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St. John's NL A1C 6M1

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301-10 Barter's Hill
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November 22, 2021

Sent by E-mail

Tara Oak
Manager, Environmental Assessment
Marathon Gold Corporation
PO Box 4006, Pearlgate PO
Mount Pearl NL A1N 0A1
Email: toak@marathon-gold.com

Dear Ms. Oak,

SUBJECT: Outcome of the Technical Review of the response to Information Requirement #2 of the Valentine Gold Project Environmental Impact Statement

The Impact Assessment Agency of Canada (Agency) has completed the technical review of the responses to Information Requirements issued on September 17 and August 31, 2021 for the Valentine Gold Project (the Project) and determined that additional information is required to proceed with the environmental assessment (EA).

To facilitate the EA, the Agency has prepared additional information requirements (IRs), contained in the attached table, in consultation with Environment and Climate Change Canada, Natural Resources Canada, Transport Canada, Fisheries and Oceans Canada, and Health Canada.

With the issuance of this third round of IRs, the federal timeline within which the Minister of Environment and Climate Change must make a decision is paused as of November 22, 2021. Once Marathon Gold Corporation has submitted responses, the Agency will determine if the information provided is complete and the timeline for the environmental assessment will resume. For further information, please consult the Agency document on Information Requests and Timelines: Information Requests and Timelines - Canada.ca

The responses to IRs may be in a format of your choice; however, the format must be such that the responses to individual IRs can be easily identified. You may wish to discuss certain IRs with the Agency or other government experts, as necessary, to obtain clarification or additional information, prior to submission of the responses. Working directly with government experts in this manner will help to ensure that IRs are responded to satisfactorily. The Agency can assist in arranging meetings with government experts, at your request.

The IRs and your responses will be made public on the Canadian Impact Assessment Registry Internet site: [Valentine Gold Project - Canada.ca (iaac-aeic.gc.ca)].

Please confirm receipt of this message and contact me if you require further information.

Sincerely,

<Original signed by>

Brent Keeping
Project Manager, Impact Assessment Agency, Newfoundland and Labrador Satellite Office, Atlantic Region

Cc: Jerry Pulchan - Environment and Climate Change Canada
Tonya Warren - Fisheries and Oceans Canada
Walker Smith - Natural Resources Canada
Jason Flanagan - Transport Canada
Beverly Ramos-Casey - Health Canada
Eric Watton – Environment and Climate Change
Joanne Sweeney – Environment and Climate Change

Attachment:

Attachment 1 – Round Three Information Requirements for the Valentine Gold Project.

Valentine Gold Project
Information Requirements – Round Three
November 22, 2021

INTRODUCTION

The Impact Assessment Agency of Canada (the Agency), with input from government experts, has completed its technical review of Marathon Gold Corporation's responses to Information Requirements issued on August 30, 2021 for the Valentine Gold Project. The Agency has determined that additional information is required, as per the table below.

ATTACHMENT 1: ROUND THREE INFORMATION REQUIREMENTS FOR THE VALENTINE GOLD PROJECT

Information Requirements

IR -2 Ref. #	IR #3 Number	Project Effects Link to CEAA 2012	Reference to EIS (including appendices)	Context and Rationale	Specific Question/ Proposed Follow-up Measure
IR #: IR(2)-11 IR(2)-12 IR(2)-14 IR(2)-15	IR Number: IR(3)-11	Project Effects Link to CEAA 2012: 5(1)(a)(i) Fish and Fish Habitat	Reference to EIS: Appendix 6A, Sections 4.3.3, 4.3.4, 4.4, 5.2.1.3, 5.3.1.2, 5.2.2, and 5.3.2, Tables 4-2, 4-3, 5-1, 5-2, 5-3, 5-4, 5-6, and 5-7, Figures 4.1, 4.2, 4.3, 4.4 5.2 and 5.4	The boundary conditions within the groundwater flow model (that includes the recharge applied to the top surface, and the drain and river boundaries used to represent surface water features) are user specified, and control the degree to which groundwater may interact with surface water, groundwater elevations, and the forecasted effects that mine dewatering and mine waste storage can have on groundwater flow. The model results are affected by these boundary conditions, and it effects the assessment of surface water and fish and fish habit as groundwater is a vector to those valued components. Round two information requests 11, 12, 14, 15 highlighted model results related to model boundary conditions that were inconsistent with either the reported applied boundary condition or the simulated changes in groundwater elevations. To support review of these results, maps showing depth to groundwater (i.e. the water table) were requested for the baseline, end of operations, and post closure conditions. These maps were provided in response to IR(2)-11 as Figures IR(2)-11.1, 11.2 and 11.3. In reviewing the response, Figure IR(2)-11.1 indicates that for the calibrated baseline simulation, many areas of the model domain have a water table that is above ground surface. These results are especially prevalent to the northwest of the Leprechaun Pit and to the south of the Marathon Pit where simulated groundwater elevations are more than 10m above ground surface. IR responses provided to date highlight the ability of this model to produce a reasonable calibration to observed groundwater levels and baseflow values. However, the results of this model are not conceptually feasible given the portions of the domain in which the water table is significantly above ground surface. Various incongruent model results highlighted in Round 2 (IRs 11, 12, 14, 15) appear to be related to numerical instability, and the related lack of conceptual feasibility from the calibrated model. Some examples include the fluxes at NT3 under baseline conditions and the increase in groundwater flow to NT1 and NT2 at the end of operations relative to baseline. Due to the highlighted concerns regarding the baseline calibrated model, forecast results for groundwater drawdown, and groundwater-surface water interaction cannot be relied upon for the effects assessment.	Provide a calibrated baseline groundwater model that aligns with the conceptual model, such that the groundwater table is at, or below the ground surface in the absence of surface water features or significant confining units. Provide forecast model results based on the updated calibrated model that limits numerical artifacts so that the reported results align with the expected outcomes, and applied boundary condition changes. Based on revised model results, update the effects assessment for surface water, fish and fish habitat as applicable.
IR(2)-54	IR(3)-54a	5(1)(a)(iii) Migratory Birds	EIS Appendix 7A, Table D-5, pdf 129 Valentine Gold Project: Responses to round two Federal information requests, pages 47-55.	The Proponent completed an avian risk assessment in response to Federal IR(2)-54. As part of this assessment, the Proponent provided information about the water intake rate of different avian receptor species (e.g. duck (black duck & mallard duck), common merganser, great blue heron, and Canada goose) that is used to characterize the degree to which avian species are exposed to contaminants that are predicted to be potentially present in TMF water. There are no peer reviewed studies provided to verify the accuracy of these water intake estimates; the accuracy of these intake values provides the foundation of the avian exposure/risk assessment. The proponent used toxic reference values (TRVs) available for various metals and water intake to calculate maximum acceptable water concentrations (MACs) for birds. MAC values were then compared to predicted worst-case scenario surface water concentrations for the tailings management facility (TMF). In order to be conservative, the Proponent recalculated MAC values based on the assumption that drinking water for birds accounts for 1% of their daily exposure to metals and it was thus concluded that the MAC values would be	a. Provide references for the water intake rate values used to estimate exposure of contaminants present in TMF water for species included in Table IR(2)-54.1 b. Provide clarification, including references, on how the MAC value would change using water intake rate versus the estimated 1% of daily metal intake attributed to drinking TMF water. c. Provide clarification on the discrepancy between the water quality values presented in Appendix 7A, Table D-5 and Table IR(2)-54.4. Describe how this discrepancy affects the conclusions drawn from the avian risk assessment.

IR -2 Ref. #	IR #3 Number	Project Effects Link to CEAA 2012	Reference to EIS (including appendices)	Context and Rationale	Specific Question/ Proposed Follow-up Measure
				reduced by 100-fold. While the Proponent has provided sample calculations used to calculate MAC values, it is not clear how MAC values were derived using the assumption that the daily exposure of metals through drinking water in birds represents 1%. Given that this approach shifted MAC values 100-fold relative to the previous assessment using intake rate values, it is important to understand how these values were calculated, and whether the assumption of 1% daily exposure associated with drinking water is a scientifically defensible methodology. In the EIS Appendix 7A, Table D-5: The highest value of the monthly mean and 95th percentile for each project phase in the TMF pond. However, these values do not correspond to the upper bound predicted values in Table IR(2)-54.4. For example, for arsenic the upper 95th percentile TMF concentration is 21 ug/L, but table 54.4 has it as 11 ug/L . For Cyanide, 95th % TMF estimates are 6700 ug/L for total and 230 ug/L for Weak Acid Dissociable, but table 54.4 has a value of 87 ug/L for Weak Acid Dissociable. The avian risk assessment evaluates the potential toxicity of individual metals and cyanide exposure by making comparisons to well-established toxicity reference values (TRVs); however, no TRV was provided for aluminum or cyanide. It is noted that, in general, risk assessment of chemicals is predicated on the toxicity of individual chemicals and not of environmentally relevant chemical mixtures. Furthermore, the potential for metal-cyanide complexes may be present in TMF water. The proponent used TRVs available for various metals and water intake to calculate maximum acceptable water concentrations (MACs) for birds. MAC values were then compared to predicted worst-case scenario surface water concentrations for the tailings management facility (TMF). There are numerous discrepancies between the TRVs in Table IR(2)-54.2 and the values in the cited references. For example, the mallard NOAEL for arsenic in Sample et al., 1996 is 5.1 mg/kg/d, but the Proponents uses a value of 4.3 mg/kg/d. Granted , in this instance, this value is more conservative but it is not clear why it was used. For mercury, it is not clear why the selected TRV was based on a single study using Japanese quail, when more relevant toxicity values are available for waterbird species, like those that the proponent identified as having a greater likelihood to be exposed to the TMF. Lastly, for TRVs based on multiple test species, it is not clear how the TRVs were established and selected for the risk assessment. Pending additional clarification and detail, the expectation from the Proponent is that metals and cyanide present in TMF water are not at sufficiently high enough concentrations to elicit toxicological effects to avian species (e.x. duck (black duck & mallard duck), common merganser, great blue heron, and Canada goose) that may come into contact with, and ingest TMF water. Two different scenarios are used to calculate MAC values, however predicted worst-case scenario water concentrations are used as the starting point for both of these risk assessment scenarios/calculations. Additional details are requested to verify the accuracy of these modelled values.	d. Describe how aluminum, cyanide and metal-cyanide complexes were accounted for in the risk assessment. e. Explain how the TRVs were chosen for the avian risk assessment. f. Describe the mitigations to protect waterfowl if water quality exceeds predicted worse case values.
IR(2)-18 IR(2)-19 IR(2)-21 IR(2)-23 IR(2)-26	IR(3)-18	5(1)(a)(i) Fish and Fish Habitat	Baseline Study Appendix 5 Attachment 5-B Section 3.1.1, 4.1.1, and 4.3.1 and Appendix A	The EIS guidelines Section 7.1.2 and 7.2.2 require a characterization program of expected mine material to predict metal leaching and acid rock drainage potential and support the evaluation of associated changes to water quality. Round 2 Information Requirements IR(2)-18, -19, -21, and -23 highlight data gaps in the sampling and testing program for waste rock and low-grade ore from the Marathon deposit, particularly related to under-represented lithologies and kinetic testing of potentially acid generating (PAG) material. Through responses to Round 2 Information Requirements, the Proponent acknowledged these gaps and is addressing them through a sampling and testing program that is currently underway. The proponent stated (Project Description Section 2.3.2.1; page 2.38) that waste rock piles will be built using bottom-up construction, while the response to IR(2)-19 confirms that PAG rock will be encapsulated/blended in the waste rock pile or backfilled in Marathon pit. INAP (2020), a global best practice report, states that bottom-up construction more effectively manages ARD/ML risk than traditional end tipping, emphasizing the importance	**Option 1:** a) Provide the static test results of the 2021 sampling program. b) Provide a detailed sample selection rationale for the 2021 samples indicating all factors used to select samples. c) Provide a methodology for the kinetic testing program. d) Once a-c have been completed, provide the updated ARD/ML management plan that confirms the approach to waste rock pile construction, and includes kinetic test data available at the time of reporting.

IR -2 Ref. #	IR #3 Number	Project Effects Link to CEAA 2012	Reference to EIS (including appendices)	Context and Rationale	Specific Question/ Proposed Follow-up Measure
				of accurately estimating material volumes and production schedule for successful implementation. Under-predicting PAG volumes can have serious implications for closure planning (Barritt *et al.,* 2016), and as such the identified data gaps need to be addressed to support successful implementation of this management approach during operations. To date, a sufficiently detailed sample selection rationale has not been provided for waste rock and low-grade ore from the Marathon deposit. Baseline Study Appendix 5 and IR-18 both emphasize the use of gold grade in sample selection, which is correlated with sulphur per response to IR(2)-18. Further, per IR(2)-18 cross sections, the Agency notes continued issues such as spatial gaps and sample locations distal to previously identified PAG material (e.g. gabbro samples in borehole MA-16-082 on cross section 16700E of Appendix IR(2)-18.A; page 37 of PDF). It is unclear if these gaps will be filled by the additional samples proposed for the Acid Rock Drainage (ARD) block model as stated in IR(2)-18a. Per IR-21, the kinetic testing program to date does not include any PAG samples and thus does not capture the potential worst-case reactivity and timing to generation of acidic conditions. Understanding the reactivity of PAG material is critical to support successful mine waste management planning. This is important to accurately evaluate timing to onset of ARD and acidic metal loading rates for input to the updated water quality model. In the response to IR(2)-23c, the proponent indicates that the water quality model will be updated upon completion of the additional static tests and after a full year of analysis of the field bin testing. An updated and substantiated water quality model is necessary to assess potential impacts to fish and fish habitat. Due to these highlighted data gaps, the baseline geochemical characterization program is not considered sufficient to capture risk to fish and fish habitat associated with the Marathon deposit during operations and post closure. Barritt, R., P. Scott, and I. Taylor. 2016. *Managing the waste rock storage design – can we build a waste rock dump that works?* Mine Closure 2016 – AB Fourie and M Tibbett (eds.). 2016 Australian Centre for Geomechanics, Perth, ISBN 978-0-9924810-4-9. Doi: 10.36487/ACG_rep/1608_07_Barritt INAP (International Network on Acid Prevention) 2020. *Rock Placement Strategies to Enhance Operational and Closure Performance of Mine Rock Stockpiles. Phase 1 Work Program – Review, Assessment & Summary of Improved Construction Methods.* Prepared for INAP by Earth Systems & OKane Consultants. https://www.inap.com.au/research/#rockPlacementStrategies	e) In consultation with Federal Authorities, update the water quality model based on additional testing/sampling. **Option 2: Alternative to a-e** Provide an updated ARD/ML management plan that clearly delineates the steps, decisions and actions that will be taken on an ongoing basis by the mine operator to identify and manage PAG materials. The plan must offset the uncertainty associated with the current geochemical characterization of the site with operational requirements that would ensure that PAG materials are managed appropriately to reduce the risk to fish and fish habitat.