

۲۶۹۶۹۵ Qikiqtaaluk

Dr, NOSZB Arctic Bay 2662PC24Q2P Qikiqtarjuaq $P^{\infty}U\Delta^{c}$ Cape Dorset ᠙᠘ᠨᢗᢦ᠈᠘ᡀ Clyde River 45C2QYQD Grise Fiord ኒ ታሪያት Hall Beach D-5-Igloolik محده ک Iqaluit **brLSc** Kimmirut (°595)96 Pangnirtung Lcurc-Pond Inlet PDYQC28P Resolute Bay

Pペとい Kivallig

ادامه المحامة Sanikiluaq

Arviati

Arviat

BLo-Ddsb

Baker Lake

Abolidb

Chesterfield Inlet

Sc5b

Coral Harbour

BY 5b 20 5b

Rankin Inlet

abb

Repulse Bay

NPS 4dsb

Whale Cove

'PN'TD' Kitikmeot

Asb からくくくい。
Cambridge Bay
いっちゃっちゃ
Kugluktuk
psゃとうい。
Gjoa Haven
はいっちゃ
Kugaaruk
C こうくくい。
Taloyoak

Executive Summary

Rescan Environmental Services Ltd. was contracted by the Kitikmeot Inuit Association and Nunavut Tunngavik Inc. to conduct a technical review of the Miramar Hope Bay Ltd. application for a water license for the Doris North Mine. Rescan made a total of 19 recommendations.

NTI Lands and Resources concurs with the report on the application and the italics and bolded bullets are the main concerns and elements that the NTI would like to emphasize as major elements that need to be addressed during the water licence hearing.

Overall NTI is satisfied with the application and support MHBL's application for their water licence as long as they abide by our wishes and concerns.

The more significant were:

- The changes in project design introduced by MHBL at the Technical Meeting held on June 11 and 12, 2007, fall within the scope of the Project Certificate issued by NIRB.
- Rescan recommends that the water licence be renewed within five years of issuance.
- During the freshet period, water quality sampling and manual flow measurements should be undertaken more frequently than MHBL's proposed bi-daily sampling program. Daily or twice daily measurements may be required until confidence is achieved in the real-time water management system that will control releases from Tail Lake.
- During winter and spring months, water quality samples should be taken from Tail Lake at sufficient depth to exclude stratification as a problem.
- During freshet, manual flow measurements may be required in Doris Creek to ensure the accuracy of the flow data.
- After closure, once the northern dam of Tail Lake is breached, turbulence in Tail Lake may stir up tailings, potentially changing water chemistry. MHBL should take this into consideration in closure planning because mitigation will likely be very difficult once the dam is breached.
- The predictions of the water quality model should be regularly updated during the operational lifetime of the mine by comparing them with fieldcollected water quality data. Updated long-term model predictions and a comparison of predicted and observed concentrations should be provided in annual monitoring reports.
- We recommend that the Board define any exceedance of CCME guidelines predicted by the water quality model, regardless of magnitude or duration, as "significant" and requiring re-calibration of the water quality model.



ادخ ۱۹۹۰ Qikiqtaaluk

Dr, NOSZB Arctic Bay SPP20C24Q2P Qikiqtarjuaq P°°L∆° Cape Dorset ᠙᠘ᠨᢗᢦ᠈᠘ᡀ Clyde River 45C2QYQD Grise Fiord ኒ ታሪያት Hall Beach D-5-Igloolik محده ک Iqaluit **PLTP**c Kimmirut (°595)96 Pangnirtung Lcurc-Pond Inlet PDYQC28P Resolute Bay 40P2056

Pペとい Kivallig

Sanikiluaq

Arviat

Arviat

SLoc Ods

Baker Lake

Aryicts

Chesterfield Inlet

いった

Coral Harbour

いった

Rankin Inlet

のけった

Repulse Bay

ハアライグが

Whale Cove

'PN'TD' Kitikmeot

Asb からくくくい。
Cambridge Bay
いっちゃっちゃ
Kugluktuk
psゃとうい。
Gjoa Haven
はいっちゃ
Kugaaruk
C こうくくい。
Taloyoak

- We recommend that the Board define any measured exceedances of CCME guidelines in Doris Creek during discharge from Tail Lake as grounds for immediate cessation of discharge.
- Care needs to be taken in the design and construction of the inlet to the pumps in Tail Lake to ensure that concentrations of total suspended sediment (TSS) do not exceed the cut-off level of 15 mg/L specified by the MMER.
- Rescan supports the concept proposed by MHBL of a two-component discharge strategy from Tail Lake: (1) end-of-pipe MMER discharge guidelines in Tail Lake and (2) CCME guidelines for protection of aquatic life in Doris Creek.
- If discharge of water from sedimentation ponds onto tundra is frequent enough to overwhelm the cleaning capacity of tundra soils, then MHBL should divert water from the sedimentation ponds to the tailings water stream.
- Rescan suggests that short monthly reports be prepared during the first year
 of operations, to provide confidence that the water management plan is
 being applied successfully. These reports should include all water quality
 data, flow measurements in Doris Creek, discharges from the pond and pond
 water levels. All data used in calculating the discharge rate from the pond
 should be provided.
- The Board should place a condition on monitoring of metal concentrations in vegetation and soils that if the results of closure sampling show a statistically significant increase compared to baseline concentrations, then at least one more monitoring event should occur within the next five years to determine whether average metal concentrations remain elevated or have returned to baseline levels.
- A fuel spill management plan and a sediment management plan should be in place when dismantling the upper layer of the jetty because this will require heavy equipment which will be at least partially used below the water surface.
- At closure, the material of the containment berms around the fuel tanks and any standing water behind the berms should be sampled for hydrocarbon analysis prior to breaching the berms.
- At closure, the hydrocarbon sludge from the fuel tanks may be burned on site. In that event, the area where incineration is to take place should be lined to prevent the incinerated material from entering water when natural drainage is restored. Ash should be disposed of prior to breaching the berm.
- At closure, the removal of the dock at Doris Lake will require heavy equipment. This may result in the generation of sediment due to the disturbance of the lake edge. A sediment control plan should be developed to minimize sediment entering Doris Lake.



۹۲۹۹۵ و الم

Dr, NOSTE Arctic Bay SPPSPC549SP Qikiqtarjuaq P°°L∆° Cape Dorset ᠙᠘ᠨᢗᢦ᠈᠘ᡀ Clyde River 45C2QYQD Grise Fiord ኒ ታሪያት Hall Beach ∆ے۔ Igloolik محده ک Iqaluit **PLTP**c Kimmirut (°595)96 Pangnirtung Lcurc-Pond Inlet PDYQC28P Resolute Bay 40P2056

P65-50 Kivallig 0800° Arviat 8Loco 18 Baker Lake D'SCLETE Chesterfield Inlet 4-696 Coral Harbour Por 29 200 Rankin Inlet ملاكم Repulse Bay Ubditale Whale Cove

Sanikiluaq

°P∩°T▷° Kitikmeot

Δ°b_s^5′γ′д°b
Cambridge Bay
「ประช่ว°b
Kugluktuk
カ°bγ′°b 5′c
Gjoa Haven
ゴレアb
Kugaaruk
C_5′七Д°b
Taloyoak

• At closure, the quarry floors will be channelled to allow precipitation runoff to drain onto the surrounding tundra which could potentially enter a local stream in the vicinity. It is assumed that the material exposed by quarrying will not be acid generating (or stored materials will not be deleterious). If there is a potential for such an issue with this material, then this should be assessed prior to carrying out channelling.

Technical Review

This technical review comments on the Revised Doris North Water License Application Support Document. The purpose was to assist the Nunavut Water Board in developing the terms and conditions of the Doris North water license. Most of the comments concern the proposed water management strategy. The key element of that strategy is a two-component discharge strategy from Tail Lake: (1) end-of-pipe discharge standards in Tail Lake based on the Metal Mine Effluent Regulations (MMER); and (2) water quality standards at a compliance point in Doris Creek based on Canadian Council of Ministers of the Environment (CCME) guidelines for protection of freshwater aquatic life. Rescan accepts that this strategy can work but it will require extensive training and rehearsal by staff, accurate and precise results from the on-site analytical laboratory, frequent comparison of predicted and observed water quality, and frequent reporting to the Nunavut Water Board. Rescan recommends that the Board define any exceedance of CCME guidelines in Doris Creek as "significant" and requiring cessation of discharge until the causes can be explained, accompanied by re-calibration of the water quality model. Rescan also recommends a five-year water license.

2.2 Duration of Water License

Rescan recommends a five year water license. Miramar has applied for a single water license for Doris North lasting eight years with periodic reviews at three years intervals. This will cover construction (one year), operation (two years) and closure (five years). After seven years, MHBL expects that water quality of the Tail Lake discharge will have reached a level that will allow unrestricted natural discharge.

Rescan has no specific recommendation concerning enforcement penalties, but encourages the Board to adopt strict standards for enforcement of discharge water quality from Tail Lake – the principal waste management issue for Doris North. The critical period for the real-time discharge management system will be during the first year of mine operation and in freshet of each subsequent year. As stated in MHBL's water management plan, should water quality monitored at the Surveillance Network Program (SNP) station in Doris Creek below the waterfall exceed water quality guidelines for the protection of aquatic life established by the Canadian Council of Environment Ministers (CCME), then MHBL must immediately stop discharge. The Board should not allow discharge to resume in that year or in any following year until the Board has received a satisfactory written



explanation from MHBL for why the exceedance occurred and how MHBL has solved the problem.

نېومې Qikiqtaaluk

Arctic Bay

Qikiqtarjuaq °∿l∆^c

Cape Dorset

Clyde River

Grise Fiord

Hall Beach

∆ےرہ Igloolik

Depour

Iqaluit

P¹FP° Kimmirut ⟨°₅⁵°Ò⁵°

Pangnirtung \[\Gamma^c \cappa LC_b \]

Pond Inlet

Resolute Bay くっとう⁵⁶ Sanikiluaq

Pペとい Kivalliq

۵°۵۵° Arviat

ዔLቍጋላሜ Baker Lake

Δンーじて。 Chesterfield Inlet

۲۶۰ Coral Harbour

βγςεςσςε Rankin Inlet

Repulse Bay

NP554056
Whale Cove

'PN'TD'
Kitikmeot

∆ኄጏኄጎረላኈ Cambridge Bay

がさいさい Kugluktuk

Dsからうち Gjoa Haven

الالله Kugaaruk دے ۲۵۶۶

Taloyoak