



Your file - Votre référence
2AM-DOH1323

June 5, 2015

Our file - Notre référence
IQALUIT-#920870

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
GJOA HAVEN, NU X0E 1J0

**Re: Aboriginal Affairs and Northern Development Canada Review of TMAC Resources Inc
Request to Modify their Existing Waste Rock and Ore Management Plan - Water Licence
No. 2AM-DOH1323**

Dear Ms. Beaulieu:

Thank you for your email of May 8, 2015, concerning the above mentioned request to modify an approved management plan. A memorandum is provided for the Board's consideration. Comments and recommendations have been provided pursuant to Aboriginal Affairs and Northern Development Canada's mandated responsibilities under the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

Please do not hesitate to contact me by telephone at 867-975-4555 or email at David.Abernethy@aandc-aadnc.gc.ca for further information.

Sincerely,

David Abernethy
Regional Coordinator
Water Resources Division
Resource Management Directorate
Aboriginal Affairs and Northern Development Canada
IQALUIT, NU X0A 0H0

Encl.

c.c.: Andrew Keim, A/Manager, Water Resources Division, AANDC Nunavut
Erik Allain, Manager, Field Operations Division, AANDC Nunavut

Memorandum

To: Phyllis Beaulieu, Nunavut Water Board

From: David Abernethy, Aboriginal Affairs and Northern Development Canada

CC: Amjad Tariq (AANDC), Andrew Keim (AANDC), Erik Allain (AANDC)

Date: June 5, 2015

Re: Request to Modify Existing Doris North Waste Rock and Ore Management Plan, Water Licence No. 2AM-DOH1323

Applicant: TMAC Resources Inc
Project: Doris North
Region: Kitikmeot

Comments:

A. Background

On May 8, 2015, the Nunavut Water Board ("NWB" of the Board) provided notification of TMAC Resources Inc's ("TMAC") request to modify their existing Doris North *Waste Rock and Ore Management Plan* pursuant to Part H, Item 1 of water licence No. 2AM-DOH1323. TMAC are requesting the Board's approval to construct and store waste rock on a previously assessed infrastructure pad, Pad T, to the north of the Doris portal. All waste rock would report to this new location rather than the currently approved storage locations on Pads I, F, and G. This revised waste rock management strategy is expected to improve mine site traffic flow and minimize re-handling requirements. Pad T is within the original development area and the existing Pollution Containment System. It is anticipated that this pad will hold a maximum of 506,000 tons during operations and a total of 188,000 tons at closure (approximately 398,000 tons of material will be required for backfill, including 368,000 tons of waste rock and 30,000 tons of detoxified tailings).

The following information was included in TMAC's modification request:

- a revised Waste Rock and Ore Management Plan (SRK 2015d);
- the waste rock storage pile (Pad T) design brief (SRK 2015a);
- a reclamation and security brief specific to the use of Pad T for waste rock storage (SRK 2015b);
- a waste rock storage pile (Pad T) stability analysis memo (SRK 2015c) and
- a draft procedure to minimize brine water use in underground mining operations (TMAC 2014).

Interested parties were asked to review this application and provide comments by June 8, 2015.

B. Results of review

On behalf of Aboriginal Affairs and Northern Development Canada (AANDC), the following comments and recommendations are provided:

1. Thermal Analysis of Pad T's Foundation (Permafrost Soils)

Source: Stability Analysis Memo (SRK 2015c)

Comment: Section 2.1.1 of the memo states,

Pad T will be constructed on permafrost soils (i.e., directly onto the tundra) and is designed to promote freeze-back, thereby minimizing long-term environmental effects from possible acid rock drainage and/or metal leaching. Permafrost soils will provide suitable foundation conditions for waste rock piles, provided the foundation remains frozen. SRK (2006) presents the thermal analysis for the site that demonstrates the viability of this approach.

Recom: TMAC should verify the stability of Pad T's foundation (permafrost soils) based on updated thermal analysis because the 2006 thermal model results (SRK 2006) are dated. Climate change and/or global warming may impact the foundation's material properties. These details should be considered.

2. Incremental Liability Associated with Waste Rock Storage on Pad T

Sources: Stability Analysis Memo (SRK 2015c)
Security Brief (SRK 2015b)

Comment: Table 2 of the Stability Analysis Memo presents material properties of the foundation soils. The Apparent Cohesion (c') of the frozen marine silt and clay is 112 kPa, whereas, in unfrozen state it is 0. An unexpected temperature rise can decrease the Apparent Cohesion of silt and clay, jeopardizing the stability of underneath soils.

Section 2 of the Security Brief provides the total incremental liability associated with Pad T, i.e., CAD \$6,000, in undiscounted 2014 Canadian dollars.

Recom: The Licensee should ensure that the incremental liability amount will be sufficient if ambient air temperatures were to increase due to climate change and/or global warming. The possibility of the waste rock pile becoming unstable due to temperature rise and resulting unfrozen soil conditions should be considered.

3. Reclamation Cost Estimate Details

Source: Security Brief (SRK 2015b)

Comment: The memo does not include details on why \$6,000 in undiscounted Canadian dollars is considered to be the total incremental liability associated with the

revised waste rock management strategy (use of Pad T). Details such as tasks, quantities, units, unit cost codes, associated subtotals, and indirect costs (e.g., general and administrative costs, post closure monitoring, etc.) are not provided. Section 2 states that it was assumed that 100% of the pad surface area would be re-graded to ensure positive drainage and ponding. Section 3 states that the value was calculated using the same principles and costing assumptions used in the current Doris North Closure and Reclamation Plan (SRK 2012).

Recom: TMAC should provide details (i.e., spreadsheet based) that demonstrate why \$6,000 in undiscounted Canadian dollars is considered to be the total incremental liability associated with the Waste Rock Storage Pile (Pad T).

4. Groundwater Considerations

Source: Revised Waste Rock and Ore Management Plan (SRK 2015d)

Comment: Information to prevent surface water contamination due to seepage has been provided in section 5 of the submitted plan. However, groundwater information is not available. Seepage and runoff from the waste rock storage pad may contaminate groundwater.

Recom: In addition to surface water protection, TMAC should consider groundwater protection. TMAC should provide groundwater information.

C. References

SRK Consulting (Canada) Inc, 2006. *Doris North Project – Thermal modeling to support design thickness for granular pads*. Technical memorandum, Prepared for Miramar Hope Bay Ltd, Project No. 1CM014.008. August 20, 2006.

SRK Consulting (Canada) Inc, 2012. *Doris North Closure and Reclamation Plan*. Prepared for Hope Bay Mining Ltd, Project No. 1CH008.065. August 2012.

SRK Consulting (Canada) Inc, 2015a. *Doris North Project: Waste Rock Storage Pile (Pad T) Design Brief*. Technical memorandum, Prepared for TMAC Resources Inc, Project No. 1CT022.002.100. March 27, 2015.

SRK Consulting (Canada) Inc, 2015b. *Doris North Project: Waste Rock Storage Pile (Pad T) Reclamation and Security Brief to Doris North Type A Water Licence No. 2AM-DOH1323*. Technical memorandum, Prepared for TMAC Resources Inc, Project No. 1CT022.002.100. March 27, 2015.

SRK Consulting (Canada) Inc, 2015c. *Doris North Project: Waste Rock Storage Pile (Pad T) Stability Analysis*. Technical memorandum, Prepared for TMAC Resources Inc, Project No. 1CT022.002.100. March 27, 2015.

SRK Consulting (Canada) Inc, 2015d. *Hope Bay Project Doris North Waste Rock and Ore Management Plan – Revision No. 2*. Prepared for TMAC Resources Inc, Project No. 1CT022.002.100. April 2015.

TMAC Resources Inc, 2014. *Draft Low Salt Underground Brine Water Use Procedure*. November 5, 2014.

Prepared by David Abernethy and Amjad Tariq