discharge of this water from the facilities was evaluated. Infiltration water is expected to be compliant with applicable MMER and O. Reg 560/94 criteria. In addition, concentrations for each potential point source were considered (as part of IR-MOE-NR-GW-16 in Appendix 1.IV of the Final EIS/EA Report) and it was found that direct discharge of these concentrations into a water body would not result in adverse aquatic impacts.

The water quality assessment considered sensitivity in relation to flows and water quality as provided in both the Site Water Quality TSD (Section 4.3) and the Lake Water Quality TSD (Section 4.2 and 4.3.2). The sensitivity analysis considered a range of flow conditions ranging from 100-year dry to 100-year wet and "average" case and "upper bound" water quality scenarios (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.

At the request of the Government Review Team, additional 3D groundwater modelling efforts were undertaken for the eastern portion of the TMF. The preliminary 3D groundwater model was constructed using available information and, through this evaluation, it was shown that capture of greater than 90% of seepage could be achieved by the proposed control system given the current TMF design configuration and the current understanding of the tailing properties and geologic conditions of the site. Further details of this modelling evaluation are provided in the *attached* memorandum entitled 'Tailings Management Facility, 3D Groundwater Modelling' *which is also* provided *in Part D of the Addendum to the Version 3 EIS/EA* ~~as Attachment 3 of the Final EIS/EA Report Addendum~~.

In light of the results of the newly undertaken groundwater modelling, it is considered that the assumed seepage capture efficiency is realistically achievable based on the conceptual design. During the detailed design stage additional information collected will be used to develop a more robust modelling evaluation to refine and optimize the design of the seepage collection system.

It is the intent of Canadian Malartic Corporation to work with the design engineers and the applicable regulatory agencies to ensure that future data collection and the development of predictive models will meet both the requirements of engineering design and needs of the agencies with respect to permitting requirements.