DORIS MINE

RESPONSES TO COMMENTS ON MANAGEMENT PLANS, NUNAVUT WATER BOARD (SUPPLEMENTAL):

AQUATIC EFFECTS MONITORING PROGRAM AND REVISIONS TO THE SURVEILLANCE NETWORK PROGRAM

GROUNDWATER MANAGEMENT PLAN

TAILINGS IMPOUNDMENT AREA OPERATIONS, MAINTENANCE AND SURVEILLANCE MANUAL

Revisions to Amendment Application No. 1 of Project Certificate No. 003 and Water Licence No. 2AM-DOH1323: Proponent's Response to Comments on Management Plans (Supplemental)

July 2016

Prepared by:

TMAC Resources Inc.
Toronto, Ontario

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LIST OF ACRONYMS

Acronym	Definition
AEMP	Aquatics Effect Monitoring Program
CCME	Canadian Council of Ministers of the Environment
chl a	Chlorophyll *a*
ECCC	Environment and Climate Change Canada
EEM	Environmental Effects Monitoring
MMER	*Metal Mining Effluent Regulations*
NIRB	Nunavut Impact Review Board
NRCan	Natural Resources Canada
SNP	Surveillance Network Program
TIA	Tailings Impoundment Area
TMAC	TMAC Resources Inc.
TSS	Total Suspended Solids

1. ID# ECCC-1

1.1 SUBJECT

Schedule J monitoring

1.2 REFERENCE

n/a

1.3 COMMENT

1. Comments on Schedule J monitoring:

ECCC participated in the June 6th workshop which discussed the monitoring conditions for TL and ST monitoring sites at the Doris mine. In general, ECCC agreed with the proposed revisions, made to accommodate project changes in water and waste management. These are outlined in the notes to the presentation, and in the meeting notes from the June 6th workshop.

The main item to follow up on is where monitoring results are to be reported, and how monitoring terms and conditions changes are to be managed. Most Nunavut licences include a clause stating that the Board can revise items in the Schedules without that being considered an "amendment" to the licence. This clause was not included in the Doris North licence. If this clause were to be added to the amended licence it would address concerns with the managing changes to monitoring conditions in Schedule J. Alternatively, relying on reporting of results in the management plans would provide flexibility, and changes to plans can be made without amending the licence, and are considered binding under the licence terms and conditions. The concern with this approach is the frequency of reporting; Schedule J monitoring results are reported on a monthly basis whereas the plans are typically included in the annual report. In the June 6th workshop John Roberts (TMAC) committed to characterization of the TIA water and making results publicly available.

Recommendations:

- That the Water Licence amendments include addition of the clause allowing for modification of the terms and conditions contained in the Schedules to the Licence.
- TIA sampling and characterization be done monthly for metals, major ions, pH, TSS, nutrients and Total Petroleum Hydrocarbons. Data should be provided to

the Water Board on an ongoing basis, whether this is regulated through Schedule J or through the water management plan.

- TL-3 – Doris Outflow Creek downstream of the falls: 1. retain oil and grease; 2. sampling frequency post closure is proposed to be annual – this is low so suggest deferring setting the frequency to later versions of the closure plan.
- TL-12 – underground minewater: retain Schedule J requirements for monthly analysis of ammonia, pH, TSS, and add major ions.

1.4 TMAC RESPONSE

Water Licence Clause
TMAC agrees with the recommendation regarding addition of the licence clause allowing for schedules to be modified without initiating a full amendment of the license.

TIA Sampling
TMAC agrees with sampling the TIA water at TL-1 during Operations. This characterization will be outlined in a revision to the Water Management Plan to be provided in September 2016.

TL-3
TMAC agrees to retain oil and grease in the parameter list for sampling in Doris Creek. However, Station TL-3, below the falls is in territory frequented by bears and characterized by a willow thicket. TMAC proposes collecting the sample at Station TL-2, downstream of the bridge on Doris Creek. There will be no intervening inputs to Doris Creek between TL-2 and TL-3 once discharge to the ocean has commenced.

TMAC also agrees to revisit post-closure sampling frequency in the final Closure Plan and at the time of water licence renewal.

TL-12
TMAC agrees to retain Schedule J requirements for monthly analysis of ammonia, pH, TSS, and add major ions.

2. ID# ECCC-2

2.1 SUBJECT

Aquatic Effects Monitoring Plan

2.2 REFERENCE

n/a

2.3 COMMENT

2. Aquatic Effects Monitoring Plan (AEMP) Comments:

TMAC provided a revised AEMP for the June 6th workshop, and provided rationale for the reduction in freshwater sampling. With the change in effluent discharge from freshwater to the marine receiving environment, the main sources of contaminant loading to surface waters will be airborne and surface runoff contributions. Monitoring during construction has not detected effects; however, there will be continued development and activity going into operations. Water level monitoring has been added to the AEMP, along with ice thickness.

TMAC proposes reduction of water quality sampling sites from two to one in Doris Lake, and removing the downstream stations (Doris Creek, Little Roberts Lake, outflow of Little Roberts Lake, and Roberts Lake outflow). In support of this, TMAC has promised to provide data for the two Doris Lake sites showing comparability. This may be a reasonable approach if there is close correlation over time; with no seasonal variation or differing trends. If any changes are observed at ST-7 it would be expected that monitoring would be expanded to other stations in Doris Lake.

TMAC does not propose to do any sediment or biological monitoring in Doris Lake. ECCC notes that there can be accumulations of metals or nutrients in sediments even when there are very low levels in the water (e.g. mercury). Similarly, there can be changes to biota in response to low levels of nutrient inputs, which are not necessarily observable as increases in the water column.

The AEMP also includes the framework for the Response Plan. ECCC notes that the benchmarks proposed are CCME guidelines, but should also include baseline water quality where warranted by background levels or for parameters which do not have CCME guidelines.

Recommendations:

- Continue *chl a* monitoring as an indicator of eutrophication, on at least an annual basis.
- Continue monitoring of benthic invertebrates in Doris Lake and in the reference lake; this could move to a three year cycle.
- surficial sediments for metals every 3 years.
- Doris Creek monitoring should be resumed prior to breaching of the Tail Lake dike; it would be reasonable to characterize Doris Creek for 2 years in advance of closure breaching.

2.4 TMAC RESPONSE

Despite confidence in the efficacy of the proposed AEMP program, TMAC understands the desire to ensure no unforeseen effects are being missed. Further, although, at this time, reference site sampling is not deemed necessary based on potential Project effects and the reasons outlined in previous submissions, TMAC will expand the AEMP sampling to address Party concerns, and include routine reference site sampling on the frequencies proposed. Program changes include:

- Collection of chlorophyll *a* samples in Doris Lake as an indicator of eutrophication once annually;
- Collection of water quality and benthic invertebrates at the Doris Lake North sampling location and in the associated Reference Lake every 3 years, concurrent with execution of the EEM program;
- Sampling of Doris Lake North surficial sediments for metals every 3 years concurrent with execution of the EEM program;
- Characterization of Doris Creek water quality at TL-2 once annually for 2 years in advance of breaching the North Dam.

3. ID# ECCC-3

3.1 SUBJECT

Marine Monitoring

3.2 REFERENCE

n/a

3.3 COMMENT

3. Marine Monitoring

An outline of the Marine Receiving Environment Monitoring was provided in an ERM memo dated April 29th, 2016. This monitoring program will be done in compliance with the Metal Mining Effluent Regulations (MMER); however, that program will not be initiated until the mine is subject to the MMER following discharge. TMAC has proactively proposed collection of baseline marine data in 2016.

Recommendations:

- Exposure sampling stations shown in Figure 2-1 are 250 m from the diffuser; this distance is too great given the predicted quality and mixing of the effluent (within less than 15 m). Sampling stations should be moved closer to the diffuser site, within approximately 50 m or less.

ECCC has no comments on either the AEMP or the SNP at this time but respectfully request the option to submit comments in the near future as our expert is otherwise engaged for the remainder of the week.

3.4 TMAC RESPONSE

TMAC looks forward to continued engagement with ECCC through both the Working Group and the Technical Advisory Panel, on matters pertaining to EEM study design in Roberts Bay.

4. ID# NRCAN-1

4.1 SUBJECT

Groundwater Management Plan

4.2 REFERENCE

n/a

4.3 COMMENT

Groundwater Management Plan

NRCan recommended during the NIRB Public Hearing in Cambridge Bay from April 12th to 14th, 2016 that the proponent document in its Groundwater Management Plan the measures it would take to minimize groundwater inflow into the mine1. These measures have been included by the proponent. NRCan is in agreement with the yearly review of the Groundwater Management Plan to capture any revisions or updates necessary to adapt to changing circumstances regarding inflow and discharge rates. Once mining ceases, the Groundwater Management Plan indicates that mitigation measures and adaptive management will be in place as required based on inflow and mine discharge rates to ensure that these issues are managed appropriately. NRCan has no further recommendations.

4.4 TMAC RESPONSE

Acknowledged.

5. ID# NRCAN-2

5.1 SUBJECT

Tailings Management Plan

5.2 REFERENCE

n/a

5.3 COMMENT

Tailings Management Plan

In its final submission to the NIRB in relation to permafrost, NRCan did not make specific recommendations with respect to monitoring the thermal condition and stability of the dams, but made recommendations with respect to geotechnical investigations and thermal analysis to support detailed design for the Tailings Impoundment Area (TIA) foundation and interim dyke[2].

Monitoring plans described for the original approved project are also applicable to the amended project. The specific monitoring plans provided for the revised TIA proposed by TMAC Resources will verify their predictions with respect to thermal and stability analysis and monitor performance of the TIA including the dams and dykes. NRCan supports the approach outlined by TMAC Resources, as it relates to thermal analysis to support detailed design, and does not have any further recommendations.

- 1 160404-05MN047- NRCan Final Hearing Presentation-IA2E.pdf and 160315-05MN047-NRCan Final Written Submission-IA1E.pdf -NIRB Public Registry NIRB File No. : 05MN047: Doris North Mine.
- 2 160315-05MN047-NRCan Final Written Submission-IA1E.pdf NIRB Public Registry NIRB File No.: 05MN047: Doris North Mine.

5.4 TMAC RESPONSE

Acknowledged.