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Memo

To:	John Roberts, PEng	**Client:**	TMAC Resources Inc.
From:	Maritz Rykaart, PhD, PEng	**Project No:**	1CT022.002
Reviewed By:	Sarah Portelance, PEng	**Date:**	February 3, 2016
Subject:	Response to EC IR #10 – Closure Water Management – UPDATED to Reflect the Alternate Water Management Strategy of Discharging High NaCl Concentration (>10,000 mg/L) Mine Water to the TIA		

1 EC IR #10

1.1 Reference

Package 6 Part 10 Site-Wide Water and Load Balance Section 6.2.3; Appendix B.

1.2 Issue/Concern

The Proponent indicates that at closure the TIA waters will be drawn down, with year-round pumping of the dewatering flows from the TIA to the mixing box and on to Roberts Bay at a rate of 4,000 m^3/day. At closure the effluent will consist of TIA water only, as groundwater collection will cease at closure and no longer be pumped to the mixing box.

Appendix B of the Site – Wide Water and Load Balance presents Figures B1 – B17 which show predicted water quality in the TIA over time. At the time of drawdown, a number of the parameters have predicted concentrations that are elevated well above CCME guidelines.

Table 6-2 shows low salinity in the TIA waters at closure; 4,000 m^3/day of fresh water would be discharged to Roberts Bay.

1.3 Information Request

a. Describe contingency measures that are available if the water in the TIA is not suitable for discharge to the marine environment.

b. Provide information on the potential effects of discharging 4,000 m^3/day of fresh water to Roberts Bay.

2 TMAC Response

In the response to item (a) of the IR #10 stated above, TMAC commented that in the event that water quality in the TIA are such that discharge to the ocean is not possible, there is sufficient capacity to retain water in the TIA until a solution to the problem can be attained. This memo provides details as to how long water can be retained within the TIA under such conditions before reaching the full supply level (FSL) of 32.5 m.

At set points in the life of mine, Operations was assumed to cease due to an inability to discharge. From that point forward, the TIA was allowed to continue to fill under different hydrological conditions assuming no outflows, with the only water loss being evaporation.

Seven scenarios were run with Operations ceasing at different time periods ranging from 2015 to 2020. The base case assumes Operations cease at the planned closure period of April 2021, as shown in Table 1. The predicted average time for the water level in the TIA to reach the FSL after operations cease is 9 years, ranging from a minimum of 5 years to a maximum of 14 years.

Table 1: Time for Tailings Impoundment Area to Reach Full Supply Level after Closure

Scenario	Closure Date	Date TIA Elevation at Full Supply Level			Years to Fill to Full Supply Level		
		Mean	5th Percentile	95th Percentile	Mean	5th Percentile	95th Percentile
1	04/2021	03/2028	06/2026	06/2030	7	5	9
2	12/2015	01/2028	06/2025	06/2030	12	9	14
3	12/2016	01/2029	06/2026	09/2030	12	9	14
4	12/2017	06/2028	06/2026	06/2030	10	8	12
5	12/2018	01/2028	06/2026	05/2030	9	7	11
6	12/2019	07/2027	06/2025	06/2029	8	5	9
7	12/2020	03/2028	06/2026	06/2030	7	5	9

3 Follow Up Request by ECCC and INAC

At the NIRB and NWB Technical Meetings held in Cambridge Bay on January 26-29, 2016, ECCC and INAC requested that TMAC update the analysis presented in Section 2 above to demonstrate how this might change under the alternate water management scenario. That is, where the initial volume of mine inflow water that exceed a NaCl concentration of 10,000 mg/L are discharged to the TIA.

4 TMAC's Follow-up Response

The alternate water management strategy entails discharging the early mine water to the TIA as opposed to directly to Roberts Bay. This will occur for the period where the NaCl concentration of the mine water exceeds 10,000 mg/L. In accordance with the Groundwater Model (Document P6-3), the volume of water that will have to be discharged to the TIA in this manner is about 415,000 m^3. This inflow will occur between May 2017 and January 2018.

This volume is approximately the same as the annual net accumulation of water in the TIA under baseline conditions of 400,000 m^3. Therefore, the addition of this water will result in a reduction in the time to reach FSL by approximately 1 year. As a result the predicted average time for the water level in the TIA to reach the FSL after operations cease for the alternate water management strategy is 8 years, ranging from a minimum of 4 years to a maximum of 13 years.