



Water Resources Division
Nunavut Regional Office
Iqaluit, NU X0A 0H0

Your file - Votre référence
2AM-WTP1826

October 22, 2018

Our file - Notre référence
CIDM# 1230008

Richard Dwyer
Manager of Licensing
Nunavut Water Board
Gjoa Haven, NU X0B 1J0

Sent via email: licensing@nwb-oen.ca

Re: Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) review of the Groundwater Monitoring Plan – Whale Tail Pit Project under Agnico Eagle Mines Limited's Type "A" Water Licence No. 2AM-WTP1826.

Dear Mr. Dwyer,

Thank-you for the email notice, received on October 3, 2018, regarding the May 2018 Version 1 Groundwater Monitoring Plan for the Whale Tail Pit Project.

CIRNAC reviewed the plan and comments are provided pursuant to its mandated responsibilities from the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Department of Indian Affairs and Northern Development Act*.

If you have any questions or require further information with respect to this matter, contact me at (867) 975-4546 or email spencer.dewar@canada.ca, or Ian Parsons at (867) 222-9278 or email ian.parsons@canada.ca.

Regards,

Spencer Dewar
Director, Resource Management Directorate – CIRNAC, NRO

Cc. Felexce Ngwa, Manager of Impact Assessment – CIRNAC, NRO
Rachel Theoret-Gosselin, Sr. Environmental Assessment Specialist – CIRNAC, NRO
Justin Hack, Manager of Field Operations – CIRNAC, NRO
Michelle Blade, Water Resource Coordinator – CIRNAC, NRO



Memorandum

To: Richard Dwyer, Manager of Licensing, NWB

From: Spencer Dewar, Director, Resource Management Directorate – CIRNAC, NRO

Date: October 22, 2018

Re: **Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) review of the Groundwater Monitoring Plan – Whale Tail Pit Project under Agnico Eagle Mines Limited’s Type “A” Water Licence No. 2AM-WTP1826.**

Applicant:	Agnico Eagle Mines Limited (AEM)
Representatives:	Jamie Quesnel and Ryan Vanengen
Project:	Whale Tail Pit Project
Region:	Kivalliq

A. BACKGROUND

On July 11, 2018, the Minister of Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) approved Agnico Eagle Mines Limited’s (AEM) Whale Tail Pit Project Type ‘A’ Water Licence No. 2AM-WTP1826 application. The Whale Tail Pit Project is a gold deposit located near Baker Lake, Nunavut.

The Whale Tail Pit Project was part of a joint Nunavut Impact Assessment Board (NIRB) and Nunavut Water Board (NWB) process. The Groundwater Monitoring Plan was therefore reviewed by CIRNAC for its compliance with “commitments made with respect to submissions received during the technical review of the Application, as well as final submissions and issues raised during the 2017-2018 Public Hearing” of Part B Item 15 of Water Licence 2AM-WTP1826, and with Term and Conditions #10, #14, #15 and #16 of the NIRB Project Certificate.

On 17 October 2018, CIRNAC and AEM met to discuss the field data collected to date, and the corresponding assumptions of the hydrogeology and geochemistry models – along with the data provided in the additional information received by CIRNAC Waters on 12 October 2018. The content of those discussions have been used to inform the Groundwater Monitoring Plan review.



B. RESULTS OF REVIEW

The deficiencies noted in the following Summary of Review Findings and Recommendations demonstrate that the current Groundwater Monitoring Plan does not meet the minimum requirements and is therefore incomplete at this time. ***CIRNAC recommends the NWB not approve the May 2018 Version 1 Groundwater Monitoring Plan for the Whale Tail Pit project until the outstanding concerns are appropriately addressed.***

CIRNAC recommends the following revisions/additions be implemented, and the updated Groundwater Monitoring Plan be re-submitted for review and approved prior to the initiation of dewatering from the North Basin of Whale Tail Lake.

Additionally, CIRNAC was informed on October 17, 2018 that AEM had no plans to install new groundwater monitoring wells and that sampling from the only operational well (Westbay multiport well) at the site was delayed significantly. This information was shared approximately half a year after AEM made its decisions on these issues, without consulting with CIRNAC or others on its intended approach. To ensure more proactive reporting and follow-up on hydrogeological issues, the Groundwater Monitoring Plan should include provisions for more frequent communication between AEM, CIRNAC and other parties to identify, discuss and address known or potential risks associated with the groundwater regime. Given the short duration of the mine life and the benefits of mitigating emerging concerns as early as possible, we recommend that more frequent communication be held during the operational phase.



Summary of Review Findings and Recommendations

#	Reference	Finding / Recommendation
1	New Site-Specific Hydraulic Data	<p>Finding:</p> <p>Throughout the NIRB and NWB regulatory processes, CIRNAC expressed concerns regarding water quality in the flooded Whale Tail Pit after closure. Those concerns are related primarily to uncertainties associated with pit wall chemistry and flows that may discharge to the pit. CIRNAC repeatedly indicated that the uncertainties should be resolved through additional characterization of the groundwater regime. This included multiple recommendations that new field data be collected from new groundwater wells prior to mine development.</p> <p>As per CIRNAC's submissions to the NWB, CIRNAC expected that its recommendations for additional hydrogeological characterization would be provided in the updated management and monitoring plans. This requirement is also captured in the NIRB Project Certificate Term and Condition #15 which requires that the Groundwater Monitoring Plan include "<i>The collection of additional site-specific hydraulic data (e.g., from new monitoring wells) in key areas during the pre-development, construction and operation phases.</i>". The Plan is also required to provide new information that allows for the "<i>Definition of vertical and horizontal groundwater flows in the project development areas</i>".</p> <p>On October 17, 2018 AEM confirmed to CIRNAC that it has not installed any new monitoring wells since the Westbay multiport well. As a result, a single Westbay multiport well continues to be the only functioning groundwater sampling station on the Whale Tail property. While we acknowledge that the Westbay system is capable of providing important information to characterize the groundwater regime, a single station provides little information to define horizontal flow gradients. As such, there continues to be uncertainty regarding hydraulic gradients in the vicinity of the pit and, by extension, this introduces uncertainty regarding the post-closure water quality of the flooded pit.</p> <p>AEM informed CIRNAC on October 17, 2018 that a Westbay sampling event scheduled for June 2018 was delayed until November 2018. The delay was reportedly required due to the presence of operational activities that rendered the well area unsafe during the original sampling event. No explanation was provided to justify the five-month delay during the critical pre-</p>



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		<p>development period.</p> <p>Based on the above, AEM has not collected the new pre-development site-specific hydraulic data as recommended by CIRNAC and required by the Project Certificate. However, the company has refined its desk-top modelling of groundwater interactions with the pit. The refined modelling predicts that post-closure arsenic concentrations in the flooded pit are likely to be below the applicable water quality criterion. There continue to be uncertainties regarding post closure water quality in the flooded pit but the revised modelling has helped to confirm that the negative implications associated with those uncertainties have reduced since the review of the Project's Application.</p> <p>Notwithstanding the new modelling information presented by AEM, their analyses were conducted using data collected from a single groundwater monitoring location (i.e., the Westbay system) that may not be representative of conditions throughout the site. They also rely on the assumption that groundwater will flow northward, despite the fact that some lake levels are inconsistent with that assumption (i.e., Nemo Lake to the north is higher than Whale Tail Lake).</p> <p>All factors considered, CIRNAC maintains that at least one additional deep groundwater well is desirable to characterize and validate AEM's assumptions regarding hydrogeological flows within the project area. The information collected from the new well(s) would help to validate AEM's assumptions regarding groundwater flows in the vicinity of the pit. While CIRNAC appreciates that developing such wells is challenging, the successful installation of the Westbay well demonstrates it can be done and that it will provide valuable information.</p> <p>Recommendation:</p> <p>Following consultation with relevant regulatory authorities (including CIRNAC), AEM should install at least one additional deep groundwater monitoring well that extends into the sub-permafrost groundwater regime to the north of the Whale Tail Pit. In combination with the existing Westbay system, the new well(s) will help to characterize the local groundwater regime. Installation should occur prior to dewatering of the Whale Tail Lake – North Basin. In the absence of this information, CIRNAC would request more frequent monitoring, data analysis and reporting.</p>



#	Reference	Finding / Recommendation
2	Incorporation of Well Monitoring into the Plan	<p>Finding:</p> <p>Linked to the previous point, the Groundwater Monitoring Plan makes no reference to future sampling from the Westbay system or any other groundwater wells that AEM plans to install. Instead, the Plan relies primarily on the sampling of groundwater that reports to the pit during the operational phase. While such data will be useful in efforts to detect water quality concerns that have already materialized, it will provide limited information in efforts to characterize the pre-development and post-closure hydrogeological conditions of the site.</p> <p>Recommendation:</p> <p>AEM should incorporate well monitoring into the Groundwater Monitoring Plan to help identify, characterize and address potential hydrogeological risks associated with the Project. The well monitoring should include detailed descriptions regarding how the existing Westbay system and any new wells will be incorporated into the Groundwater Monitoring Plan (scheduled monitoring events of groundwater quality and flow, etc.).</p>
3	Thermal Monitoring	<p>Finding:</p> <p>The current Groundwater Monitoring Plan does not include any information related to additional site-specific permafrost monitoring, mapping, and thermal analysis. Based on the documentation reviewed, CIRNAC has yet to see evidence confirming there is an open talik beneath Whale Tail Lake. Further, CIRNAC notes that these additional thermal analyses are also a requirement under NIRB Project Certificate Term and Condition #10.</p> <p>Recommendation:</p> <p>Based on the importance of ground temperatures to the behaviour of the hydrological regime, CIRNAC recommends that additional site-specific permafrost mapping, monitoring, and thermal analysis be incorporated into the Groundwater Monitoring Plan, particularly in the vicinity of the north wall of the pit. Evidence should be provided demonstrating there is an open talik beneath Whale Tail Lake.</p>
4	Thresholds and Adaptive Management	<p>Finding:</p> <p>Thresholds triggering implementation of adaptive mitigations are fundamental requirements of the adaptive management process to mitigate uncertainties and address emerging conditions. However, the current version of the Plan lacks any information related to thresholds and, more generally, adaptive management strategies AEM will implement to reflect site-specific conditions</p>



#	Reference	Finding / Recommendation
		<p>encountered at the project site. This is an important deficiency and, as a result, the current version of the Plan needs to be updated to incorporate clearly the adaptive management strategies.</p> <p>Additionally, CIRNAC notes the inclusion of “<i>Thresholds that will trigger the implementation of adaptive management strategies that reflect site-specific conditions encountered at the project site</i>” in the Groundwater Monitoring Plan is required under NIRB Project Certificate Term and Condition #15.</p> <p>Recommendation: CIRNAC recommends that AEM revise the Groundwater Monitoring Plan to include clear descriptions of the thresholds and adaptive management practices that will be used to identify, assess and respond to groundwater issues that have the potential to result in adverse environmental impacts.</p>
5	Study Designs	<p>Finding: Based on the concerns regarding water quality in the flooded Whale Tail Pit after closure expressed by CIRNAC throughout the review processes, the Groundwater Monitoring Plan should describe how AEM will accomplish the following:</p> <ol style="list-style-type: none">Conduct additional analyses to determine the approximate fill time for the Whale Tail Pit at closure;Undertake a hydrogeological characterization study to assess the potential for arsenic and phosphorous diffusion from submerged Whale Tail pit walls;If the results of the characterization study indicate a moderate to high potential for arsenic and/or phosphorous diffusion, perform detailed hydrodynamic modelling of the flooded pit lake prior to closure to evaluate meromictic conditions and flooded pit water quality; andAdd these required activities to the site Groundwater Monitoring Plan. <p>During meetings held in July and October 2018, AEM presented additional information related to the items noted above. However, the current version of the Groundwater Monitoring Plan does not include any descriptions of how each of the items will be achieved. Additionally, the description of AEM's plan to fulfill these requirements is requested in Project Certificate Term and Condition #16.</p>



#	Reference	Finding / Recommendation
		Recommendation: CIRNAC recommends that the Groundwater Monitoring Plan be revised to include all information specified in Project Certificate Term and Condition #16.
6	Sensitivity Analyses on Groundwater Flows	Finding: S.2.3.2 of the Plan states: “ <i>Preliminary evaluation of these values with respect to groundwater flows indicate that the inflow to the pit could be up to five times higher (up to 1,400 m³/day).</i> ” This statement indicates that AEM anticipates groundwater flows into the pit may be significantly greater than the baseline case. While the statement refers to the operational phase, we assumed it may also apply to the post-closure period after the pit has flooded. Recommendation: CIRNAC recommends that AEM confirm whether the uncertainty in groundwater volumetric flow rates to the pit were incorporated into modelling that was used to determine arsenic concentrations in the pit after closure.
Linked Comments: The following findings and recommendations from our review of the Water Management Plan are also relevant to the Groundwater Monitoring Plan.		
7	Table 3-1	Finding: The table indicates groundwater wells will be sampled only once per year. Recommendation: Based on the importance of characterizing the groundwater regime during the short operational period of the mine, CIRNAC recommends that the sampling frequency be increased such that wells are sampled once per month during periods in which the wells are unfrozen. This is necessary to validate current assumptions regarding groundwater flows and quality in the vicinity of the pit.
8	Table 3-1	Finding: The Plan indicates that water collected in the Whale Tail Pit or pit sump (ST-WT-4) will be analyzed four times per year. Given the importance of accurately characterizing future pit water quality, more frequent sampling is justified. Recommendation: CIRNAC recommends that sampling and analysis occur monthly whenever water is reporting to the pit (including flooding during closure). Further, all water volumes pumped from the pit should



#	Reference	Finding / Recommendation
		be measured.
9	Table 3-1	<p>Finding: While the current plan includes sampling of water collected in the base of the pit (i.e., ST-WT-10), no stations are provided to differentiate between different sources of loadings to the pit.</p> <p>Recommendation: CIRNAC recommends that monitoring of pit seep quality be incorporated into the plan, particularly in the vicinity of lithologies with high acid rock draining and metal leaching (ARD/ML) potential.</p>
10	S.3.3	<p>Finding: The Plan states that results of the annual monitoring will be compared to the FEIS water quality predictions to determine if conditions are similar to predicted. Based on the important uncertainties related to surface water quality and the short duration of the proposed operation, annual comparisons are insufficient.</p> <p>Recommendation: CIRNAC recommends that the comparisons be performed and reported on a quarterly basis. This will facilitate a more rapid identification of potential emerging concerns and, where necessary, management plans can be implemented more expediently.</p>
11	Figure 3-1 & S.5.3	<p>Finding: The Plan indicates that the NWB, CIRNAC Inspector and KIA will be informed if water concentrations exceed applicable criteria (i.e., regulatory thresholds). However, no commitments are made to inform regulators if trigger levels have been reached.</p> <p>Recommendation: To ensure regulatory authorities are aware of emerging issues, CIRNAC recommends that the same parties are also informed when trigger levels are reached.</p>