SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2

**T: +1.604.681.4196**
**F: +1.604.687.5532**
vancouver@srk.com
www.srk.com

# Memo

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| **To:** | John Roberts, PEng | **Client:** | TMAC Resources Inc. |
| **From:** | Sarah Portelance, PEng | **Project No:** | 1CT022.002 |
| **Reviewed By:** | Maritz Rykaart, PhD, PEng | **Date:** | March 3, 2016 |
| **Subject:** | Doris North Project Water Licence Amendment – Interim Water Management Plan | | |

# 1 Context

In response to Environment and Climate Change Canada's (ECCC) letter of January 8, 2016, TMAC has developed an interim strategy to manage saline groundwater until the toxicity testing protocol amendments to the Metal Mining Effluent Regulation (MMER) are complete. TMAC's preferred water management is described in the Revisions to Amendment Application No. 1 of Project Certificate No. 003 and Water Licence No. 2AM-DOH1323 (the Revised Application). However, TMAC is confident that the interim mine water management strategy described in this memo will ensure protection for the environment. A presentation outlining the proposed interim mine water management method was presented during the Technical Meetings in Cambridge Bay January 26-29, 2016

# 2 Background

Mine water inflow is expected as mining progresses into the Doris Lake talik. For a period of time early in the mine life, between May 2017 and January 2018, TMAC will encounter saline groundwater similar in concentration to seawater. After which the salinity concentration is expected to decline due to an increased fresh water component of the mine inflow originating from Doris Lake. This is described in detail in Document P6-3 of the Revised Application. The Amendment Application proposes to discharge the saline mine water to the Arctic Ocean at Roberts Bay via a pipeline and diffuser.

ECCC informed TMAC on December 23, 2015 of its interpretation that the MMER requires effluent not be acutely lethal to rainbow trout when tested in accordance with the Reference Method and that ECCC will not authorize the use of an alternative species acclimated to salt water. ECCC also advised that active efforts are underway to amend the MMER to address this issue and TMAC understands that these amendments are scheduled to be in place sometime in 2017. As such, TMAC has been actively engaging with ECCC on the matter of toxicity testing with saline tolerant species.

The salinity, expressed as the sodium chloride (NaCl) concentration in the groundwater at the Doris Mine, is predicted to exceed the Reference Method threshold value 10,000 mg/L. To ensure it is in compliance with the MMER, TMAC has developed an interim effluent and mine water management strategy to be employed while ECCC is completing the necessary amendments.

# 3 Interim Water Management Strategy

As a result of the clarification provided by ECCC on December 23, 2015, TMAC is proposing an option to temporarily manage saline groundwater with a NaCl concentration >10,000 mg/L during the period May 2017 through January 2018. Figure 1 illustrates the groundwater inflow chloride concentration as presented in Document P6-3. (Note that TMAC has carried out its investigation of this matter using salinity in terms of chloride concentration, where 6,000 mg/l chloride is approximately equal to 10,000 mg/l NaCl.)

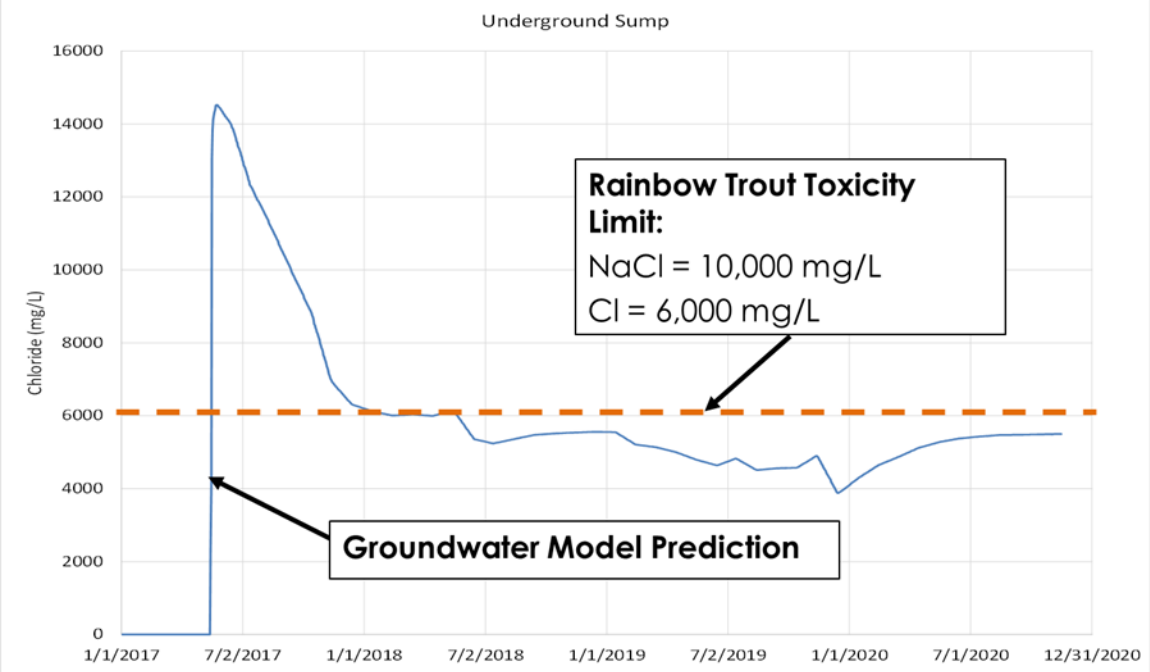


**Figure 1: Groundwater inflow chloride concentration as presented in Document P6-3**

During this time, the saline groundwater >10,000 mg/L NaCl, which is estimated to be approximately 415,000 $m^3$ in total volume, will be pumped to the TIA for holding instead of directly to Roberts Bay as previously proposed. The resulting concentration of NaCl in the TIA will be approximately 1/3$^{rd}$ of the Reference Method threshold value which may allow water from the TIA to be discharged to Roberts Bay, in compliance with the MMER. The peak chloride concentrations within the TIA as a result of this interim water management strategy are presented in Figure 2.

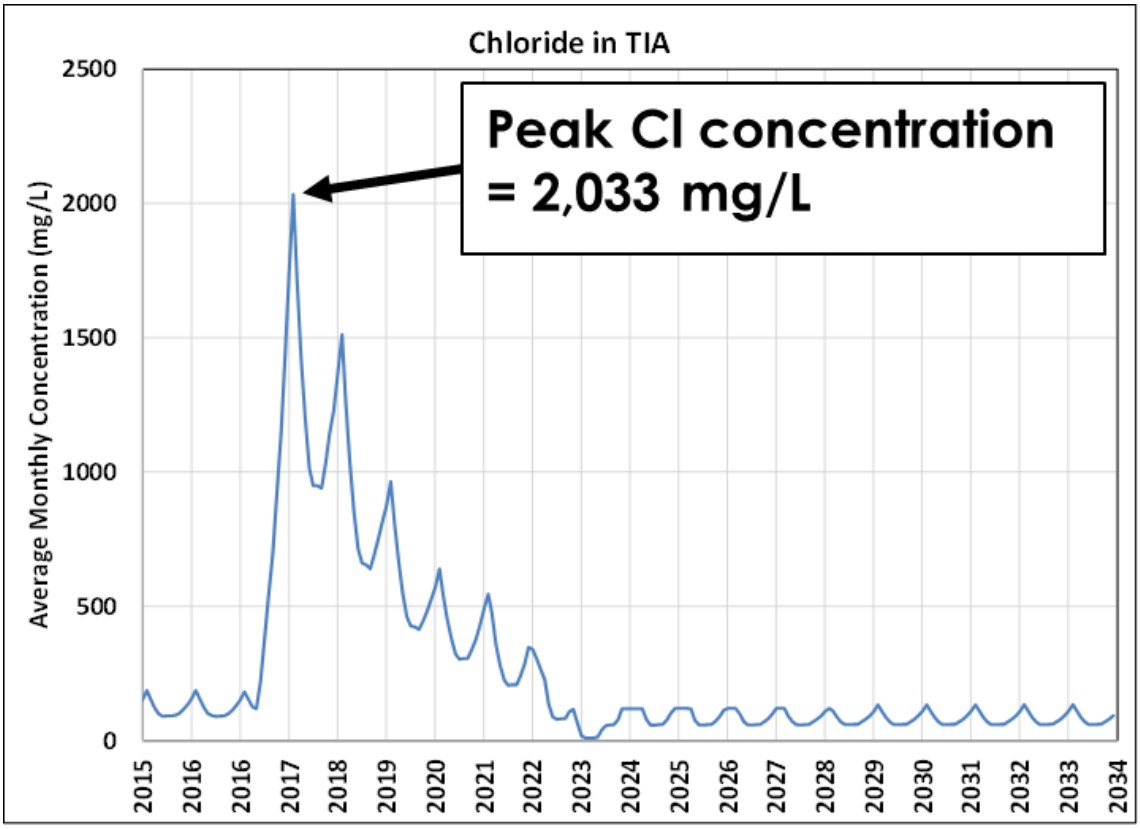


**Figure 2. Chloride concentration within TIA, with implementation of the Interim Water Management Strategy**

Once permitted by ECCC to carry out toxicity testing on saline tolerant species, TMAC would revert to the water management plans proposed in the Revised Application.