

August 1, 2019

Mark Cliffe-Phillips
Executive Director
Mackenzie Valley Environmental Impact Review Board
Box 938, #200 Scotia Centre, 5102- 50th Avenue
Yellowknife, NT, X1A 2N7

**RE: Depositing Processed Kimberlite into Pits and Underground, Diavik
Diamond Mines Inc. (EA 1819-01), Lutsel K'e Dene First Nation's Written
Intervention**

To, Mr. Mark Cliffe-Phillips:

Enclosed is the Lutsel K'e Dene First Nation's written intervention for the depositing processed kimberlite into pits and underground at Diavik Diamond Mine (EA 1819-01) environmental assessment.

Respectfully,

Robert Paishegwon
Wildlife, Lands and Environment Department, Manager
Lutsel K'e Dene First Nation

Non-technical Summary

The Lutsel K'e Dene First Nation (LKDFN) is a Denesoline Nation and a signatory to the Participation Agreement with DDMI. The Diavik Diamond Mine is located in the traditional and unceded territory of the Akaitcho Dene First Nations – Lutsel K'e Dene First Nation, Yellowknives Dene First Nation, and Deninu K'ue First Nation. Members of the LKDFN have and continue to exercise our Aboriginal and treaty rights in the Lac de Gras area. This area was and is of high cultural, ecological, and social significance to the LKDFN.

The LKDFN has participated in the *Depositing Processed Kimberlite into Pits and Underground, Diavik Diamond Mines Inc.* (EA 1819-01) environmental assessment process to the best of our abilities, given our very limited financial and human resources.

The LKDFN is highly concerned about the potential significant adverse effects of depositing and storing processed kimberlite in mined out pit lake(s) and possibly reconnecting pit lake(s) containing processed kimberlite to the greater ecosystem. Specifically, LKDFN is concerned about the effectiveness of meromixis as a containment method to isolate processed kimberlite from the rest of the environment in perpetuity. The 100-year temporal scale used by DDMI is inadequate for assessing the potential socio-ecological impacts associated with the proposed project. A much more appropriate time scale would have been 200-500 years to account for continued cultural uses. DDMI has failed to adequately assess contingency plans if meromixis is not established and/or maintained. The water quality modeling results for pit lake A21 are particularly worrisome as the potential for residual effects is greater than the other pit lakes. LKDFN recommends that processed kimberlite should not be stored in pit lake A21. If processed kimberlite is stored in pit lakes A154 and A418, then AEMP benchmarks should also be based on Traditional Knowledge and pre-mine water quality conditions in Lac de Gras or more stringent water quality guidelines. Water quality and fish and fish habitat should be monitored for at least a 100-year period closure and post-closure phases. This will help ensure traditional users feel safe hunting, trapping, fishing, or gathering in the area. Finally, LKDFN recommends that the precautionary principle should be applied and pit lake(s) A154 and/or A418 containing processed kimberlite should not be reconnected to Lac de Gras to protect the long- and very-long term health, quality, and safety on the environment and the people that use the land and water.

1.0 Cultural uses

1.1 Issue statement

As required in MVEIRB's *Final Scope and Reasons for Decision*, the assessment of cultural use includes "[a]ctivities that may affect *how traditional land users perceive the safety, quality, and health of Lac de Gras* needs to be carefully considered, because perceptions can change how an area is used. Actual or *perceived* effects to Lac de Gras that affect how people use the area must be identified and assessed so that, if necessary, impacts may be mitigated appropriately" (PR #40, p. 9, emphasis added). DDMI argues that the proposed project will have virtually no negative affect on the availability, access, and condition of resources, sites, or areas (PR #53, p. 168-70). The LKDFN disagrees with DDMI's conclusions due to traditional users' from Lutsel K'e *perceptions* that the Lac de Gras area will be contaminated by mining waste if the pit lakes containing processed kimberlite are reconnected to Lac de Gras. The long- and very long-term viability of the pit lakes maintaining stratified is unproven in the Arctic. As such, traditional users from Lutsel K'e would exercise caution by not fishing, hunting, gathering, or camping in the area. Thus, alienating traditional users from the Lac de Gras area. This would result in a significant adverse impact on the availability, quality, and access to traditional area and resources.

1.2 Diavik's conclusions

DDMI claims that the residual adverse effects of the proposed project on the availability of traditional resources for cultural use and access to traditional resources or areas for cultural use are predicted to be adverse, negligible in magnitude, limited to the LAA, short-term, and reversible (PR #53, p. 168-70). DDMI also claims that, "[c]hange of quality of traditional resources is considered within the potential environmental effect "change in availability of resources for cultural use" (PR #84, p. 47).

1.3 LKDFN's conclusions

The LKDFN disagrees with DDMI's assessment of the potential impacts on cultural uses. Traditional users from Lutsel K'e will not feel safe consuming meat, fish, plants, or water in the Lac de Gras area if the pit lakes containing processed kimberlite are reconnected to Lac de Gras. Any pit lake(s) containing processed kimberlite should not be reconnected to Lac de Gras.

Traditional users from Lutsel K'e would use the area for a far greater timeframe than the 100-year period that has been used by DDMI for models and predictions. Traditional users' cannot be confident that beyond the long-term (50 to 100 years), that the quality of the traditional areas and resources, including Lac de Gras, would be safe to use. As such, the impact would be adverse, long-term, continuous, irreversible, and high in magnitude. The pit lake(s) containing processed kimberlite should be monitored for the very long term to ensure the pit lakes and Lac de Gras is safe for traditional users to use.

1.4 Evidence and rationale

DDMI used a 100-year period to assess the temporal effects of the proposed project on cultural uses. This timescale is too short to adequately assess adverse, significant effects on cultural use. Cultural uses will extend far beyond a 100-year period. LKDFN believes that meromixis could breakdown over a very long-term period and cause adverse significant affects on cultural uses.

DDMI states that, "[p]otentially affected Indigenous groups could identify perceived change in value of availability of traditional resources for cultural use. The measurable parameters similarly may take account of change in quality of resources, where that information is provided by Indigenous groups" (PR #84, p. 47-8). To LKDFN's knowledge, DDMI has not requested nor provided any funding to gather information from any Indigenous government or organizations involved in the environmental assessment regarding change in the availability of, quality of, or access to cultural sites or areas. DDMI should have obtained this information when preparing the SIS. LKDFN

does not believe that DDMI did an adequate job assessing change in the safety, quality, and health of resources for cultural uses/users.

The current environmental management plans – namely the interim closure and reclamation plan, wildlife monitoring program, and aquatic effects monitoring plan – do not include parameters/benchmarks/criteria based on traditional knowledge. This means that Indigenous ways of knowing about the safety, quality, and health of the traditional areas and resources are not being considered or applied to the construction, operation, closure, and post-closure phases of the proposed project.

1.5 LKDFN's recommendations

For the reasons stated above, the LKDFN recommends that the Review Board make a determination that there would be a significant adverse impact from the proposed project on cultural uses pursuant to s. 128(1)(b) of the *Mackenzie Valley Resource Management Act* (MVRMA). The LKDFN suggests there are some measures that could and should be adopted. The LKDFN recommends that:

Measure 1:

Meaningful integration of Traditional Knowledge into environmental management plans and programs, including but not limited to the interim and final closure and reclamation plans, aquatic effects monitoring plan, and wildlife monitoring program. There must be goals, objectives, criteria, indicators, benchmarks, and/or parameters based on Traditional Knowledge in these and others plans and/or programs.

Measure 2:

Within one year of the approval of the proposed project, establish an environmental monitoring program that uses Traditional Knowledge to monitor the construction, operation, closure, and post-closure of the proposed project. DDMI is responsible for funding for at least two full-time Traditional Knowledge Monitors and one full-time Program Coordinator, program infrastructure and equipment, and program development, delivery, and reporting. The purpose of the environmental monitoring program is to observe and document ecological, social, and cultural change, and make recommendations to DDMI regarding the proposed project.

2.0 Caribou and other wildlife

2.1 Issue statement

During the operation, closure, and post-closure phases, there is potential for caribou and other wildlife (e.g., grizzly bears, wolverines) to access the pit(s) and interact with processed kimberlite or pore water, during infilling and mixing of the pit(s) with water from Lac de Gras. In the event that pit lake(s) are not reconnected to Lac de Gras, the potential for adverse, significant impacts on caribou and other wildlife that may use those pit(s) is even greater due to potential poor water quality in isolated pit lake(s) over the long- and very long-term. TK Panel experts also expressed these concerns during the TK Panel session #11 (PR #53, p. 126, 164,168). DDMI did not take into account the stress and energetic losses associated with deterrent measures on caribou or the long- and very long-term affects of caribou and other wildlife coming into contact with potentially contaminated water and vegetation if the pit lake(s) do not remain stratified and/or are not reconnected to Lac de Gras.

2.2 Diavik's conclusions

In the SIS, DDMI concludes that “[o]verall, PKMW Project residual effects on caribou health are predicted to be negligible in magnitude, medium-term in duration, as restricted to the period during pit infilling, following pit lake infilling, prior to and immediately following dike breaching and mixing of pit lake surface water(s) with Lac de Gras” (PR #53, p. 139).

2.3 LKDFN's conclusions

The LKDFN disagrees with DDMI's conclusion that residual effects on caribou health are negligible. The proposed deterrent measures put forth by DDMI would likely cause stress on caribou, resulting in an energy expenditure, which could negatively effect caribou health and, ultimately, survival rates for caribou. As such, the LKDFN believes that deterrent measures should be considered low or greater in magnitude. Given the state of the Bathurst caribou herd, even a low magnitude (1%) of change is significant and unacceptable.

The LKDFN does not believe that the current Wildlife Monitoring Program can detect and evaluate changes in wildlife health without conducting post-mortem examinations on caribou and other wildlife carcasses found within the zone of influence to determine the effects of ingesting possibly contaminated water in pit lake(s) on wildlife. This uncertainty and lack of information would also negatively impact cultural uses. Traditional users' are concerned that contamination from the proposed project could have a negative affect on caribou and other wildlife's health and, in turn, the health of people that consume caribou and other wildlife.

2.4 Evidence and rationale

In the SIS, DDMI states that, “[b]ased on the findings of the assessment residual effects to wildlife during closure are predicted to be negligible in magnitude and short term in duration, *except for A21 4a* which would be *medium term in duration* if AEMP benchmarks are exceeded for a longer period of time. During post-closure, residual effects are predicted to be negligible for scenarios where pit lakes are able to be

reconnected to Lac de Gras. *Post-closure effects are not assessed for scenario A21 4a because the pit lake would not meet the criteria for reconnection to Lac de Gras*” (PR# 53, p. 139). “In scenario A21 4a, nitrite is predicted to be 3% higher than the AEMP benchmark in surface water...[t]here are no CCME guidelines for wildlife, but the BC guidelines recommend using the drinking water guideline of 1 mg/L” (PR#53, p. 139). Based on DDMI’s assessment, pit lake A21 4a possesses a greater risk to caribou and if processed kimberlite is deposited and stored in pit A21, under scenario 4a, caribou and other wildlife could come into contact with potentially contaminated water over the long- and very long-term.

As previously stated, deterrents such as visual and sound-making devices such as gas-operated exploders, pyrotechnics, electronic noisemakers (PR #53, p. 138), will likely cause caribou and other wildlife stress and energy expenditure. Energy losses for Bathurst caribou could negatively affect their body condition and, ultimately, their survival rate.

2.5 LKDFN’s recommendations

To reduce LKDFN’s concerns regarding potentially significant adverse effects of the proposed project on caribou and other wildlife’s, LKDFN makes the following recommendations:

Measure 3:

To help prevent a significant adverse impact on caribou and other wildlife that may be exposed to contaminated water in pit lake(s), DDMI shall create a physical barrier around the pit lake(s) containing processed kimberlite so that caribou and other wildlife cannot access the pit lake(s) during infilling and dike breaching. If pit lake(s) are not reconnected to Lac de Gras, a permanent barrier should be constructed around the pit lakes to deter caribou and other wildlife from accessing the pit lake(s) containing processed kimberlite.

DDMI shall work collaboratively with the Indigenous governments and organization and TK Panel experts to identify the most appropriate barrier to isolate the pit lake(s) during infilling, and, possibly, breaching of the dikes.

Measure 4:

Any caribou or other wildlife carcasses found in the zone of influence should be tested, in partnership with GNWT ENR, to assess the cause of death and overall health of the animal. DDMI shall notify Indigenous governments and organizations within 24 hours of the any deceased wildlife found within the zone of influence. Test results and analysis are to be shared with affected Indigenous governments and organizations Lands Departments in a timely manner.

Measure 5:

Update the wildlife monitoring plan, before the transportation of processed kimberlite to pit lake(s) begins, to include methods to deter/remove caribou and other wildlife from access the pit lake(s) containing processed kimberlite during operation, closure, and post-closure phases.

3.0 Fish and fish habitat

3.1 Issue statement

DDMI's models and predications are predicated on the pit lake(s) establishing and maintaining stratified. It is the LKDFN opinion that the fish and fish habitat section of the SIS does not adequately assess the possibility of destratification and the potential long-term effects this would have on fish and fish habitat as well as the people that use it. This approach to storing processed kimberlite in mined out pits and reconnecting them to the larger ecosystem has not been proven in the arctic environment.

In the event of destratification, DDMI's suggests that dilution is an acceptable solution. Dilution in Lac de Gras is unacceptable to the LKDFN. Traditional users from Lutsel K'e would not feel safe consuming fish and plants from or in the vicinity of Lac de Gras.

If stratification is established and maintained in the pit lake(s), there are no AEMP benchmarks based on Traditional Knowledge to indicate that fish and fish habitat are acceptable to Traditional users, which will likely be the primary users of the area in the future.

If stratification is established, it is unclear how long it should be maintained (without intervention) before the pit lake(s) are considered for reconnection to Lac de Gras. Without this certainty, it is unacceptable to the LKDFN to reconnect the pit lake(s) to Lac de Gras.

3.2 Diavik's conclusions

DDMI argues that the proposed project will have a negative, low or negligible in magnitude, reversible, and short-term effect on fish and fish habitat during the closure and post-closure phases (PR #53, p. 112). The only long-term, continuous impact identified by DDMI is change in fish habitat, which would be the result of not reconnecting the pit lakes to Lac de Gras; however, this change in fish habitat will be offset elsewhere in order to comply with the no-net-loss plan with DFO.

3.3 LKDFN's conclusions

DDMI's predications for fish and fish habitat mitigation strategies are based on stratification being established and maintained over a 100-year period. In the event destratification occurs, the solution presented by DDMI in the SIS is dilution in Lac de Gras (PR #53, p. 117). This is an unacceptable solution to destratification. This potential scenario would also result in significant adverse effects on cultural uses. Traditional users from Lutsel K'e would perceive the entire Lac de Gras watershed as contaminated and unsafe. The LKDFN is concerned that stratification of pit lake(s) may not be maintained in the long- and very long-term, especially in pit lake A21. DDMI did an inadequate job assessing or identifying contingency strategies or actions that would be taken if stratification is not established in two years and maintained over a long period of time.

It is not clear from the SIS how long AEMP benchmarks for aquatic effects will need to be met if dikes are breached.

Taste/ palatability is not the only Traditional Knowledge indicator that should be used to assess the health of fish.

3.4 Evidence and rationale

As stated in the SIS, "in the unlikely event that PK was able to reach Lac de Gras, measurable effects to fish are expected to be short in duration (i.e., less than six months) and limited to the localized site where the PK enters the water. This is because the processed kimberlite is very fine and would be dispersed quickly as it is suspended in the water column by wave action along East Island and because, once dispersed in the lake, the potential acute or chronic toxicological effects of the PK on fish survival, growth, or health would be significantly reduced by the large *dilution capacity* of the lake" (PR #53, p. 115, emphasis added). DDMI's reliance on dilution to pollution caused by the potential breakdown of meromixis is unacceptable to LKDFN.

3.5 Recommendations

To reduce the significant adverse impacts to fish and fish habitat as a result of the proposed project, LKDFN recommends:

Measure 6:

To minimize significant adverse ecological and cultural impacts associated with fish and fish habitat, DDMI shall integrate goals, objectives, indicators, and benchmarks based on Traditional Knowledge in the aquatic effects monitoring plan, interim/final closure and remediation plans, and any other plans or programs, if appropriate.

Measure 7:

To minimize significant adverse ecological and cultural impacts on fish and fish habitat, the maximum rate of water withdrawal and time periods shall does not inhibit fish passage and littoral habitat at the Narrows. Refilling pit lakes shall not result in greater than 1% or less loss of fish and fish habitat.

4.0 Water quality

4.1 Issue statement

DDMI did not indicate the minimum amount of time that the pit lake(s) containing processed kimberlite will need to meet all AEMP benchmarks before considered reconnection to Lac de Gras, and both the current AEMP and ICRP documents do not include any meaningful inclusion of Traditional Knowledge. This is particularly worrisome when the likely future users of the area will be Traditional users.

The temporal scale used to assess the potential impacts on water quality of Lac de Gras from the proposed project is too short. A more appropriate timeline would have been at least a 200-500 year period. This would have better reflected the very long-term importance of fish and fish habitat and the people that do and will continue to use the area. In the SIS, it is “visually predicted” that within 200-500 years the chemocline will breakdown without a continuous supply of dissolved elements to the monolimnion that is greater than the loss rate (PR #53). Given this prediction, it is unclear and uncertain how the chemocline will be maintained in the long- and very long-term.

The likelihood of pit lake A21 remaining stratified is particularly troubling. If processed kimberlite is deposited and stored in pit lake A21 there is a potential to cause residual effects on water quality, wildlife, fish and fish habitat and cultural uses that are unacceptable to the LKDFN.

4.2 Diavik’s conclusions

DDMI concludes, “Water quality parameters within the upper 40 m of the water column are predicted to be below the updated ecological thresholds (AEMP benchmarks) for water quality in A418 and A154 (scenarios 2a, 3a and 4a) and pit lake A21 (scenario 2a). Three water quality parameters (nitrite, nitrate and molybdenum) are predicted to exceed the thresholds at depths of 40 m below surface in scenarios A21-3a and nitrite is predicted to exceed the threshold in A21-4a at both surface and depths of 40m” (PR# 53, p. 51).

4.3 LKDFN's conclusions

The LKDFN does not agree with DDMI's conclusion that there will be no adverse effects on water quality as a result of depositing and storing processed kimberlite in mined out pits. DDMI's mitigation measures rely heavily on isolating pit lakes from Lac de Gras during refilling and the pit lakes establishing stratification. If the pit lake(s) are reconnected to Lac de Gras and destratification occurs then dilution is the proposed solution. Dilution is not an acceptable solution to DDMI failing to establish and maintain stratification in pit lakes. The temporal scale should be extended to 200-500 years and the fresh water cap should be at least 100 m.

4.4 Evidence and rationale

Based on the information provided in the SIS, the water quality modeling indicated that a water cap of approximately 50 m depth was necessary to isolate the PK pore water from the surface and facilitate the stratification (stable meromixis) and was an effective mitigation for water quality based on the low surface water concentrations (Golder, 2018). By extension, deeper water caps would be similarly or more effective at sequestering the more highly concentrated waters in the bottom of the pit lakes (PR #53, p. 53). As such, to enhance the likelihood of maintaining stratification for a longer period of time a deeper water cap is recommended.

For pit lake A21, modeling indicates that the high concentrations of TDS in the bottom layer may break down after approximately 50 years. The breakdown of meromixis and full mixing in A21 is a result of the shallower depth of water cover in A21 relative to A418 and A154. According to the modeling, under scenario A21 2a, water quality constituents are in general predicted to increase in concentration for approximately five years following closure, decrease, then fluctuate for approximately 65 years, then stabilize. Constituents are predicted to be below the AEMP benchmarks in the top section and at depths of 40 m below surface (p. 60). And under Scenario 3a, water quality constituents are predicted to be stable in the top section and in general are predicted to increase in concentration for approximately eight years following closure, decrease over

75 years, then stabilize. Concentrations in the top section are predicted to be below the AEMP benchmarks; however, water at 40 m depth is predicted to exceed the AEMP benchmarks by 133%, 37%, and 5%, respectively for nitrite (0.14 mg/L), nitrate (4.1 mg/L), and molybdenum (77 ug/L) for a medium duration (PR #53, p. 56). Under scenario 4a, water quality constituents are predicted to be stable in the surface water and in general are predicted to increase immediately following closure, then decrease erratically over the modeled time series at a depth of 40 m. Concentrations at the surface and at 40 m depth are predicted to be below the AEMP benchmarks, with the exception of nitrite for a short duration (maximum concentration of 0.062 mg/L in surface and at 40 m depth, 3% above AEMP benchmarks (p. 60). In summary, modeling results for pit lake A21 scenario 2a predicts a neutral effect of negligible magnitude within the PDA during closure and post-closure. Modeling results for pit lake A21 scenario 4a predict an adverse effect of negligible magnitude within the PDA during closure and post-closure. Given that negligible adverse effects to the pit lake are anticipated, it is expected there will be no adverse effects to Lac de Gras. And modeling results for pit lake A21 scenario 3a predict residual effects on the aquatic environment, with an adverse effect of high magnitude for moderate duration within the PDA during closure and post-closure. Given that an adverse effect to pit lake A21 for scenario 3a is anticipated, there is the potential that an adverse effect to Lac de Gras could occur (PR #53, p. 68). Based on these findings, LKDFN recommends that pit lake A21 should not be used to store processed kimberlite given the potential for residual ecological and social impacts.

Modeling also shows that “unless there is a continuous supply of dissolved elements to the monolimnion that is greater than the loss rate across the chemocline then the chemocline gradient will gradually decrease over time. With the pit lakes the only modeled source of dissolved elements to the monolimnion is the processed kimberlite pore water and this source is expected to gradually reduce to zero over time as the PK consolidates. Visually extrapolating from the 100 year simulations this chemocline breakdown could occur in 200-500 years depending on the pit lake (A154 or A418) and the scenario” (PR #84, p. 86). It is unclear if there will be a continuous supply of dissolved elements to maintain the chemocline.

A TK Panel expert stated, “the 100-year timeframe for water quality modeling is likely an under-estimation and should be extended” (PR #53, p. 38). LKDFN agrees with this statement. As previously stated, a 200-500 year period is more appropriate when assessing potentially significant adverse impacts to fish and fish habitat as this will also affect traditional uses. Using this longer temporal scale would have better reflected the importance and use of this area for traditional users. If fish are not safe to consume in 200+ years, then traditional users will be alienated from Lac de Gras.

4.5 LKDFN’s recommendations

To mitigate potentially significant adverse ecological and social impacts associated with fish and fish habitat that may be caused by the proposed project, the LKDFN recommends that the Review Board adopt the following measures:

Measure 8:

To prevent significant adverse impacts to water quality in Lac de Gras, DDMI shall not deposit and store processed kimberlite in pit lake A21.

Measure 9:

To prevent significant adverse impacts to water quality in Lac de Gras through the application of the precautionary principle, any pit lake(s) containing processed kimberlite will not be reconnected to Lac de Gras.

Measure 10:

To reduce significant adverse impact to water quality in Lac de Gras, DDMI shall monitor water quality in the pit lakes at least once a year for at least 100 years to help ensure that meromixis is established and maintained. AEMP benchmarks should be based on pre-mining, baseline conditions in Lac de Gras or the most stringent water quality guidelines for drinking water and fish and fish habitat in Canada.

Measure 11:

To prevent significant adverse impacts on water quality in Lac de Gras and increase the probability of maintaining stratification in pit lake(s) in the very long-term, at minimum a 100 m freshwater cap depth overlying processed kimberlite in mined out pit(s) is required.