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ECCC File: 5100 000 036/010
MVEIRB File: EA1819-01



August 1, 2019

via email at: cfairbairn@reviewboard.ca

Catherine Fairbairn
Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
200 Scotia Centre
Box 938, 5102-50th Ave
Yellowknife, NT X1A 2N7

Dear Catherine Fairbairn:

RE: EA1819-01 – Diavik Diamond Mines Incorporated – Processed Kimberlite to mine workings EA – ECCC Final Intervention

Environment and Climate Change Canada (ECCC) has reviewed the information submitted to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) regarding the above-mentioned Environmental Assessment and we are submitting our Final Intervention via email. Our specialist advice is based on our mandate, pursuant to the *Canadian Environmental Protection Act*, the pollution prevention provisions of the *Fisheries Act*, the *Migratory Birds Convention Act* and the *Species at Risk Act*.

Please contact Russell Wykes at (867) 669-4743 or Russell.Wykes@Canada.ca if you need more information.

Sincerely,

Andrea McLandress
Regional Director PNR

Attachment(s): ECCC Final Submission – Diavik Processed Kimberlite to Mine Workings EA

cc: Georgina Williston, Head, Environmental Assessment North (NT and NU)



ENVIRONMENT AND CLIMATE CHANGE CANADA'S FINAL SUBMISSION TO THE MACKENZIE VALLEY ENVIRONMENTAL IMPACT REVIEW BOARD

RESPECTING THE DIAVIK - PROCESSED KIMBERLITE TO MINE WORKINGS (EA 1819-01)

PROPOSED BY DIAVIK DIAMOND MINES INCORPORATED

August 1, 2019



Diavik- Processed Kimberlite to Mine Workings (EA 1819-01)
Environment and Climate Change Canada
Final Submission to the Mackenzie Valley Environmental Impact Review Board

Executive Summary

Diavik Diamond Mines Incorporated (DDMI) has submitted an application to amend the Diavik Water Licence (WL; W2015L2-0001) to allow the deposition of processed kimberlite (PK) into the mined out pits and underground portions of the mine workings. This proposed amendment was referred to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for an Environmental Assessment (EA) on February 26, 2019 (EA 1819-01).

Environment and Climate Change Canada (ECCC) has participated in the EA process, providing specialist advice based on areas within our mandate, specifically the pollution prevention provisions of the *Fisheries Act* (FA) and *Migratory Birds Convention Act* (MBCA), as per the *Mackenzie Valley Resource Management Act*. ECCC is submitting this Final Submission to the MVEIRB for consideration.

ECCC's Final Submission addresses the technical review comments (submitted June 2019) and associated responses provided by DDMI (July 2019). ECCC's recommendation is provided regarding the use of A21 pit to deposit Processed Kimberlite. The A21 pit is the shallowest and smallest of the three proposed deposition sites, and modelling has shown the potential for water quality issues related to water quality benchmark exceedances and the breakdown of meromixis. As such, ECCC recommends that A21 pit not be considered for PK deposition.

ECCC is also commenting on two technical review comments that are considered resolved. The first is the modelling of PK consolidation rates, which is currently being addressed by DDMI through a University of Alberta study to further refine model predictions. The second is the operational monitoring during the filling of the pit, which will be carried forward to the Wek'èezhìi Land and Water Board's (WLWB) review of the Water Licence application.

List of Abbreviations

CEPA	<i>Canadian Environmental Protection Act</i>
DDMI	Diavik Diamond Mines Inc.
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
FA	<i>Fisheries Act</i>
IR	Information Request
MBCA	<i>Migratory Birds Convention Act</i>
MVEIRB	Mackenzie Valley Environmental Impact Review Board
PK	Processed Kimberlite
SARA	<i>Species at Risk Act</i>
SIS	Summary Impact Statement
SNP	Surveillance Network Program
WL	Water Licence
WLWB	Wek'èezhii Land and Water Board

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1.0 Introduction

Diavik Diamond Mines Inc. (DDMI) is proposing an amendment to their current Water Licence (WL; W2015L2-0001) to allow for the deposition of processed kimberlite (PK) into mined out pits, and underground portions of the mine workings.

This proposal was referred to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for Environmental Assessment (EA) on February 26, 2019 (EA 1819-01).

Environment and Climate Change Canada (ECCC) has participated in all phases of the EA process for the Project thus far and is continuing its participation by way of this Final Submission to the MVEIRB for consideration. This Final Submission summarizes the results of ECCC's review of the information provided throughout the EA process that is within ECCC's mandate. This Final Submission provides ECCC's expert advice on DDMI's assessment of the environmental effects and proposed mitigations, and identifies outstanding concerns and recommendations for consideration by MVEIRB.

A summary of ECCC's mandate and legislation is provided in Section 2.0. ECCC's technical review comments and recommendations are provided in Section 3.0 and acknowledgments is provided in Section 4.0.

ECCC's Final Submission addresses the technical review comments (submitted June 20, 2019) and associated responses provided by DDMI (July 4, 2019). ECCC has provided a recommendation with respect to the use of A21 pit to deposit PK. The A21 pit is the shallowest and smallest of the three proposed deposition sites, and modelling has shown the potential for water quality benchmark exceedances and the breakdown of meromixis. As such, ECCC recommends that A21 pit not be considered for PK deposition.

ECCC is also commenting on two technical review comments that are considered resolved. The first is the modelling of PK consolidation rates, which is currently being addressed by DDMI with a University of Alberta study to further refine model predictions. The second is the operational monitoring during the filling of the pit, which will be carried forward to the Wek'èezhii Land and Water Board's (WLWB) review of the WL application.

2.0 Environment and Climate Change Canada's Mandate, Roles, and Responsibilities

The mandate of ECCC is determined by the statutes and regulations under the responsibility of the Minister of Environment and Climate Change. ECCC's mandate covers matters such as the preservation and enhancement of the quality of the natural environment (including water, air and soil quality, and the coordination of the relevant policies and programs of the Government of Canada), renewable resources (including migratory birds and other non-domestic flora and fauna), meteorology, and the enforcement of rules and regulations. In delivering its mandate, ECCC's specialist advice is provided in the context of the *Canadian Environmental Protection Act* (CEPA), the pollution prevention provisions of the *Fisheries Act* (FA), the *Species at Risk Act* (SARA), and the *Migratory Birds Convention Act* (MBCA).

ECCC administers the pollution prevention provisions of the FA, which prohibits the deposit of a deleterious substance into fish-bearing waters. ECCC also participates in the regulation of toxic chemicals and the development and implementation of environmental quality guidelines pursuant to CEPA.

ECCC is responsible for protecting and conserving migratory bird populations and individuals under the MBCA. ECCC also administers SARA in cooperation with Fisheries and Oceans Canada and the Parks Canada Agency to prevent wildlife species from becoming extirpated or extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity, and to manage species of special concern to prevent them from becoming threatened, endangered or extirpated.

Additional information on ECCC's mandate can be found at: <https://www.canada.ca/en/environment-climate-change/corporate/acts-regulations/acts-administered.html>.

3.0 Environment and Climate Change Canada's Technical Review Comments

This Final Written Submission summarizes the results of ECCC's technical review and the additional information provided by DDMI following the technical comments submission on June 20, 2019.

ECCC has undertaken a science-based review of issues within ECCC's mandate with the aim of providing expert advice on DDMI's assessment of the effects and proposed mitigation. The following sections outline the current status of ECCC's outstanding concerns, identifying concerns that have been resolved, concerns which ECCC deems resolved pending further actions committed to by DDMI and concerns that remain outstanding along with ECCC's recommendations.

3.1 Technical Comment Responses

Based on the DDMI's technical comment responses on July 4, 2019, ECCC considers the following technical comments to be resolved:

- **ECCC-TC1:** regarding the use of updated water quality benchmarks for zinc.
- **ECCC-TC4:** regarding a model that was referenced, but not included in DDMI's May 21, 2019 information package.
- **ECCC-TC6/ ECCC-TC7** – regarding the monitoring and management of migratory birds from the pit filling process to the reconnection of the pits to Lac de Gras.

ECCC-TC2: Monitoring During Filling of Pits

Reference(s):

- DDMI, 2019 Technical Comment Response EMAB-13

DDMI's Conclusion:

DDMI has provided a description of proposed Surveillance Network Program (SNP) station 1645-88, which outlines the proposed sampling during filling of the pits with processed kimberlite (PK), during flooding of the pits with lake water, and prior to dike breach. During the WLWB technical sessions on January 16-17, 2019, DDMI further clarified this proposed sampling, stating that water quality monitoring to ensure stability of the pit will include sampling in both the open water and ice-cover period (which is reflected in quarterly sampling during flooding), and that no breach will occur until the pit is stable and closure criteria are achieved. The

monitoring data collected from the SNP Station will be used to ensure that pore water and surface water quality are following model predictions, and that meromixis remains stable over time post-flooding. This SNP station will ensure that water quality is well understood during all phases of PK deposition to the mined out pits.

ECCC's Conclusion:

ECCC considers ECCC-TC1 resolved. ECCC understands that determination on specific criteria related to closure and breach will be discussed during the WLWB WL application review and through the development of the final closure plan.

ECCC's Recommendation(s):

ECCC has no additional recommendations.

ECCC-TC3: The Use of A21 Pit for the Deposition of Processed Kimberlite

Reference(s):

- DDMI. 2019. Summary Impact Statement, Section 4.4.2: Summary of Project Residual Environmental Effects.
- ECCC. 2019. Technical Comments Submission, ECCC-TC3.
- MVEIRB. 2019. Technical Comments Submission, MVEIRB-TC34.

DDMI's Conclusion:

As part of the Summary Impact Statement (SIS), DDMI provided three different PK deposition scenarios (2a, 3a and 4a) and modelled these scenarios in all three pits (A418, A154 and A21) at the Diavik diamond mine. The SIS indicates that based on the three modelling scenarios, in each of the three pits, only A21 has the potential to cause residual environmental effects. Specifically, A21 scenario 3a predicts, "residual effects on the aquatic environment with an adverse effect of high magnitude within the Project Disturbance Area during closure and post-closure" (Page 68). In addition, while meromixis is modelled to establish and remain over the 100-year simulation period in A418 and A154 (thereby isolating low quality water at the bottom of the pit), there is the potential for meromixis to break down 50 years post-closure in A21. This breakdown in meromixis would cause the surface water and pore water within the pit to mix, potentially leading to adverse effects on surface waters in Lac de Gras.

In response to concerns regarding PK deposition into A21 (ECCC-TC3), DDMI states that at this time A418 is the preferred pit for PK deposition and A21 is the least preferred, but DDMI continues to seek approval for PK deposition in all pits.

DDMI believes that it is premature to remove options at this stage, and that limiting PK deposition to A418 could influence operational flexibility going forward.

ECCC's Conclusion:

Overall, the A21 pit has the highest uncertainty for closure and post-closure water quality, for establishment of meromixis, and is the only pit for which adverse environmental effects are predicted (SIS, Page. 68). Based on the modelling results, the significantly reduced capacity for PK storage in A21 compared to other pits, and the current ongoing mining at A21, ECCC questions the necessity for A21 to be included in the approval for PK pit deposition. Given that modelling predicts both A418 and A154 to have stable meromixis in the modelled time-frame of 100 years, increased capacity for storage of PK, and water quality remaining below benchmarks under all modelled scenarios, these two pits are preferable over A21.

ECCC Recommendation(s):

ECCC recommends that DDMI not use A21 pit for PK deposition since it displays the highest potential for environmental risk, and lowest capacity for storage.

ECCC-TC5: Updates to Modelling and Increasing Certainty in Predictions

Reference(s):

- DDMI, 2019 Technical Comment Response EMAB-11

DDMI's Conclusion:

The water quality modelling completed to date incorporates existing data to predict the expected pore water quality that will develop once the PK is deposited into the pits, and subsequently to determine the water quality at closure. DDMI determined that fresh PK slurry was the most representative data for the eventual PK to be deposited; however, this was based on a limited dataset including only three samples. DDMI has acknowledged the limited dataset, and has initiated a study at the University of Alberta to further inform PK consolidation rates, pore water development, pore water quality, and subsequently overall water quality in the water column. As described in response to EMAB-11 (Environmental Monitoring and Review Board technical comment #11), preliminary results from this study generally support the use of existing PK slurry data in the current water quality modelling. Using the results of this study, DDMI has committed to complete additional water quality modelling with a target date of late 2019/early 2020, which will further refine model predictions and decrease uncertainty.

ECCC's Conclusion:

ECCC considers ECCC-TC5 to be resolved.

ECCC's Recommendation(s):

ECCC has no additional recommendations.

4.0 Acknowledgements

ECCC acknowledges and appreciates the effort that DDMI has taken to address concerns brought forward by parties throughout the Diavik - Processed Kimberlite to Mine Workings EA process (EA1819-01).

ECCC would like to thank MVEIRB for this opportunity to provide input to the Diavik EA process review and looks forward to continuing its participation.

ECCC's technical review comments and recommendations are not to be interpreted as any type of acknowledgement, compliance, permission, approval, authorization, or release of liability related to any requirements to comply with federal or territorial statutes and regulations.