ENVIRONMENTAL MONITORING ADVISORY BOARD FOR THE DIAVIK MINE

Working with *the* People *for the* Environment

ENVIRONMENTAL MONITORING ADVISORY BOARD FOR THE DIAVIK PROJECT

ANNUAL REPORT 2017 2018

Photo courtesy of Diavik Diamond Mine

ENVIRONMENTAL MONITORING ADVISORY BOARD FOR THE DIAVIK MINE

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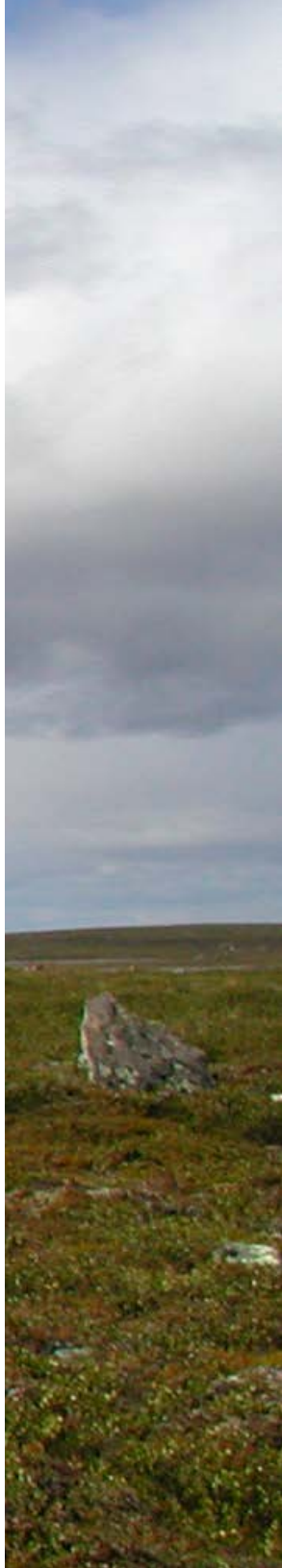


REPORT CARD ON THE ENVIRONMENT

At the beginning of the Project, Diavik went through an Environmental Assessment to learn more about the water, vegetation, air, fish, and wildlife in the area. This information was documented in the Comprehensive Study Report (1999) where Diavik also made predictions about environmental changes that would happen as a result of the mine. This summary gives an overall picture about how much the environment has changed at Diavik, and how in line the changes are with predictions.

WATER

[Note: EMAB had not reviewed the 2017 Aquatic Effects Monitoring Program report at time of writing this annual report so this assessment is based on information from 2016]

Water quality is generally within licence limits and predictions. Lac de Gras is experiencing mild nutrient enrichment in parts of the lake, based on chlorophyll *a* measurements. The source of the nutrients is phosphorus and nitrogen. Nutrient enrichment means more food is available for plankton, benthics and fish but can also increase oxygen consumption in the system. The extent of the area affected has shown large, variable increases above normal in recent years (25% of the lake in 2013, 42% in 2014, 10% in 2015 and 43% in 2016). This is beyond the predicted extent of effect, which was 20% of the lake. Diavik only measures nutrient enrichment at sample sites far from the mine every third year so we can't always be sure of the full extent in other years. EMAB recommended

Diavik sample the far-field sites for nutrient enrichment every year.

Diavik has dust deposition stations in Lac de Gras to measure the amount of dust that comes off the mine. The extent of total phosphorus in Lac de Gras has been variable over the years (19% in 2008, less than 1% in 2012, 14% in 2013, less than 1% from 2014 to 2015 and 6% in 2016). Background deposition rates of phosphorus and metals from dust increased from 2010-2013 to 2014-2016 but no explanation was given as to why rates increased. This may be showing a mine-related increase over time. Diavik noted that elevated concentrations of total phosphorus at the mid-field stations are most likely related to dike construction rather than dust deposition. The area of Lac de Gras affected by phosphorus increased from 2010-2013 to 2014-2016 as did the amount of phosphorus available for nutrient enrichment.

FISH

There are many different kinds of small organisms living in Lac de Gras that are useful and easy-to-measure indicators of aquatic health. Benthics live on the lake-bottom, and plankton are microscopic plants and animals that live in the water. Benthics include snails, clams and worms which are food for fish. Changes in the number and type of benthics can affect fish populations in different ways. From 2013 to 2016 benthic density, type and densities of the most common kinds returned to within the normal range. Prior to 2013, density of benthics was higher closer to the mine compared to further away.

Plankton are also food for fish. Since 2007, plankton communities near the mine have been different from those far away. These changes suggest that increased nutrients in Lac de Gras from Diavik's effluent are affecting plankton that live near the mine.

Community participants in Diavik's Fish Camp, last done in 2015, say taste and texture of fish in Lac de Gras have not changed.

[Note: The Fish Camp was also done in August 2018, but the results were not available before this report went to print.]

Diavik also monitors the health of Slimy Sculpin, a tiny fish that lives on the lake bottom. They are a good early warning species for effects on other fish. The Slimy Sculpin seem to be healthy, although the ones closer to the mine are smaller. Mercury levels in Lake Trout have been variable in Lac de Gras since the beginning of the mine, and in some cases, have been above consumption limits for sport and subsistence

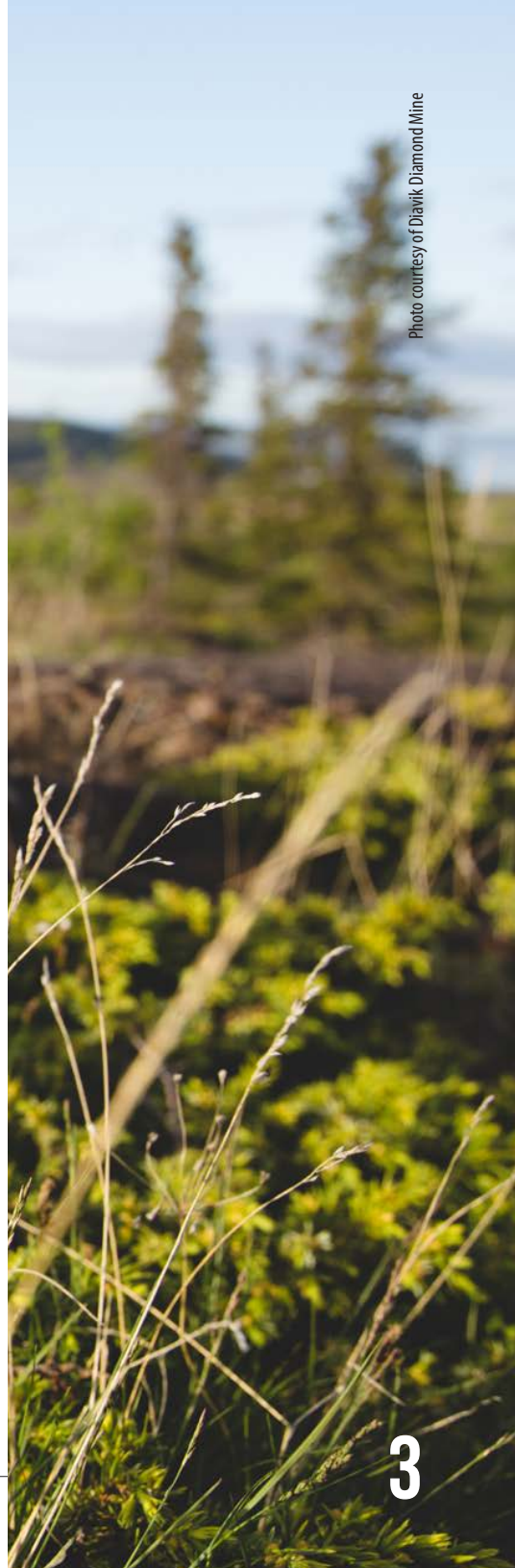


Photo courtesy of Diavik Diamond Mine

fisheries set by Health Canada. Mercury levels in fish in many other lakes in the NWT are increasing, and mercury has not been detected in Diavik's effluent, so this effect cannot necessarily be linked to Diavik. EMAB continues to monitor changes in mercury levels in fish in Lac de Gras; however, Diavik requested a change to the Aquatic Effects Monitoring Program and will no longer sample trout for mercury unless Slimy Sculpin show effects. EMAB and communities, however, remain concerned about this issue and will continue to monitor it.

WILDLIFE

Diavik monitors caribou, grizzly bear, wolverine, raptors and the vegetation they feed on. The average population size of Bathurst caribou dropped from 349,000 in 1996 to about 19,000 in 2017. The cause of this decline is not well understood – some other herds are also declining but not as quickly. Community members have expressed concern that the mines are contributing to this effect.

In addition to the lower numbers of caribou, movement and migration patterns are changing. The Bathurst caribou are staying on the calving grounds for several weeks longer than in the past. When they do migrate south, many are moving in different directions when approaching the mine than in the past. In the last couple of years many Beverly/Ahiak caribou have been seen around the mine in winter. These changes affect the data collected by the mines and require adapting the methods to the current situation.

The Zone of Influence for caribou is larger than Diavik predicted. EMAB recommended that Diavik consider what operational changes it can make to reduce the Zone of Influence, but Diavik has not proposed any changes so far. Zone of Influence monitoring has been put on hold at Diavik since 2011, but with A21 open-pit mining beginning in 2018, EMAB recommended Diavik begin Zone of Influence monitoring again in 2019.

Caribou behavior data have not been analyzed since 2011 because Diavik says there are not enough data. Diavik has now agreed to analyze these data. There have also been problems coordinating methods for collecting data with the Ekati mine. EMAB is working to help resolve these issues.

The grizzly bear hair snagging surveys that Diavik did in 2017 added to the information collected on their population in 2014. The results show that grizzly bear populations are stable or increasing.

The wolverine hair snagging surveys Diavik did with Environment and Natural Resources and Ekati show that wolverine populations may be decreasing in the study area.

AIR

Diavik studies air quality at the mine by measuring the amount of dust in the air and that which falls into Lac de Gras. Dustfall increased in Lac de Gras near the A21 dike as construction activity for A21 occurred. This will likely continue with above-ground mining of A21 starting in 2018. Snow core samples from Lac de Gras showed that some control areas had higher levels of dustfall than areas closer to the mine; EMAB has asked Diavik to consider other sources of dustfall that may be causing this.

Diavik's 2016 Vegetation and Lichen Monitoring Program showed that there is less lichen cover in areas close to the mine compared to further away. This is likely because vegetation close to the mine experiences higher levels of dustfall than areas far from the mine.

Diavik's air quality report showed that total suspended particulate emissions were generally within GNWT guidelines with one exceedance in 2016. However, one monitor was not working properly for the entire year and the other monitor had many issues with the data quality and methodology that put the data collected into question. EMAB recommended that a formal assessment of the Total Suspended Particulate program take place as soon as possible and identified a number of specific concerns about the current program. Diavik is now reviewing the program. The 2017 report will be reviewed this coming year.

CLOSURE

The North Country Rock Pile is the first part of the mine that Diavik is closing. It submitted a revised North Country Rock Pile closure plan in 2017 after the Wek'èezhìi Land and Water Board sent the first one back for more community engagement. Diavik plans to use till (soil) and rock from the A21 pit to cover the pile. They have re-sloped the sides to be less steep and started placing till on it.

EMAB continues to have serious concerns with the revised plan. The Wek'èezhìi Land and Water Board said these issues will be dealt with through the review of the closure plan for the rest of the mine.

Diavik submitted its Interim Closure and Reclamation Plan for the rest of the mine last year. EMAB also has many concerns about this plan including:

- Lack of Revegetation – Diavik is proposing to revegetate about 11% of the site. Vegetation covered about 70% of the site before development
- Contaminated Runoff and Seepage – the biggest concern is runoff from the North Country Rock Pile, but there will also be runoff from the tailings pond and other areas
- Mixing Zone – Diavik is proposing a 25-square-kilometre mixing zone around the East Island; inside this zone water quality would not have to meet aquatic health guidelines. EMAB thinks this area is much too big
- Effectiveness of the cover on the North Country Rock Pile is uncertain, particularly with the effects of climate change – this could also lead to more contaminated water from the pile
- Wildlife Safety – Diavik should plan to make sure wildlife cannot hurt themselves walking around the mine, or by eating vegetation growing there or drinking water
- Processed Kimberlite Containment Facility or tailings pond – the proposed plan to close the Processed Kimberlite Containment area has a good chance of failing; a lot of work needs to be done here
- Contaminated soil – Diavik wants to bury any soil that doesn't meet guidelines
- Closure Criteria – many of Diavik's proposed criteria are not adequate
- Security Estimate – EMAB is concerned that in light of all the uncertainty the security estimate may not be enough, particularly if there are problems in the future after the ice road has closed
- Long-term maintenance and monitoring – EMAB expects that parts of the mine will need a very long time after closure before we can be sure there will not be problems. Diavik would like to finish closing the site seven years after they stop operating. A plan is needed for monitoring and making repairs over the long-term, including a policy and legislative framework.

ABOUT US

EMAB Photo

HOW EMAB WAS FORMED

The Environmental Monitoring Advisory Board (EMAB or the Board) exists because of the Environmental Agreement for the Diavik Diamond Mine. The Environmental Agreement came into effect in March 2000. It was signed by five Aboriginal Parties, the Federal and Territorial governments and Diavik. EMAB is the environmental watchdog organization that came out of the Environmental Assessment to make sure the environment around Diavik remains protected. The Environmental Agreement states EMAB will work independently and at arm's length from Diavik and the other Parties who signed the agreement.

WHY THE ENVIRONMENTAL AGREEMENT IS IMPORTANT

The Environmental Agreement is a legal contract between the Parties. It says what Diavik and the Parties must do to minimize environmental effects of the mine. The Environmental Agreement says Diavik must meaningfully involve the Aboriginal Parties in environmental monitoring at Diavik mine. This includes the use of Traditional Knowledge and Inuit Qaujimajatuqangit (TK/IQ). Finally, the Environmental Agreement sets out EMAB's mandate.

WHAT EMAB DOES

EMAB was set up in 2001 and is in its 17th year of operations. EMAB's mandate covers four main areas:

1. Oversight and Monitoring
2. Aboriginal and Community Involvement
3. Communications
4. Leadership and Governance

WHO WE ARE

There are eight Parties to the Environmental Agreement. Each Party appoints one Director to the Board. EMAB has two staff members:

- Executive Director
- Environmental Specialist

Since December of 2013, the GNWT and the Government of Canada have taken steps to amend the Environmental Agreement as a result of the Devolution process. Their plan is for Canada to remain a Party but with many of Canada's responsibilities transferred to the GNWT. This is an ongoing process. Canada has delegated its authority regarding the Environmental Agreement to the GNWT in the meantime.


EMAB Photo

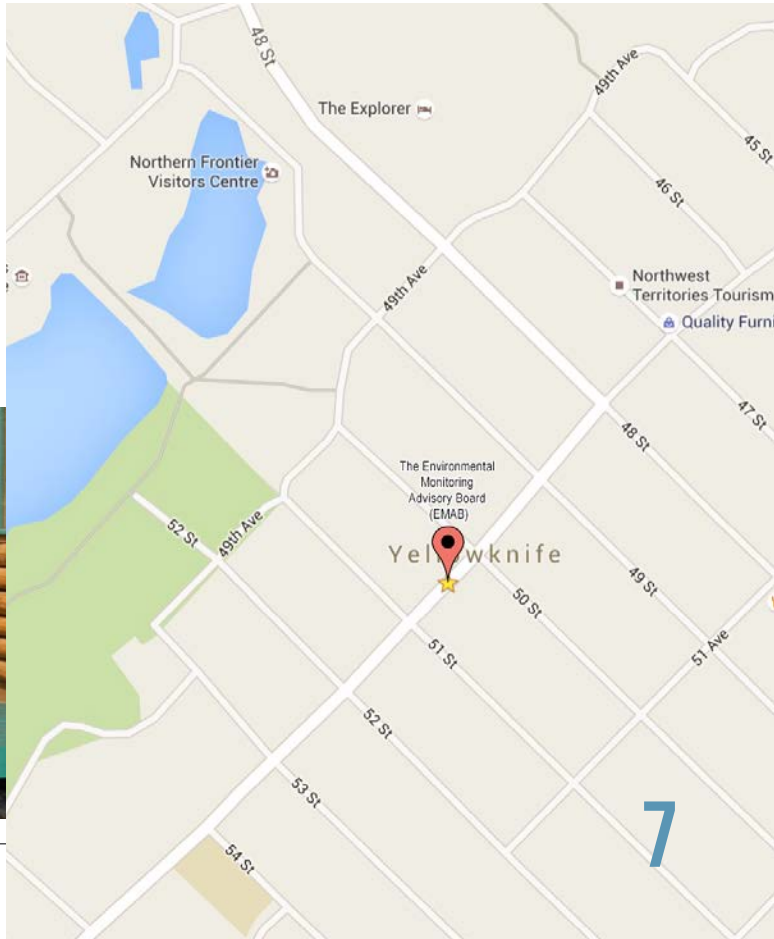
WHERE WE ARE LOCATED

Our office is in downtown Yellowknife at 5006 Franklin Avenue, suite 204 on the 2nd floor of the 50/50 Mini Mall.

Phone: **867-766-3682**

Email: **emab1@northwestel.net**

Website: **www.emab.ca**



CHAIR'S MESSAGE

EMAB Photo

"EMAB wants to know what people think about the activities and effects of the mine."

EMAB Chair, Napoleon Mackenzie

As EMAB's Chair since 2016, I am pleased to take this opportunity to address the Parties to the Environmental Agreement, my colleagues on the Board and everyone who is interested in knowing more about EMAB's activities in monitoring and making recommendations about environmental management of Diavik mine.

This year was another busy one for Board members and staff with much of the focus being on closure planning at the mine. EMAB is fortunate to have a strong board and dedicated staff, all with a great deal of experience in monitoring Diavik.

EMAB's engagement with communities continues to be a priority. Staff and the Board member for Łutselk'e held an update in the community in November. We also met with the Wildlife, Lands and Environment Committee there. We heard a lot of interest and concerns about the mine's closure plans and its effects on wildlife. We heard similar concerns during our update with the North Slave Métis Alliance in January; since the meeting was in Yellowknife we invited the public to attend as well. We also held a Board meeting in Behchokǫ̀ in February. Staff made a presentation at the Chief Jimmy Bruneau School during the meeting, and we were very pleased with the

level of interest. We plan to involve students more in all our community updates. Unfortunately, we were not successful in attracting community members to the public meeting in Behchokǫ̀ following the Board meeting.

EMAB wants to know what people think about the activities and effects of the mine. Please contact the Board member from your area or our office directly or by phone or email if you have concerns.


EMAB Photo

EMAB staff and Directors on a site visit in September 2016

EMAB put most of its effort into technical reviews last year, including two very important closure planning documents: the revised final closure plan for the waste rock pile and an updated closure plan for the entire mine. We looked at these plans from the perspective of the people and communities who have used the Diavik area, and their vision of its future after the mine closes. Diavik made several presentations on closure to EMAB during our meetings. The plans raised serious concerns which we talk about in the Oversight and Monitoring section of the report.

EMAB is also concerned about the long-term issues surrounding closure of the mine. How closely will the land, and the lake, be returned to their original condition? How will this be monitored? Will people and animals that use the site be safe? What will happen if there is a problem after the mine is closed; who will fix it and who will pay for it? Some of these answers are being proposed by Diavik, but the GNWT and the federal government make the laws and enforce them. We are happy to know they, along with the Wek'èezhìi Land and Water Board, are working on these questions now and plan to have rules in place well before Diavik stops mining.

EMAB members and staff toured the mine in September, with particular attention to the way Diavik proposes to close some areas. Diavik has begun to reslope the surface of the rock pile and board members were able to look around the top of the pile as well as at locations where seepage would report. The tour also looked at the Processed Kimberlite Containment Facility and the results of the tests on changing the amount of coarse processed kimberlite compared to fine, and at the revegetation test plots.

EMAB is interested in the Traditional Knowledge Panel recommendations on closure. EMAB has been addressing questions around TK/IQ since it was formed, and we have been raising this with Diavik for many years. Very little of the monitoring at Diavik includes TK/IQ and we would like to see more. This year EMAB made a number of recommendations to Diavik about TK/IQ in relation to the Traditional Knowledge Panel and in the company's environmental reporting. We are very interested in knowing more about how the Panel makes recommendations and how Diavik follows up.

We look forward to another busy year, and to working with communities to make sure all concerns have a voice.

Napoleon Mackenzie, Chair

WHAT HAVE WE DONE THIS YEAR?

EMAB works with the people of the Affected Communities to help protect the environment around the Diavik mine.

This is a summary of our activities in 2017-18, with more detail on the following pages. Readers can also visit our website: www.emab.ca.

GOVERNANCE: The Board is following the updated strategic plan that reflects changes in EMAB's priorities, focus and structure as well as reduced resources. The emphasis continues on doing more technical reviews of Diavik's plans and reports. We provide these to the Parties for their information and use in making their own interventions to regulators. The plan also recognizes the changed role of the Traditional Knowledge Panel, and EMAB's role in working with the panel. It highlights the need for tracking collection and use of TK/IQ by Diavik.

COMMUNITY INVOLVEMENT: EMAB held three community update meetings in 2017-18 in Łutselk'e, Yellowknife, and Behchokǫ̀.

OPERATIONS: EMAB's budget for 2017-18 was $531,840. There were no staff changes from the previous year.

REVIEWING REPORTS: In 2017-18 EMAB reviewed 16 reports from Diavik, most of which were also reviewed by technical experts. These reports are required by the water licence, fisheries authorizations and the Environmental Agreement. EMAB focuses on reports

EMAB Photo

Executive Director, John McCullum, and Board member, Charlie Catholique, giving an update in Łutselk'e

that are in our priority areas (water, air, wildlife, closure and TK/IQ). EMAB also reviewed discussion documents on the Bathurst Caribou Range Plan, Metal Mining Effluent Regulations amendments, legislative update priorities for the *Waters Act* for GNWT Environment and Natural Resources and a discussion document on a proposed *Mineral Resources Act* from GNWT ITI.

COMMUNICATIONS: EMAB's website – emab.ca - has been re-designed to improve usability. We continue to produce an annual report accessible online through our website and in print.

BOARD MEETINGS: The Board met six times in 2017-18; five face-to-face meetings and one conference call. Board Members visited Diavik minesite in the fall.

The Board membership has been the same since 2015-16 providing valuable consistency and experience. The Executive Committee (Chair, Vice Chair, and Secretary Treasurer) stayed the same as the previous year.

WHAT DO WE DO?

REVIEW Diavik's monitoring programs and reports with the help of technical experts

PROVIDE comments and recommendations to Diavik, the regulators and Parties to the Environmental Agreement

EVALUATE Diavik and regulators to make sure commitments are kept

PARTICIPATE in the regulatory process as a reviewer and intervenor

ADDRESS regulatory gaps including wildlife management, air quality and securities

COMMUNICATE through workshops, community information sessions, our website and annual report

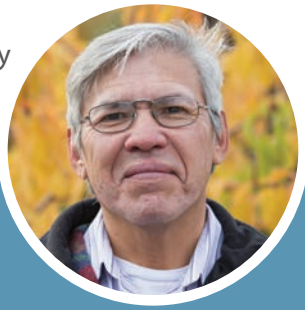
ASSESS Diavik's use of TK/IQ in environmental monitoring program design

SUPPORT participation of Aboriginal Peoples in monitoring Diavik

LISTEN to community concerns and bring those forward to Diavik

WHO ARE WE?

There are eight parties to the Environmental Agreement. Each party appoints a member to the Board.



Napoleon Mackenzie, Chair
YKDFN

Charlie Catholique, Vice Chair
LKDFN

Julian Kanigan, Secretary/Treasurer
GNWT

Arnold Enge
NSMA

Jack Kaniak
KIA

Gord Macdonald
DDMI

Sean Richardson
TG

Vacant - *Government of Canada*

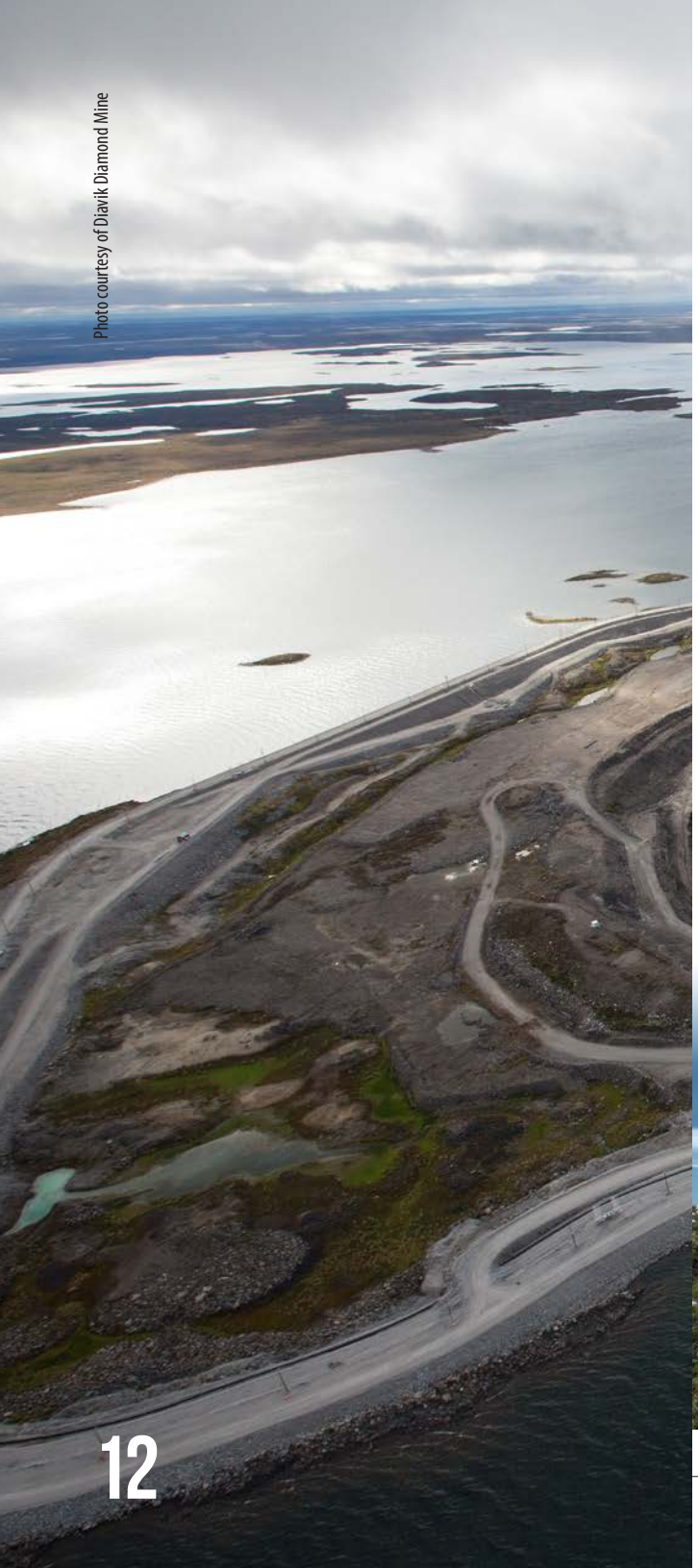


Photo courtesy of Diavik Diamond Mine

ENVIRONMENTAL SETTING OF DIAVIK MINE

Lac de Gras is a large lake, 60 kilometres in length, with an average width of 16 kilometres and 740 kilometres of shoreline. This lake is located roughly in the centre of the Slave Geological Province, north of the tree line, and in Canada's Southern Arctic ecozone. The area is cold and dry. Lac de Gras is the headwaters of the Coppermine River, which flows 520 kilometres north to the Arctic Ocean. Typical of arctic lakes, it is cold with long ice-covered periods and with little food for fish and other creatures. Fish species include Lake Trout, Cisco, Round Whitefish, Arctic Grayling and Burbot. Lac de Gras is also near the centre of the Bathurst caribou herd range. Since 2016 substantial numbers of Beverly/Ahiak caribou have been seen in the area in the winter and spring. The Bathurst caribou population has declined considerably from 186,000 in 2003 to 20,000 in 2015 (GNWT). Many other animals include the Lac de Gras area in their home ranges, such as grizzly bears, wolves, wolverines, smaller mammals, migratory birds and waterfowl.

Photo courtesy of Diavik Diamond Mine

DIAVIK NOW

(courtesy of Diavik)

In 2017, Diavik saw an increase in its production rate and a good safety performance through a very busy year of development and growth.

The A21 project was 84% complete by year end with the following milestones completed:

- Fish out and the commencement of dewatering
- Cut-off wall
- Instrumentation in place
- Pre-stripping of material begun

The A21 kimberlite ore body development was ahead of schedule and on budget. Diavik continued to incorporate TK/IQ (TK) through the Traditional Knowledge Panel which was established to facilitate appropriate and meaningful accommodation of TK in environmental management and monitoring, most notably as it relates to closure planning for the mine. The tenth session brought together Elders and youth selected by their community organizations to focus on the design and closure of the South Country Rock Pile (SCRP) so that it is safe for caribou movement after the Diavik mine is closed, and for initial discussions on post-closure monitoring. In 2017, the Traditional Knowledge Panel developed 23 specific recommendations relating to caribou movement and closure watching/monitoring programs. To date, the Traditional Knowledge Panel has provided a total of 179 detailed recommendations for consideration by DDMI and other parties.

Diavik is actively planning closure for 2025 and will be working closely with community partners and stakeholders to operate and plan the closure of the mine responsibly, leaving behind a positive community and environmental legacy.

Diavik provides financial and in kind resources through its community contribution program. In 2017, we continued to support the NWT *On the Land Collaborative* to offer land-based activities across the territory. We also provided donations and sponsorships to the Inuit Tattoo Revitalization Project, the NWT Aboriginal Sport Circle, the NWT Literacy Council and many more.

Diavik by the numbers:

- 2017 rough diamond production: 7.5 million carats
- Total rough diamond production: 111.7 million carats (2003 to 2017)
- 2017 spending 68% of the $283.6 million, was with northern businesses
- Spending: C $7.6 billion ($5.4 billion northern, of which $2.8 billion was Indigenous) (2000 to 2017)
- 2017 total workforce of 1,223 (45% Northern, 18% Northern Indigenous)

INVOLVING AND SUPPORTING COMMUNITIES


EMAB Photo

Chief of Łutselk'e, Darryl Boucher-Marlowe, (front-left) and community members listen to EMAB's presentation on Diavik

EMAB Board members appointed by Aboriginal Parties are a key link between the board and Affected Communities. They are able to update community members on EMAB activities and report to the Board on concerns raised by the community. In the past EMAB has set aside a budget to support members to update their communities, but with cuts to EMAB's overall budget and a lack of uptake by Board members, this community consultation budget is now minimal.

EMAB reviewed 16 reports and plans in 2017-18 as well as proposed legislation. All these reviews were forwarded to the Parties to the Environmental Agreement and the land/environment managers for each Party. Technical reviews always include a plain-language summary to make them more useful for general readers. EMAB also makes these reports available on our website.

EMAB staff went to Łutselk'e in November 2017 to hold a public meeting, as well as meeting with the Wildlife, Lands and Environment Committee. We heard a lot of interest about the mine's closure plans including concerns about contaminated seepage and effects on Lac de Gras, concerns about wildlife eating contaminated vegetation, the need for a long period of monitoring after the mine closes and the effectiveness of a number of Diavik's proposed plans.

EMAB staff, NSMA and the NWT Cumulative Impact Monitoring Program (CIMP) held a joint community update in Yellowknife in January 2018, where we heard similar concerns about closure of the waste rock pile, contamination in seepage, quality of water in pit lakes after closure, and the need for long-term monitoring. A member suggested that youth could be employed to collect local seeds for re-vegetation, which is done now at the Bullmoose mine. There were also questions about wildlife monitoring and air quality monitoring.

EMAB staff held a Board Meeting and community update in Behchokǫ̀ in February 2018 as well as held an update and discussion with a group of high school students at the Chief Jimmy Bruneau School in Edzo.

EMAB staff attended a Closure Plan Update hosted by Diavik in Ndılǫ in April 2017 to observe and assess the process.

Photo courtesy of Diavik Diamond Mine

Traditional Knowledge Panel members at the Diavik Fish Camp in 2015

TRADITIONAL KNOWLEDGE/ INUIT QAUJIMAJATUQANGIT

EMAB's strategic plan includes objectives to assess the use of TK/IQ in Diavik's monitoring programs as well as requesting Diavik provide an annual update on use of TK/IQ in monitoring and management at the mine. EMAB has identified Diavik's use of TK/IQ in environmental management and monitoring at the minesite as a monitoring priority. The meaningful involvement of Aboriginal people in environmental monitoring program design, as well as the inclusion of TK/IQ has been an EMAB priority since EMAB's creation. EMAB has tried various ways to encourage Diavik to take action on this EA commitment.

Another EMAB strategic objective is to develop a reporting procedure for TK with the Traditional Knowledge Panel. EMAB is pleased to see that Diavik has made efforts to include TK/IQ in closure planning through the Traditional Knowledge Panel. The Panel's recommendations, and Diavik's responses, are included as part of Diavik's closure planning reports and can be found on the EMAB website: www.emab.ca. EMAB met with two Panel members as well as the facilitators who support and guide the Panel meetings in May 2017. We all shared information about our respective roles and activities with each other, and EMAB gained a better understanding of how the Panel does its work and arrives at its recommendations.

Following the meeting EMAB developed the following **TK Recommendations** that were sent to Diavik in November 2017:

1. Panel should **meet at least twice per year**. Diavik did not accept this.
2. Topic for next Panel meeting should be an **assessment of the Panel's satisfaction with Diavik's responses and follow-up to all Traditional Knowledge Panel Recommendations**. Diavik stated that the Panel sets its own agenda and proposed to discuss this with the Panel at the next meeting and asked for EMAB's support for this approach.

In 2011 EMAB became more actively involved in bringing TK/IQ holders together as a Traditional Knowledge Panel, to address issues such as caribou and closure planning. Then in 2013 Diavik began to take a greater role in facilitating the Traditional Knowledge Panel, with EMAB assessing the results of the work and Diavik's response. EMAB also made recommendations to Diavik on ways to more effectively work with the panel. The Panel had made 179 recommendations as of March 2018.

EMAB Photo

3. EMAB suggested a **number of topics for the Panel to discuss**. Topics were:
   - Women's panel on vegetation – Diavik preferred to involve men, women and youth in all discussions;
   - Post-closure monitoring – this was discussed at the September 2017 meeting; another meeting on this will likely happen in future;
   - Review of all recommendations regarding closure plan to ensure consistency – Diavik has done this with the waste rock pile recommendations and plans to do it with the Interim Closure and Reclamation Plan Version 4.
4. Panel should continue to **involve youth**. Diavik supported this.
5. Diavik should describe **how it uses TK** in its aquatic, wildlife and air quality monitoring reports. Diavik responded that it already does this whenever TK is explicitly included and invited EMAB to make suggestions on how this could be reported in a different way.

EMAB will be following up Diavik's responses. As part of its follow-up to the recommendations EMAB requested that it be invited to an entire Traditional Knowledge Panel meeting to gain a better understanding of how the Panel arrives at its recommendations.

EMAB members and staff have been attending the final day of Traditional Knowledge Panel meetings since 2015; EMAB finds these meetings helpful in informing us what the Panel's concerns are and gives us a better understanding of the Panel's process of forming recommendations to Diavik. This year EMAB's Environmental Specialist attended the last day of the September 2017 Panel meeting, the only Panel meeting during the year. The Panel discussed the proposed South Country Rock Pile where waste rock from the A21 pit will be placed.

OVERSIGHT AND MONITORING

Photo courtesy of Diavik Diamond Mine

EMAB monitors Diavik and regulators to make sure they are doing a good job protecting the environment around the Diavik mine and are keeping the promises they made in the Environmental Assessment and Agreement.

Most of EMAB's focus is on Diavik's environmental monitoring programs and reports, and on the way the regulators handle them. When EMAB notes concerns coming from regulators we take that as a signal that we need to know more about the issues. These issues are outlined in the following pages.

Each year we do our own reviews of the aquatic effects, closure, wildlife and air quality monitoring programs. We review other reports and documents on a case-by-case basis.

WHO ARE THE REGULATORS AND MANAGERS?

- **Wek'èezhìi Land and Water Board (WLWB)** are responsible for the issuance of Diavik's water licence and the technical review of all documents required under the licence. The WLWB is a regional panel under the Mackenzie Valley Land and Water Board.
- **Canada**
  - › Department of Fisheries and Oceans (DFO) reviews some of the reports submitted under the water licence and all the reports submitted under the fisheries authorizations.
  - › Environment and Climate Change Canada (ECCC) reviews the reports required by the water licence focusing on water and air quality. ECCC officers inspect compliance with federal environmental regulations and permits, such as fisheries authorizations.

- **Government of the Northwest Territories (GNWT)**
  - Department of Lands reviews reports required by the water licence and land use permits. Lands has an inspector assigned to Diavik. This inspector updates the Board regularly to keep us aware of what is happening at the site. The inspector is also responsible for ensuring Diavik meets the terms of its water licence, land use permits and land leases.
  - Environment and Natural Resources (ENR), has regulatory responsibility for wildlife, including monitoring under the *Wildlife Act*. It also proposes better ways to monitor effects of Diavik on wildlife. ENR also has responsibility for environmental protection, including air and water quality, and provides detailed reviews of reports in these areas. The Minister of ENR approves Diavik's Type A water licence.
- **Wek'èezhìi Renewable Resources Board (WRRB)** is a wildlife co-management authority established by the Tłı̨chǫ Agreement. The WRRB is responsible for managing wildlife and wildlife habitat (forests, plants and protected areas) in the Wek'èezhìi area.

TECHNICAL DOCUMENTS EMAB RECEIVED FOR REVIEW IN 2017-18

Report Name	Date Received	Regulatory Instrument
PK Trial Extension Request – Mar 24/17	28 March 2017	Water Licence
Management Plans (Annual, various) 2017	30 March 2017	Water Licence
Type 'A' Water Licence (Annual, 2016)	31 March 2017	Water Licence
Seepage Report (Annual, 2016)	31 March 2017	Water Licence
WRSA Closure Plan Ver 1.1	9 May 2017	Water Licence
ICRP Version 4.0	19 May 2017	Water Licence
AEMP 2016 Dust Erratum	26 May 2017	Water Licence
Definition of Waste – WLWB Request	15 June 2017	Water Licence
Waste Rock Misclassification Report	3 July 2017	Water Licence
EAQMP (Annual, 2016)	13 July 2017	Environmental Agreement
Contingency Plan (Ver 22)	7 Sep 2017	Water Licence
Revised SSRBCC Report	8 Sep 2017	Water Licence
AEMP Reference Conditions Supplement	4 Oct 2017	Water Licence
WRSA Closure Plan - Diavik Response to WLWB Directives	10 Oct 2017	Water Licence
PK Trial Extension Request – Mar 14/18	30 Jan 2018	Water Licence
Request for WLWB approval to allow ponded water against PKC dam	6 Feb 2018	Water Licence

Report Name	Date Received	Regulatory Instrument
Water Management Plan Ver 14.1	6 March 2018	Water Licence
2014-2016 Aquatic Effects Re-evaluation Report	14 March 2018	Water Licence
AEMP Design Plan Version 5.0	14 March 2018	Water Licence
Draft Bathurst Caribou Range Plan	19 March 2018	Environmental Agreement
Type 'A' Water Licence (Annual, 2017)	31 March 2018	Water Licence
Seepage Report (Annual, 2017)	31 March 2018	Water Licence
WMP (Annual, 2017)	3 April 2018	Environmental Agreement
EAAR (Annual, 2017)	18 May 2018	Environmental Agreement

ENR LEGISLATION UPDATE

In September 2017, GNWT's Department of ENR initiated a process to review and update a number of pieces of legislation, including the *Waters Act* and the *Environmental Protection Act*. This process includes consultation with stakeholders and EMAB was invited to participate; EMAB staff actively participated in meetings in October 2017 and February/March 2018. EMAB was particularly interested in:

- the *Waters Act* as it relates to Diavik's water licence, and;
- the *Environmental Protection Act* as it relates to air quality regulations being developed by GNWT and their relation to Diavik's Air Quality Monitoring Program.

The updating process is ongoing and EMAB will continue to participate and raise issues the Board has identified.

WATERS ACT

ENR is proposing a number of updates EMAB has an interest in:

- allowing the Minister to send a draft water licence back to the land and water board for clarification or further consideration
- security and long-term liability for mine closure may be addressed through the *Waters Act*
- updating offences section so that the Inspector can give direction if the company breaks the terms of the water licence
- possible use of *Waters Act* to include air quality permitting by the land and water boards

INSPECTOR'S AUTHORITY TO PROVIDE DIRECTION TO DIAVIK

EMAB raised an issue in our 2016-17 annual report regarding a challenge by Diavik to the Inspector's direction regarding exceedance of Total Suspended Solids (TSP) limits during construction of the A21 dike. EMAB investigated this issue and concluded that this challenge could set a precedent limiting the ability of the Inspector to issue direction to Diavik or any other activity regulated under the *Waters Act*. EMAB followed up with a recommendation to the GNWT:

RECOMMENDATION: EMAB recommends that Section 67(1) of the *Waters Act* be reviewed and revised at the earliest opportunity, to allow the Inspector to issue a direction where there are reasonable grounds to believe a condition of a water licence has been broken, without having to meet any additional criteria.

EMAB is pleased that the GNWT has included this issue in its proposed update to the *Waters Act* and will continue to advocate for this amendment to the Act.

PONDED WATER AGAINST PROCESSED KIMBERLITE CONTAINMENT FACILITY DAMS

In February 2018, Diavik submitted a request to the WLWB for approval to allow ponded surface water against the Processed Kimberlite Containment (PKC) Facility dams due to snow melt, rainfall or excess process water. In the past Diavik had occasionally been out of compliance with its water licence because this ponding is not allowed. It asked to be allowed temporary ponding up to 14 days with approval of the Engineer of Record with immediate notifications to the Inspector and WLWB. It also asked for longer periods if approved by the WLWB and the Engineer of Record.

EMAB reviewed the request and contracted Arcadis Canada to provide technical expertise. ENR also commented on Diavik's request.

EMAB raised a number of concerns and made several recommendations related to the possible effect of the ponding on the stability of the PKC dam, which is about 50 metres high.

RECOMMENDATIONS: Confirm the dam has adequate safety factors for the extra load from the water and any sudden drawdown.

Provide information on expected depth of water, the amount of seepage with ponding, seepage amounts to the toe of the dam and speed of the seeping water.

Provide an assessment of the potential for increased seepage to cause internal erosion and loss of dam integrity. Monitor suspended solids in seepage at the toe of the dam and develop contingency plans for any increase.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the request to allow ponding against the PKC dam.

WLWB DECISION

The WLWB decided to allow ponding due to snowmelt, rainfall or excess process water up to 14 days with a number of conditions, including a number of contingency plans.

WATER MANAGEMENT PLAN VERSION 14.1

Diavik submitted Version 14.1 of its Water Management Plan in March 2018. As part of the review, the WLWB requested reviewers provide input on the definition of waste to help clarify whether waters that are discharged to Lac de Gras untreated fall within the definition of waste. EMAB reviewed the updated plan and made three recommendations. EMAB also stated that waste is defined in the *Waters Act*, and this definition should be used. ECCC, ENR, Lands and Tłı̨chǫ Government also made comments.

Go to EMAB's website – emab.ca – to see the full list of recommendations on Version 14.1 of the Water Management Plan.

WLWB DECISION

The WLWB approved Version 14.1 of the Water Management Plan subject to a number of changes being made.

AQUATIC EFFECTS MONITORING PROGRAM

1. REFERENCE CONDITIONS REPORT SUPPLEMENT

When the AEMP first started, Diavik compared areas close to the mine to areas far from the mine to determine what the impacts of the mine were on Lac de Gras. However, the far-field areas began to show effects from the mine as early as 2007. This meant they no longer represented pre-development (reference) conditions in Lac de Gas. To address this issue, the WLWB directed Diavik to submit a Reference Conditions Report. Diavik would compare the AEMP data to these reference conditions to see what changes were taking place in Lac de Gras. An extensive review was done on this report and eventually the report was approved by the WLWB in November 2015. Version 1.1 of the Reference Conditions Report includes all the parameters that Diavik measures in the AEMP.

In the 2016 AEMP Report, 19 new sediment quality variables were added to Diavik's Substance of Interest list. Diavik submitted the reference conditions for these variables in the Reference Conditions Report Supplement. EMAB had North-South Consultants (NSC) review the Supplement and submitted seven recommendations to the WLWB. GNWT ENR also submitted comments on the Supplement.

THE ENVIRONMENTAL ASSESSMENT AND THE WATER LICENCE

The water licence and the Environmental Assessment both contain requirements for the AEMP. Most of the water licence requirements are more detailed than those in the Environmental Assessment. The WLWB cannot make Diavik meet any of the Environmental Assessment commitments unless they are also in the water licence. In the Environmental Assessment Diavik said it would do its best to involve Aboriginal People in designing monitoring programs, and that all its monitoring programs would include activities to:

- **consider TK/IQ,**
- **establish or confirm thresholds or early warning signs,**
- **trigger adaptive mitigation measures,**
- **provide ways to involve each of the Aboriginal Peoples in the monitoring programs and**
- **provide training opportunities for each of the Aboriginal Peoples.**

EMAB is working with Diavik to help it meet its commitments as described throughout this annual report

Photo courtesy of Diavik Diamond Mine

EMAB's review focused on potential issues with the Total Organic Carbon, Organic Matter, and Total Nitrogen data sets.

RECOMMENDATION: Given the significance of the data used for establishing the normal range, Total Organic Carbon, Organic Matter, and Total Nitrogen data should be evaluated. This review should include evaluation of the original laboratory reports and QA/QC results. If the apparent discrepancies cannot be clearly resolved through a desktop review, additional field sampling should be conducted to confirm the normal range.

WLWB DECISION

The WLWB decided not to approve the report and directed that a revised Version 1.3 be submitted that includes EMAB's recommendations.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the Reference Conditions Report Supplement.

2. 2014-2016 AQUATIC EFFECTS RE-EVALUATION REPORT

Diavik's AEMP monitors dust, water quality, eutrophication indicators (phosphorus and chlorophyll *a*, which is related to algae) sediment quality, plankton, benthic invertebrates, and fish health. Diavik submits an Annual AEMP Report, which describes the effects for that year. A re-evaluation report is submitted every three years to give a summary of AEMP results and discuss trends over time. It also compares the AEMP results from each component to predictions made at the beginning of the project to see if they were accurate. Diavik submitted the 2014 to 2016 Aquatic Effects Re-evaluation Report to the WLWB on March 14, 2018.

EMAB had NSC help with the review of this report. EMAB submitted 103 comments to the WLWB. Below is a summary of our review. ECCC and GNWT ENR also submitted comments.

2.1 DUST DEPOSITION

2.1.1 GROUPING OF DATA SETS

Diavik measures dust deposition/dustfall from the mine. The purpose of this is to see if there are changes in dustfall depending on the season and distance from the mine, and estimate the amount of nutrients and contaminants landing on Lac de Gras. Diavik generally expects dustfall to be lower during underground mining and higher when open pit mining is happening.

Diavik's study of dustfall grouped the data into time periods that reflected changes in mining activities over time. NSC felt this approach of pooling multiple years of data might hide short-term effects.

RECOMMENDATION: Diavik should discuss whether short-term effects have been observed for dust deposition. Short-term trends should be presented in the report.

2.1.2 CHANGES OVER TIME

Background dustfall rates of phosphorus and metals increased from 2010-2013 to 2014-2016, however Diavik did not explain why this may be. This could indicate a mine-related influence in the later period.

RECOMMENDATION: Diavik should discuss possible explanations for the increase in background deposition rates.

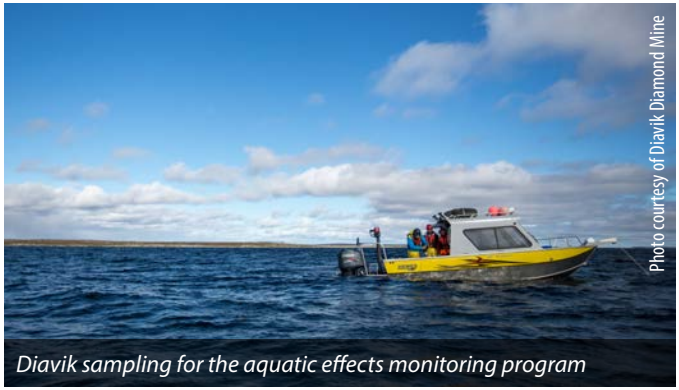


Photo courtesy of Diavik Diamond Mine

Diavik sampling for the aquatic effects monitoring program

WHAT IS EUTROPHICATION?

Eutrophication happens when a water body has more nutrients in it than normal. More nutrients promote growth of algae and aquatic plants which take oxygen from the water. This can lead to a situation where there is not enough oxygen for all of the organisms who live there. Lac de Gras gets increased nutrients from Diavik's effluent.

2.2 EUTROPHICATION

Diavik has three sets of water quality monitoring stations: near-field, mid-field, and far-field. The near-field sites are closest to the mine and the far-field sites are furthest from the mine. They sample the near-field and mid-field sites every year but only sample the far-field sites every three years. Diavik studies Total Nitrogen and chlorophyll *a* at these sites to see how much of Lac de Gras has been affected by eutrophication.

The far-field sites were not sampled for Total Nitrogen or chlorophyll *a* in 2014 or 2015 so we cannot know the actual area of Lac de Gras affected by these nutrients. The data from 2014 and 2015 show these nutrients extended to the mid-field stations, but there is no data to show whether these changes extended into the far-field. In 2016, when far-field sites were sampled, the whole area of Lac de Gras was affected by Total Nitrogen and 44% was affected by chlorophyll *a*.

RECOMMENDATION: Diavik should include a discussion of the lack of far-field data for 2014 and 2015 and the implications regarding limitations on defining the spatial extent of effects in those years. Modify figures to clearly indicate sites that weren't sampled in a given year.

2.3 FISH

From 2013 to 2016 benthic density, type and densities of the most common kinds returned to within the normal range. Prior to 2013, density of benthics was higher closer to the mine compared to further away. The types of benthics have also changed over the years, but this was observed in the near-field and far-field, which suggests a natural shift in communities over time.

Plankton communities near the mine have been different from those far away from 2007 to 2016. These changes suggest that increased nutrients in Lac de Gras from Diavik Mine's effluent are affecting plankton that live near the mine. Plankton communities are showing a mine-related nutrient enrichment effect in the near-field and mid-field areas.

The fish component of the AEMP summarizes changes to the health and tissue chemistry of Slimy Sculpin and mercury concentration in Lake Trout. Slimy Sculpin are monitored every three years and Lake Trout are monitored only if triggered by the Slimy Sculpin studies. Mercury in Lake Trout is also monitored through the fish tasting program with the Traditional Knowledge Panel every three years.

Slimy Sculpin near the mine are smaller than fish farther from the mine, although Diavik thinks this may

be due to a difference in habitat (e.g. water temperature is colder near the mine and gets warmer farther from the mine, which could slow the growth of fish close to the mine). While there are some differences in fish size, fish appear to be healthy overall.

Community participants in Diavik's fish palatability study, last done in 2015, say taste and texture of fish in Lac de Gras have not changed.

2.3.1 LAKE TROUT TISSUE

Diavik used to measure mercury in Lake Trout every three years, however moving forward the WLWB will only require those studies if the small bodied fish studies (Slimy Sculpin) trigger further investigation. Mercury concentrations in Lake Trout found in Lac de Gras have been variable over the life of the mine. The last time the study was done in 2014 levels were near baseline.

RECOMMENDATION: The report does not include a description of what constitutes 'baseline' for mercury concentrations in Lake Trout. Diavik should include a description of what baseline mercury concentrations in Lake Trout are and how they were derived.

Photo courtesy of Diavik Diamond Mine

The Re-evaluation Report summarizes the Lake Trout tissue data to date. However, due to the different labs Diavik used to analyze the data, and confusion about which data were included in the analysis, it was difficult for NSC to evaluate the conclusions in the report. Changes in labs can affect conclusions, how data and trends are interpreted.

RECOMMENDATION: Diavik should add a summary table identifying, by year, analytical labs used and explicit identification of data incorporated in the analyses.

2.3.2 LAKE TROUT MERCURY BENCHMARK

Diavik uses 'benchmarks' to measure if a chemical is harmful to fish and other bugs living in Lac de Gras. If a chemical in the water is higher than the benchmark, then effects to fish and bugs could occur.

Diavik concluded that Lake Trout are unlikely affected by mercury based on a benchmark of 0.5-1.0 mg/g. This benchmark is incorrect and is actually one thousand times higher than the current approved benchmark of 0.5-1.0 µg/g. Mercury in individual Lake Trout from Lac de Gras and Lac du Savage have often been within that benchmark range from 2005-2015.

RECOMMENDATION: Diavik should reassess conclusions related to potential effects of mercury concentrations on fish health based on appropriate guidelines.

2.3.4 SLIMY SCULPIN MERCURY COMPARISONS TO NORMAL RANGES

Mercury concentrations in Slimy Sculpin were higher in 2007 compared to 2013 and 2016 in the near-field and far-field. Diavik did not fully explore reasons for the higher concentrations found in 2007. NSC's review noted that the 2007 data were analyzed at a different lab than the 2013 and 2016 data, but could not conclude that this was the reason for the higher concentrations found in 2007.

RECOMMENDATION: Diavik should include a discussion of the high mercury concentrations in Slimy Sculpin in 2007 and explore potential explanations for the relatively high concentrations observed in that year, notably for the near-field area. If data are deemed to be suspect, trend analysis should be re-visited, since sampling after 2007 has always found lower levels than later years ie. downward trend.

2.4 WLWB DECISION

The WLWB had not made a decision on the 2014-2016 Aquatic Effects Re-evaluation Report at the time of writing this report.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the 2014-16 Aquatic Effects Re-evaluation Report.

3. AEMP DESIGN PLAN VERSION 5

This AEMP Design Plan describes how Diavik will carry out water, sediment and biological monitoring studies in Lac de Gras. According to Diavik's water licence, it must review and update the AEMP Design Plan every three years, or as directed by the WLWB. The purpose of updating the AEMP design is to make changes to the existing program based on findings to date. Design Plans give reviewers like EMAB a chance to comment on how well the program is working and recommend changes. Diavik submitted Version 5.0 of the AEMP Design Plan to the WLWB on March 14, 2018. EMAB had NSC review the report. EMAB submitted 19 comments to the WLWB. ECCC and GNWT ENR also submitted comments.

3.1 PROPOSED GRADIENT DESIGN AND SAMPLING STATION CHANGES

Under Version 5.0, Diavik proposed to evaluate spatial trends along a gradient – rather than compare near-field and far-field results – to determine mine-related effects. This is because the far-field is no longer pristine; it is affected by Diavik's effluent. NSC felt this proposed change in monitoring design was reasonable and appropriate. Diavik also adjusted the number and location of stations in the far-field to support the gradient design. Given the change in sample design, NSC also felt the proposed changes to far-field stations were appropriate.

3.2 ADDING MORE DUSTFALL MONITORING SITES

In EMAB's review of Diavik's 2016 AEMP Report, we recommended Diavik add two more dustfall monitoring sites. The WLWB also asked Diavik to consider adding dustfall monitoring sites. Diavik did not add any new sites to the new design, and no rationale was provided.

RECOMMENDATION: Diavik should discuss its rationale for the proposal to not add dustfall monitoring sites.

3.3 ADDING BENTHIC INVERTEBRATES TO THE NUTRIENT ENRICHMENT ANALYSIS

Currently Diavik measures chlorophyll *a* to see if the mine is having a nutrient enrichment effect on fish

health. Diavik uses chlorophyll *a* because it is an early indicator of food supply for fish. However, because chlorophyll *a* is only measured once per year and it can vary depending on where and when it is measured, it may not be the best way to show nutrient enrichment effects. Benthic invertebrates would be a better indicator and they are the main food supply for Slimy Sculpin.

RECOMMENDATION: Diavik should incorporate benthic invertebrate density into the nutrient enrichment analysis.

3.4 LAKE TROUT MERCURY SURVEY TRIGGER

Diavik started sampling mercury in Lake Trout as part of the AEMP in 2008 after the results of Slimy Sculpin studies showed higher levels of mercury in 2007. Mercury in trout was sampled as part of the fish palatability testing starting in 2003. Diavik continued to sample mercury concentrations in Lake Trout every three years in 2011 and 2014. The 2014 study showed that mercury concentrations in Lake Trout were near baseline. Based on this data, in Design Plan Version 4.1, Diavik proposed to sample mercury in Lake Trout only if triggered by the results of the Slimy Sculpin studies.

EMAB disagreed with this proposed change, identifying a number of reasons why Slimy Sculpin are not a good indicator of mercury risk in Trout:

- Slimy Sculpin and Lake Trout have many differences such as habitat and movement patterns. Slimy Sculpin are found in nearshore, shallow areas. Lake Trout are unlikely to feed on Sculpin and more likely to eat Round Whitefish in a different zone of the lake than where Slimy Sculpin live.
- Lake Trout are a top predator, meaning they are most at risk to biomagnification of mercury.
- Monitoring mercury in Lake Trout is more relevant to monitoring for potential effects on humans.

EMAB recommended that Diavik continue to sample Lake Trout for mercury every three years to ensure community concerns regarding mercury in fish were addressed and to verify predictions in the Comprehensive Study Report (CSR). The WLWB did not agree with EMAB's recommendation and approved Diavik's proposal.

The only ongoing monitoring of mercury in Lake Trout takes place through the fish palatability studies. EMAB will continue to take a keen interest in the results of the analysis of Trout tissue from these studies and will take appropriate action if we believe a potential risk is present, particularly for subsistence users.

Version 5.0 of the AEMP Design Plan also proposes that the mercury in Lake Trout surveys will only occur if the results of the Slimy Sculpin studies show an increasing trend in mercury concentrations caused by the mine. This is problematic because:

- In the proposed design at least six years will go by after mercury is found in Slimy Sculpin before a Lake Trout survey is developed, and;
- The high level of mercury found in Slimy Sculpin in 2007 means there would have to be very high levels found before the trend would actually increase.

More information is needed on how an increasing trend of mercury in Slimy Sculpin will be identified.

RECOMMENDATION: Diavik should provide a description/operational definition of how an "increasing trend" in mercury concentrations in sculpin will be identified for the purposes of triggering a Lake Trout mercury survey.

3.5 UPDATE ACTION LEVELS

In addition to changing the frequency of Lake Trout surveys, Diavik also proposed to change the trigger for when these surveys would be done. The trigger Diavik proposed is higher and an Action Level 3 compared to the previous Action Level 2 trigger in AEMP Design Plan 4.1.

In order for an Action Level 3 to be triggered the following conditions must be met: (1) Things like Slimy Sculpin weight and length have to be different from reference data and equal/above critical threshold values in the Environmental Effects Monitoring (EEM) guidelines; (2) Observed in two sampling events in a row; and (3) Beyond the normal range. This means Slimy Sculpin will have exceeded the critical threshold values recommended by ECCC in EEM for six years before a Lake Trout study is even defined in the AEMP Response Plan. Design Plan Version 5.0 also provides little information about how Lake Trout health monitoring would be done and how data would be analyzed if a large-bodied fish study was triggered.

RECOMMENDATION: Review the Lake Trout health survey trigger and provide a description of a potential study design.

3.6 CHANGES TO SAMPLING SCHEDULE

Diavik proposed to increase the sampling frequency of plankton at the mid-field sites from once every three years to once a year. EMAB and NSC agree with this addition.

Far-field sites are currently sampled once every three years. In years where there is no far-field sampling, and the eutrophication effects reach the far end of the mid-field, we can't tell if they go further than that because there are no samples. EMAB and NSC have noted in previous AEMP Reports that this makes it impossible to be sure of the extent of Total Nitrogen and chlorophyll *a*. It would be valuable for Diavik to sample eutrophication variables (nutrients, chlorophyll *a*, and potentially plankton) at far-field sites every year.

RECOMMENDATION: Consider increasing the frequency of far-field sampling for eutrophication indicators to every year and/or provide a rationale for what actions would be taken if the spatial extent of effects on eutrophication metrics extended to the mid-field sites in years when far-field sampling is not conducted.

WHAT IS AN ACTION LEVEL?

Diavik has a "Response Framework" as part of the AEMP to make sure unacceptable effects do not happen to Lac de Gras. When a certain level of change to a variable is measured, Diavik must respond to this change. The level of change is defined as an "Action Level." Action Levels are set low enough so that if there is a change in the environment, Diavik can detect this in a timely manner and respond before effects that could be harmful to the lake can happen.

3.7 WLWB DECISION

The WLWB had not made a decision on the AEMP Design Plan Version 5 at the time of writing this report.

Go to EMAB's website – emab.ca – to see the full list of recommendations on AEMP Design Plan Version 5.0.

4. 2017 AEMP REPORT

The 2017 AEMP report had not been circulated for review at the time of writing this annual report.

METAL MINING EFFLUENT REGULATION AMENDMENTS

The Metal Mining Effluent Regulations (MMER) were established under the Fisheries Act in 2002. The Fisheries Act prohibits depositing "deleterious substances" in waters where there are fish, except if authorized by MMER. The MMER sets out a list of deleterious substances, such as arsenic and lead, and allowable concentrations. Generally, the MMER have been criticized for having a very limited list of substances, and some allowable concentrations that can be toxic to fish.

The MMER also require each mine to have an EEM program to assess effects on fish or fish habitat. These include specific types of sampling and testing.

ECCC completed a ten-year review of the MMER in 2015 and proposed to complete amendments to the regulations in 2018. The amendments will add diamond mines to the MMER. The amendments will also add some deleterious substances and lower some allowable concentrations.

Having diamond mines under the MMER means that Diavik will be required to meet the limits of the MMER and meet requirements for EEM.

EMAB reviewed the proposed amendments to MMER in the *Canada* Gazette, Part I in May 2017. EMAB's main priority is that the AEMP not be negatively affected by trying to align it more closely with EEM requirements. EMAB recommended that ECCC implement the EEM in a way that will not diminish the AEMPs ability to detect site-specific aquatic effects or respond to effects in a timely manner.

The final amendments will be published in the *Canada Gazette*, Part II in spring 2018. EMAB looks forward to reviewing the finalized amendments.

DRAFT *MINERAL RESOURCES ACT*

GNWT's Department of Industry, Tourism and Investment circulated a draft *Mineral Resources Act* in fall 2017. EMAB made comments on the draft as it related to EMAB's mandate:

- EMAB observed that the draft Act should not address environmental protection related to mining as this is a potential conflict with its objective of increasing competitiveness of the mining sector. Environmental protection should fall under departments with a mandate for environmental protection.
- The draft Act should be clear that its scope does not include inspection and monitoring of compliance with environmental legislation and regulations.
- The draft Act should not include references to mine rehabilitation and closure. Again, this could lead to a potential conflict with the stated mission of increasing competitiveness of the mining sector. Mine rehabilitation and closure are regulated by the Land and Water Boards, the Department of ENR, and Lands. Lands is also tasked with developing a policy framework for closure security and long-term monitoring and maintenance of closed mines (see p. 36-37: GNWT Policy on security and longterm closure monitoring).

SPILL REPORT FOR DIAVIK DIAMOND MINE 2017-18
(GNWT DATABASE)

Spill No.	Date	Commodity	Quantity	Source
2017100	2017-04-06	Drill Cuttings	20 L	Storage Tank less than 4000 litres
2017120	2017-04-26	Hydraulic Fluid	49 L	Other Transportation
2017140	2017-05-03	Drill Cuttings	2 L	Instrument
2017170	2017-05-19	Hydraulic Fluid	100 L	Other Transportation
2017187	2017-05-30	Waste Oil	200 L	Drum or Barrel
2017205	2017-06-09	CMS Grout	200 L	-
2017305	2017-08-18	Sewage	3000 L	Pipe or Line
2017325	2017-08-18	Sewage	890000 L	Pipe or Line
2017361	2017-09-24	Diesel Fuel	100 L	Truck
2017381	2017-10-09	Fine Processed Kimberlite	51000 L	Pipe or Line
2017411	2017-11-08	Hydraulic Fluid	200 L	Other Transportation
2017431	2017-11-27	Engine Coolant	400 L	Truck

INTERIM CLOSURE AND RECLAMATION PLAN

Diamond mining produces large amounts of waste and disturbs the landscape: roads, open pits, waste rock piles, concrete pads, buildings and processed kimberlite containment facilities. Diavik's Interim Closure and Reclamation Plan (ICRP) provides detailed information on the way Diavik will reclaim the land as close to its original state as possible.

Diavik works with a Traditional Knowledge Panel to review the proposed closure planning and receive input. The Panel's recommendations can be found on the EMAB website: www.emab.ca.

Photo courtesy of Diavik Diamond Mine

North Country Rock Pile

1. WASTE ROCK STORAGE AREA (NORTH COUNTRY ROCK PILE) CLOSURE PLAN UPDATE

In August 2017 the WLWB decided not to approve Diavik's Final WRSA Reclamation Plan. The WLWB divided its comments in two parts: requirements that needed to be met soon, so that Diavik could begin placing the cover on the WRSA and a second set that could be dealt with through the review of ICRP Version 4 (see Section 2 below). The WLWB also said it would host a workshop in November 2017 to address outstanding issues including: closure criteria, monitoring the till/rock cover, and security.

The WLWB directed Diavik to submit additional information on:

- Till moisture content in the cover
- Cover material consistency
- Incomplete thermal modelling
- Till thickness
- Misclassification of waste rock
- Seepage/runoff water quality predictions

Diavik submitted responses to the WLWB directive on September 29, 2017, and a supplemental response on October 30. EMAB had Randy Knapp Consulting review Diavik's responses and submitted comments to the WLWB. GNWT ENR and Lands also submitted comments.

TILL MOISTURE CONTENT OF COVER

It is critical that the till layer contain between 10% and 25% water for it to work properly. EMAB expressed concerns that Diavik has not shown how it will be able to ensure this. If moisture is too high or too low the till layer might allow moisture to seep into the potentially acid generating rock underneath resulting in contaminated seepage.

RECOMMENDATION: Diavik should provide more information on how it will maintain the moisture content of the till cover.

GEOCHEMICAL PREDICTIONS

The testing of the A21 rock for contaminated runoff and seepage is limited and may not be accurate. The fines from blasting and moving the rock may be much greater than estimated; this would increase the possibility of contaminated runoff and seepage from the rock cover.

RECOMMENDATION: Diavik should provide more information on the justification for its calculations of the concentrations of contaminants running off the rock cover including the estimate of proportion of fines and the adjustment of the lab testing results.

MIXING ZONE

The mixing zone for runoff from the mine that Diavik is proposing is very large, roughly 25 square kilometres, and completely surrounds East Island where Diavik is located. It would apply to discharge from anywhere

on the island, not just the WRSA. For comparison, the MVLWB Guidelines for Effluent Mixing Zones identifies the maximum mixing zone as 0.03 square kilometres as a starting point, over 800 times less. As we have stated since Diavik proposed it, this extremely large mixing zone is not justifiable and unacceptable to EMAB.

RECOMMENDATION: Diavik should address all discharges to Lac de Gras and identify where water quality guidelines might be exceeded. This would allow a rational discussion of a post-closure mixing zone.

WLWB DECISION

The WLWB reviewed Diavik's responses and reviewer comments and made the following decisions (meeting of January 24, 2018):

- Design drawings for WRSA approved as an interim plan once required revisions are made:
  - Sampling till moisture on a 50x50 metre grid and moisture-reading instruments installed in at least five places based on readings within six months of completion
- Increased security holdback to account for uncertainty in till moisture and effects of climate change
  - Diavik to propose estimates
  - WLWB will set security holdbacks, including for long-term maintenance and monitoring
- Closure plan for rest of pile, where Type 1 rock is disposed
  - Type 1 rock leaches contaminants even though it is not acid-generating
- Water quality predictions coming off the WRSA are mostly at or below baseline except uranium and cadmium
  - Uranium is likely over-predicted and cadmium may be able to meet MVLWB mixing zone guidelines
- The long-term performance of the cover on the WRSA will need to be validated
- The WRSA Closure plan is approved as an interim closure plan (not final as requested) once all WLWB conditions are met. Diavik is to submit Version 1.2 to the WLWB.
- Security is increased by $24.4 million
- Other issues can be finalized as part of the review of ICRP Version 4.0

Diavik submitted version 1.2 of the WRSA-NCRP interim closure plan on March 1, 2018.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the Response to WLWB Directives on the WRSA Closure Plan.

2. CLOSURE AND RECLAMATION PLAN VERSION 4.0

Diavik submitted Version 4.0 of its Closure and Reclamation Plan (CRP) on April 20, 2017. This plan lays out the closure design for each mine component. CRP Version 4.0 is similar to the previous version but includes more recent information and changes to closure concepts. EMAB hired three consultants to help review this report and submitted 161 comments and recommendations to the WLWB. ECCC, GNWT ENR and the NSMA also submitted comments.

Below is a summary of our review.

GNWT Inspector Photo

Vegetation reclamation research plot

EMAB Photo

EMAB Directors and Staff inspecting the re-vegetation plots

RE-VEGETATION

Diavik's current re-vegetation plan only proposes to vegetate 11% of the total area disturbed. The plan is based on a map of priority areas for re-vegetation identified by the Traditional Knowledge Panel. This area is much less than pre-development vegetation conditions, which covered about 70% of the footprint. EMAB feels that the proposed area should be expanded, and that it does not meet Diavik's closure objective to make the minesite look like the surrounding area.

Participants in EMAB's 2017 Closure Workshop, and communities Diavik consulted with, have stated they want the site to be returned to pre-development conditions, including vegetation cover. This means that there should be as much vegetation as there was pre-development, and it should be healthy for animals to eat and live in. EMAB has heard similar comments during community consultations.

RECOMMENDATION: Diavik should re-vegetate the minesite – using local species – to the maximum extent possible compared to pre-development conditions. Diavik should make sure that vegetation is safe for wildlife.

RUNOFF AND SEEPAGE WATER QUALITY

Diavik's closure plan proposes a 1 km mixing zone around the entire East Island where Diavik is built. Within that, Diavik is not expecting to meet aquatic effects benchmarks. This means there could be toxic health effects to aquatic life within this zone. EMAB, Affected Communities, and participants in EMAB's Closure Workshop have concerns with this mixing zone and feel that Diavik's rationale is inadequate.

The reason Diavik gives to justify this very large mixing zone (25 square kilometres) is based on the 1999 Environmental Assessment of the project. The Environmental Assessment defined a significant adverse effect as "a high probability of permanent or long-term effect of high magnitude, within the regional study area." The regional study area at Diavik for water and fish is the area further than 1 km from East Island, so Diavik says that any effect that is less than 1 km from the island is not a significant adverse effect.

EMAB does not agree that the definition of significant adverse effects from the Environmental Assessment can be applied to water quality at Diavik during and after closure of the mine. Diavik's proposal misuses the intent of the Environmental Assessment and contradicts its

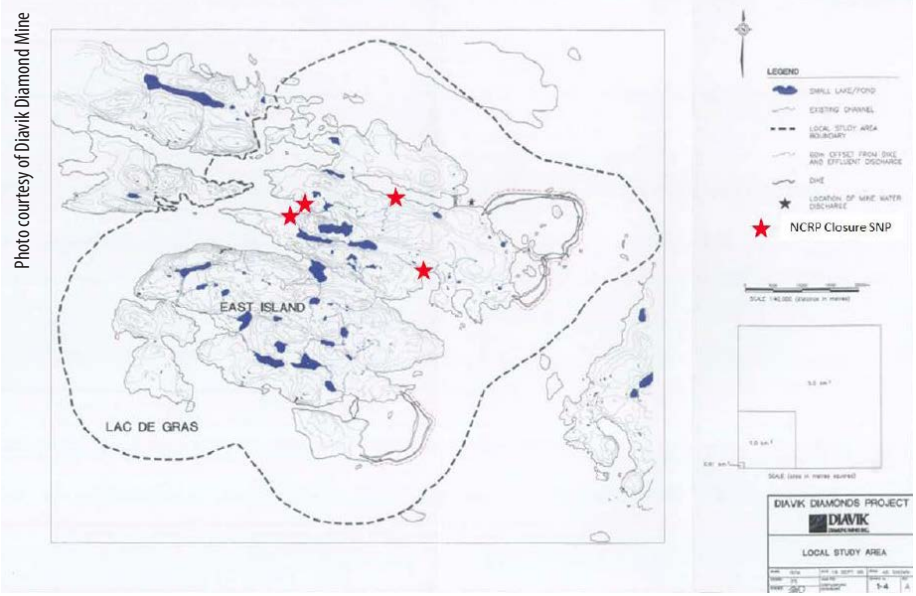


Photo courtesy of Diavik Diamond Mine

closure objectives for water quality and aquatic health.

Diavik has predicted that seepage and runoff from the WRSA may not meet many standards for protection of aquatic life where it enters Lac de Gras, as well as some standards for human and wildlife health. Diavik has not made predictions about the quality of runoff and seepage from the PKC or other areas of the mine. Diavik should know where each source enters the lake and make predictions about the water quality and effects for each one.

[Note: much of the minesite is constructed with Type 1 rock which has been shown to have contaminated run-off.]

RECOMMENDATIONS: Diavik should abide by the proposal and commitments it made during the Environmental Assessment to collect and treat runoff/seepage that does not meet CCME guidelines for the protection of aquatic life post-closure. Diavik should propose closure criteria for water quality and aquatic health that meet the closure objectives for Lac de Gras.

Diavik should provide a detailed description of the predicted character of post-closure runoff and seepage for each source including the levels of contaminants where they enter Lac de Gras, seasonality, volume, and flow, as well as mixing and dilution after it enters Lac de Gras.

WILDLIFE SAFETY

EMAB noted concerns raised during our 2017 Closure Workshop as well as by the Traditional Knowledge Panel and EMAB members regarding the need to keep wildlife that use East Island safe from any mine-related dangers:

- Harm from rough surfaces or holes that caribou or other animals could trap their legs in
- Drinking contaminated runoff and seepage
- Eating plants and vegetation that have taken up contaminants from soil

RECOMMENDATIONS: Diavik should make sure that wildlife is protected from eating vegetation that has unsafe metal/contaminant uptake content.

Diavik should apply the strictest human and wildlife health criteria for drinking water everywhere on the minesite where water can be accessed. Water quality should be monitored and actions set to identify trends and avoid any potential exceedances.

Diavik should develop a plan to identify and mitigate possible hazards to wildlife crossing or using the minesite.

NORTH INLET CLOSURE OBJECTIVES AND CRITERIA

Diavik proposed to remove the closure objective to reconnect the NI with Lac de Gras. Oil and grease contamination in the sediment may not allow this. EMAB feels the objective should remain. Communities have also stated the minesite should be restored as close as possible to the original condition, which includes reconnecting the NI with Lac de Gras.

EMAB has recommended Diavik do research on whether the sediment quality in the NI will improve over time once mining stops, through natural processes, and any other options that would allow Diavik to safely reconnect the NI to Lac de Gras. EMAB is pleased to note that the Traditional Knowledge Panel will consider the NI during its March 2019 meeting.

RECOMMENDATION: To meet this closure objective, Diavik should begin a research project to assess if sediment quality in the NI will be safe for reconnection with the rest of Lac de Gras by 2031 through natural breakdown of the contaminants. If not, Diavik should dredge the contaminated sediment and store it in the pits.

PROCESSED KIMBERLITE CONTAINMENT FACILITY

The PKC Facility is where Diavik's tailings are dumped. The tailings (called fine processed kimberlite, similar to sand) are in a dammed area and are over 40 metres deep. There is also a pond roughly in the center that changes size depending on the time of year and Diavik's operations. Diavik's closure design for the PKC has changed since the last approved CRP.

Diavik's proposed closure plan involves leaving the pond in the center of the PKC Facility with a spillway leading to Lac de Gras for any overflow. Under the pond is a thick layer of very fine Processed Kimberlite (PK) that


EMAB Photo

Re-sloping work on the North Country Waste Rock Pile

is like thin mud or quicksand. It is also called slimes, and anyone walking on it would sink in. The pond will protect wildlife or humans from being caught in the slimes.

The sandy fine PK would be covered with a layer of very strong synthetic fabric (geotextile), which would support a layer of waste rock as the cover. This rock layer would go right up to the edge of the pond and be safe to walk on and keep any wildlife from directly contacting the PK.

EMAB's review raised uncertainties about the design including the water quality of the pond after closure and the long-term stability of the pond and the waste rock cover:

- A lot of water seeps out of the PKC; right now it is replaced with water in the PK that comes from the processing plant. Unless this seepage can be stopped by having the tailings freeze, the pond will drain and expose the slimes.
- After closure there will likely be runoff and seepage from the PKC from time to time. Diavik hasn't tried to make predictions about the quality of this water.


EMAB Photo

Building PK beaches around the edge of the PKC Facility

- When the rock cover is placed on the PK the fine material may push up through it and be exposed.
- Potential for vegetation to grow on the PKC and be unsafe for wildlife to eat.
- The PKC dams hold all the tailings in. Diavik has not made any assessments of what would happen to the dams if there were an earthquake or something similar.
- The PKC spillway will need maintenance from time to time to make sure it doesn't get blocked with ice. This maintenance will need to be done as long as the dams are in existence.

EMAB made many recommendations about the PKC that can be found on EMAB's website: emab.ca. Here are four key ones:

RECOMMENDATIONS: Diavik should revisit the water balance for the PKC over the long term and assure the WLWB that the PKC pond will be maintained and fine PK will not be exposed.

Diavik should update the PKC seepage quality model and provide revised predictions. This should not be delayed for another three years.

Diavik should explain what options would be applicable for removal and disposal of the slimes.

Diavik should complete a failure analysis (i.e. risk analysis) on the proposed design for the PKC.

The PKC Facility will be permanently contained by dams. These will likely require permanent monitoring and periodic maintenance to ensure their permanent performance, taking into account the potential effects of climate change.

CONTAMINATED SOILS

Diavik currently stores contaminated soil in a lined part of the Waste Transfer Area (WTA). It estimates there may be 1,000 to 1,500 cubic metres of contaminated soil over the life of the mine. Diavik plans to treat these soils. If the treatment does not remove the contamination and make the soils safe, Diavik is proposing to bury the soil at closure rather than remove it from site. At the WLWB Closure Workshop in November 2017, Diavik said they would bury treated soil deep underground to stop wildlife getting to it.

The WLWB allowed Diavik to bury inert (won't interact with the environment) material in the on-site landfill. However, EMAB has heard over the years and during our Closure Workshop that communities are generally concerned about storing any waste underground.

RECOMMENDATION: EMAB understands that contaminated soils should not be accessible to wildlife; however, Diavik's proposal to bury soils out of reach of wildlife is not the appropriate solution. Diavik should treat all contaminated soil to meet soil quality guidelines for agricultural soils. Any soil that does not meet these criteria should be taken off site to be reclaimed.

CLOSURE CRITERIA AND SITE-SPECIFIC RISK-BASED CRITERIA

Many of the closure criteria are unsatisfactory or insufficient, and do not address the need for long-term assessment of performance for many closure objectives. EMAB provided detailed comments on criteria proposed to address the closure objectives.

We also undertook a complete review of Diavik's updated site-specific risk-based closure criteria and provided many specific recommendations. Diavik's updated reports were not provided until after the WRSA review was complete; the revised reports, and our recommendations, apply to all components of the mine, including the WRSA.

LONG TERM MAINTENANCE AND MONITORING

Diavik plans to be done operations in 2025. After 2025, Diavik has committed to seven years of post-closure monitoring, at the same time as active closure work. They hope to be able to leave the minesite in 'walk-away' condition in 2032. EMAB's review of the closure plan identified issues that will require monitoring and maintenance for many more than the seven years Diavik has committed to. These include: active dams, PKC ditches and spillway, the rock cover on WRSA and PKC, revegetation success, wildlife activity and runoff/seepage quality from the WRSA and PKC. Uncertainties about the effects of climate change on frozen structures such as the WRSA and PKC beyond the current predictions require long-term monitoring and possible adaptive responses.


EMAB Photo

Alternate Board Member, Doris Enzoe, inspecting PKC Facility

RECOMMENDATION: Diavik should complete a detailed assessment of the potential long-term care and maintenance costs. This should consider the potential on-site requirements and the impacts of the loss of ice roads due to the closure of the mines and/or global warming impacts. Diavik should also assess the viability of ice road access under the current global warming projections. The initial budget as proposed by Diavik is a good starting point.

WLWB DECISION

As of time of writing the WLWB had not released a decision on CRP Version 4.0.

Note that on March 1, 2018, Diavik requested permission to provide an updated CRP Ver 4.1 by Oct. 1, 2018 to address comments on CRP Ver 4.0 and the WLWB direction on the WRSA-NCRP in its Feb. 9, 2018 letter.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the CRP Version 4.0.

1. WLWB CLOSURE WORKSHOP

The WLWB hosted a closure workshop for Diavik and stakeholders in November 2017. EMAB staff and closure consultants participated. The purpose of the workshop was for participants to discuss CRP Version 4.0 and get a better understanding of the issues and views of other parties. There were also less urgent issues from the WRSA Final Closure Plan that the WLWB was not planning to decide on right away; these items were discussed at the workshop (for example monitoring plans and re-vegetation). EMAB found this workshop very useful and informative, and the discussions helped inform our recommendations submitted to the WLWB on CRP Version 4.0.

2. GNWT POLICY ON SECURITY AND LONG-TERM CLOSURE MONITORING

During our review of Diavik's recent final closure plan for the WRSA, and the most recent version of the CRP, EMAB identified concerns about long-term liability at the minesite:

- Who would ensure long-term maintenance was done?
- Who would pay for fixing any unexpected problems that came up, or failure of a closure component?
- How can the taxpayer be protected from having to accept liability for unexpected failures or problems after the mine is closed?

EMAB sent a letter to the GNWT recommending they work with the WLWB to develop the proper legislative framework and policy to address long-term liability for closed or abandoned mines in the NT prior to Diavik ceasing operations. EMAB feels this is a high priority for the GNWT and the WLWB as it will create regulatory certainty for long-term responsibility for closed and abandoned mines, including Diavik.

RECOMMENDATION: GNWT should place a high priority on timely development of a policy, and any required implementing legislation, on security and long-term liability and responsibility for maintenance and monitoring at closed or abandoned mine sites. EMAB further recommends that GNWT provide a timeline for the development of the policy, and that development of the policy include consultation with organizations with an interest in mine closure, including EMAB. For clarity and consistency the policy and implementing legislation should be in place prior to submission of Diavik's Final Closure Plan to the WLWB.

WILDLIFE MONITORING PROGRAM

Diavik's Wildlife Monitoring Program (WMP) began in 2002. This program is not part of Diavik's Water Licence; it is required by the Environmental Agreement. The WMP studies the Mine's effects on wildlife and vegetation in the study area and determines if these effects were correctly predicted in the Environmental Assessment. (Note: The study area is 1,200 km^2 and covers the East and West Islands, smaller islands in the northeast part of Lac de Gras, and parts of the mainland along the southern, eastern and northern shores of Lac de Gras.) The main species Diavik studies include Bathurst caribou, grizzly bear and wolverine.

The WMP has changed over the years to account for community concerns, and to include regional wildlife monitoring objectives. While Diavik documents these changes in the annual WMP reports EMAB has requested that it compile all the current objectives and methods into a current WMP Description.

ENR organizes Regional Wildlife Workshops from time to time to discuss regional monitoring. In 2018 they held a Slave Geological Province (SGP) Wildlife Monitoring Workshop. Attendees included representatives from GNWT, mining companies, Aboriginal governments, wildlife consultants, monitoring agencies and other stakeholders. Monitoring programs run by Diavik and other mines are reviewed, as is their participation in, and contributions to, regional monitoring programs for caribou, grizzly and wolverine.

Diavik produces a Wildlife Monitoring Report (WMR) each year as part of the WMP. This report compares results of the program to predictions made at the beginning of the Project, and to any revised objectives. Diavik submitted their 2017 WMR to EMAB on April 3, 2018. EMAB had MSES help with the review.

BARREN GROUND CARIBOU

During the Bathurst caribou herd's annual migration to and from the calving grounds, they move through the Lac de Gras region and may be influenced by Diavik and Ekati. Caribou from the Beverly/ Ahiak herd have also been seen near Diavik recently in the winter and early spring, so may now be affected by the mine.

Photo courtesy of Diavik Diamond Mine

The Bathurst caribou herd has declined from nearly 450,000 in 1986 to 19,000 in 2017. The direct cause has not been determined. Factors that affect herd size include: weather, fire, predation (including hunting), development, and climate change. There have been fewer caribou in the Lac de Gras area recently which makes monitoring caribou at Diavik difficult. It also makes it difficult to compare data between years. Diavik's WMP has several monitoring programs to measure mine-related effects on caribou.

ZONE OF INFLUENCE

Diavik did aerial surveys in the past to identify its Zone of Influence (ZOI), and to assess changes in the ZOI with changes in Mine activity (e.g. open pit vs. underground). This has been done in cooperation with the Ekati mine. Analysis of the aerial survey data shows a 14 kilometre ZOI around the two mines. In 2013, however, Diavik and Ekati asked ENR if they could discontinue the surveys due to low caribou numbers (surveys were also suspended for 2010 and 2011). ENR approved this request and aerial surveys have not been completed since 2012.

In 2014, ENR set up a ZOI Technical Task Group (TTG) to decide when aerial surveys should resume, or if other studies would better address caribou ZOI. The TTG produced a draft guidance document in 2015. EMAB attended the TTG meeting in 2018 which resulted in a final "living" document (ie. it will be updated as circumstances change). This document suggests that ZOI monitoring should resume when a Project sees a major

shift in activities, such as an expansion or a shift from underground to above ground mining.

RECOMMENDATION: EMAB recommends that Diavik resume formal ZOI monitoring in 2019 given that they are beginning open-pit mining of A21 in 2018.

At the 2018 SGP Wildlife Monitoring Workshop there was discussion about using GPS collar data from caribou to measure ZOI. This new method means less disturbance to caribou and less cost to industry than flying aerial surveys but provides much less data.

RECOMMENDATION: If Diavik uses the GPS collar analysis approach to ZOI evaluation (as presented during the 2018 SGP Wildlife Monitoring Workshop), Diavik should consider including other factors in the analysis to reflect changing mine activity over time to answer the question: Does mine activity influence ZOI between years?

The current accepted ZOI is 14 km, which is larger than what was predicted at the beginning of the project. Over the years, EMAB has made repeated requests that Diavik discuss what the unanticipated effects of this larger than predicted ZOI may be, and provide adaptive management options. EMAB was pleased to see some discussion on this at the SGP workshop; however, more discussion regarding potential adaptive management actions were put off to the future.

RECOMMENDATION: Diavik should discuss their plans regarding adaptive management actions relating to the larger than predicted caribou ZOI.

RECOMMENDATION: Diavik should consider the use of TK to help uncover causes for unanticipated impacts on caribou and to develop adaptive management measures.

BEHAVIOUR

Diavik does ground-based behavioural surveys to see if caribou behaviour changes with distance from the Mine. These surveys were done in collaboration with Ekati; Diavik focused on caribou far from the mine and Ekati focused on caribou close to the mine. These data were compared to see if there was a difference in caribou behaviour when they were close to versus far from the mines. However, in 2013 Ekati changed the type of survey they were doing which made the data between the two mines incompatible. There is now a five-year period where caribou behavioural data have not been analyzed. This is in part because caribou are spending less time around the mines, as well as data compatibility issues between Diavik and Ekati.

In June 2018, EMAB organized a meeting with Diavik, Ekati and ENR to discuss the future of caribou behavioural monitoring. Ekati informed the meeting they would be starting behavioural scans again which means the data between the two mines will be compatible again. This will allow combined analysis of behavioural data in the future which will help test the prediction of how caribou behaviour changes with distance from the mines.

RECOMMENDATION: Analyze a DDMI-Ekati combined dataset for the next reporting period, using all behavioural data available to date, to test how caribou behaviour changes as a function of distance from the Mine. This is particularly relevant given the recent change to above-ground mining at the Diavik mine.

In 2017, Diavik did behavioural scans on 32 caribou groups from 0 - 2.7 km away from the minesite. No analysis was done as Diavik concluded that they need 65 caribou groups to detect a statistical difference in behaviour.

DISTRIBUTION AND MIGRATION

Diavik uses data from collared caribou to monitor changes in caribou distribution and migration due to mining activities. Diavik did an analysis on data collected from 1996-2017 to test predictions regarding caribou migration patterns. Diavik addressed one of EMAB's recommendations from 2016-2017 to use collar data up to the end of November 2017 to account for changes in migration timing. Diavik found that caribou are not following the predicted pattern for the southern migration.

RECOMMENDATION: Diavik should discuss potential response actions to the change in the southern migration of caribou compared to the prediction, and the shift to later migration.

RECOMMENDATION: Diavik should consider the use of TK to help uncover causes for unanticipated changes to the caribou southern migration and to develop adaptive mitigation measures. TK may also provide insight into why some caribou may have traveled past Lac de Gras, then turned around and traveled back to the opposite side of Lac de Gras.

GRIZZLY BEAR

Diavik's monitoring objective for grizzly bear is to provide estimates of their abundance and distribution in the study area over time. Diavik, Ekati, Snap Lake, and Gahcho Kue mines undertook a grizzly bear hair snagging program to meet this objective. Sampling first happened in 2012 and 2013 and again in 2017. Results from the 2017 sampling period are expected mid-2018. Decisions regarding the long-term frequency of this program will happen once the 2017 results are reviewed. EMAB supports Diavik's continued involvement in the


EMAB Photo

grizzly bear hair-snagging program and we look forward to seeing the results of the 2017 data analysis.

Over time there are more days where grizzly bears are observed on East Island. The same bear seems to be responsible for most of the observations as its home range includes the Mine.

RECOMMENDATION: Diavik should look into the possibility that there is something attracting grizzly bears to the site and whether some mitigation could be applied to remove any attractants.

WOLVERINE

Diavik's monitoring objective for wolverine is to provide estimates of wolverine abundance and distribution in the study area over time. Wolverine presence around the Mine is monitored using snow track surveys, hair-snagging surveys, and observations.

SNOW TRACK SURVEYS

Diavik did wolverine snow track surveys in 2017. Diavik did not complete a detailed analysis of the track data in the 2017 WMR. The most recent snow track analysis

from 2003-2016 showed that wolverine occurrence in the study area is increasing over time, but Diavik could not determine a definite reason for this.

HAIR SNAGGING SURVEYS

ENR organized wolverine hair-snagging surveys with Diavik and Ekati to determine wolverine abundance and distribution in the study area in comparison to Daring Lake, which was used as the control (not affected by mines) site. The last survey was completed in 2014 and the results of the program, which ran from 2005-2014, were analyzed by ENR in 2018. The study found that average wolverine density at Diavik, Ekati and Daring Lake declined from 2005 to 2014. The weakest decline occurred at Diavik.

RECOMMENDATION: Diavik should use recently available information from the DNA hair snagging program results (2017) to support conclusions in the 2018 WMR regarding the changes to wolverine populations.

RECOMMENDATION: Diavik should collaborate with other mines, GNWT ENR and agencies to determine the long-term frequency and duration of the hair snagging program.

FALCONS

Diavik monitors pit walls and mine infrastructure for nesting raptors. Two active peregrine falcon nests were observed; one was located at the Site Services Building and the other was located at A154.

WASTE MANAGEMENT

In 2017, there appeared to be a high number of misdirected food items for the WTA and Landfill Areas, and observations of fox and wolverine were highest for the WTA. There also seems to be an increasing trend in the number of grizzly bear incidental observations and wolverine probability of occurrence over time.


Photo courtesy of Tracy Covey

Fox in the Waste Transfer Area

RECOMMENDATION: Diavik should explore the reasons for the higher levels of misdirected food waste in the WTA in 2017 as this may be contributing to wildlife presence and possible habituation near the Minesite.

VEGETATION AND LICHEN SURVEYS

Diavik monitors direct vegetation loss or change resulting from the mine. It monitors vegetation and lichen to see if dust deposition from the Mine changes the abundance and number of plant species. Diavik did a comprehensive analysis of this program in the 2016 WMR. Diavik found that dust deposition is higher closer to the mine and higher in years with above-ground mining. Diavik has been completely underground since 2010, but this changed in 2016 when construction of the A21 dike began and will continue until 2023 when mining of the A21 pit is complete.

In 2016, Diavik proposed to change vegetation and lichen monitoring studies from every three years to every five years. Diavik also introduced a trigger and said it would resume vegetation and lichen monitoring every three years if dust deposition rates went over the trigger. EMAB did not agree with the number proposed for the trigger and felt there would be impacts to vegetation if deposition rates went over it.

RECOMMENDATION: Diavik should use a trigger in line with original predictions for dust deposition.

[Note: Diavik agreed to this request and chose a threshold that was in line with reference station values.]

RECOMMENDATION: Diavik should continue with the established three-year vegetation and lichen monitoring schedule.

BATHURST CARIBOU RANGE MANAGEMENT PLAN

The Bathurst caribou herd declined from roughly 450,000 animals in the mid-1980s to a low of about 19,000 today. Due to concern over the low population and development pressures on the herd, the GNWT initiated a Bathurst Caribou Range Plan (BCRP) to manage human and natural disturbance across its habitat. The BCRP brings together scientific and TK/IQ for habitat management across the range.

The 2018 Draft Range Plan is meant to guide decision makers, companies, and communities to manage land-based activities that promote herd recovery and maintain a healthy habitat. It does not have any legal authority.

The Bathurst caribou range includes the Diavik Diamond Mine, and mine activities contribute to cumulative effects on the herd and its habitat. EMAB reviewed the Draft BCRP as it relates to our mandate and submitted comments to the GNWT.

BATHURST PLANNING AREA

The Bathurst Planning Area Boundary does not include all areas used by Bathurst caribou in the last several decades, as confirmed by traditional and scientific knowledge. Although the Draft BCRP will be reviewed on a five-year basis, once set, the boundary may be difficult to change.

LAND AND WATER CROSSINGS

During the GNWT consultation process, TK holders identified land bridges and water crossings that are important for maintaining connectivity in the range and successful migration. The GNWT will make sure these areas are protected by restricting activities in these areas during certain times.

CENTRE OF HABITATION

The Plan identifies an area that the caribou use most frequently, especially when the herd numbers are low, as they have been for the last several years. The Diavik mine is near the middle of this Centre of Habitation.

GUARDIANSHIP PROGRAMS

EMAB supports the Draft BCRP's call for Guardianship Programs to observe and understand the land, people, and natural cycles of caribou. EMAB feels it is important for the GNWT and industry to support the development of new Guardianship Programs and maintain existing ones. These programs should be designed to feed information back to decision-makers and guide management activities.

EMAB also plans to make sure the GNWT follows through on commitments they made in relation to the Draft BCRP. These include a commitment to:

- Support Guardianship Programs;
- Support conservation of the calving grounds, water crossings and land bridges;
- Limit activity in the Centre of Habitation;
- Use Wildlife Management Plans to monitor and control effects of development;
- Assess cumulative effects of disturbance on caribou; and
- Work with regulatory boards.

ENVIRONMENTAL AIR QUALITY MONITORING PROGRAM

Diavik has been doing the Environmental Air Quality Monitoring Program (EAQMP) since 2012. This program is not part of Diavik's Water Licence; it is required by the Environmental Agreement.

EAQMP ANNUAL REPORT

Diavik submitted their 2016 EAQMP Annual Report to EMAB in July 2017. EMAB had Arcadis help with the review and submitted 13 recommendations to Diavik. Many of EMAB's comments from the 2014-2015 Consolidated EAQMP Report were not addressed in the 2016 Annual Report. Below is a summary of highlights from our review.


EMAB Photo

Inside one of Diavik's TSP monitoring stations

CONTINUOUS TOTAL SUSPENDED PARTICULATE MONITORING PROGRAM

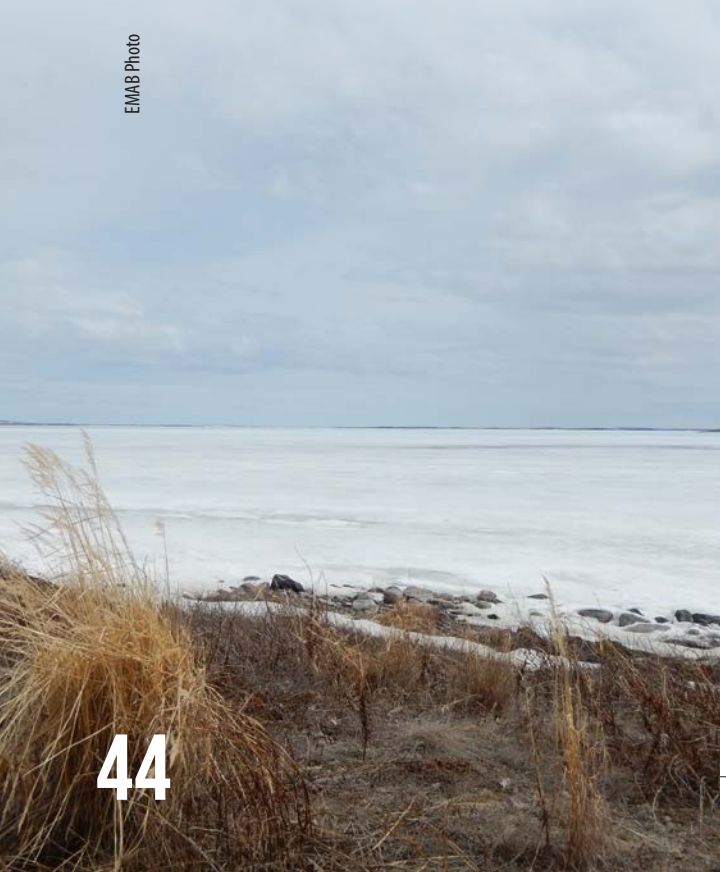
Diavik continuously monitors the amount of small airborne particles using Total Suspended Particulate (TSP) monitoring stations within the minesite. These stations measure the amount of TSP in the air by drawing air in and measuring the weight. The TSP collected is largely made up of dust and air emissions, such as exhaust, that come from mine operations. EMAB feels TSP monitoring is important because it gives information on air quality.

Diavik's monitoring showed one exceedance of the GNWT air quality guidelines for TSP in 2016. However, there are a number of concerns about the data collection. The main concern EMAB has with Diavik's TSP monitoring program has been the inability of the program to track changes in TSP over time. Diavik has two TSP monitors; one is located at the Communications Building (CB) near the accommodations area and the other is on the A154 dike. The monitor at the A154 dike was not working for most of 2016 and any data collected are not considered valid. There is no way of knowing whether there were exceedances there. The CB TSP monitor worked 87% of

WHAT IS THE DIFFERENCE BETWEEN TSP AND DUSTFALL?

TSP is made of very small airborne particles such as dust, smoke, ash, and pollen; in technical terms, smaller than 100 microns. Higher levels of TSP in the air is a concern for human, wildlife and plant health due to problems it can cause with breathing. Dustfall or dust deposition refers to all particles that fall out of the air and settle, no matter the size. Generally the large particles fall out of the air closer to their source than the smaller ones.

EMAB Photo



EMAB Photo

Superintendent of Environment Sean Sinclair explaining Dustfall Monitoring at Diavik

the time, but had calibration issues, meaning that the data it collected may not have been accurate. Taken together, EMAB does not feel this program is providing much useful information. To address these issues, EMAB recommended that Diavik undertake a re-assessment of the EAQMP in August 2016. Diavik informed EMAB in July 2017 that it had begun the review and hoped to complete it by late fall 2017. Diavik updated EMAB in February 2018 and informed us that the assessment was not complete and that they planned to drop the TSP monitoring as part of the assessment. EMAB had not received the assessment report at the time of writing this annual report.

RECOMMENDATION: EMAB recommends that the formal assessment of the TSP monitoring should consider the air quality monitoring requirements that came out of the Jay Project Environmental Assessment in their re-evaluation of the EAQMP.

RECOMMENDATION: Diavik should re-evaluate the TSP monitor locations using historical meteorology and dustfall results, as the TSP monitor results do not appear to be correlated with the 2016, 2015 and 2014 meteorology or dustfall monitoring results presented.

DUSTFALL MONITORING

Diavik also monitors dustfall at the minesite. Dustfall is the amount of TSP that falls onto vegetation, snow and water. The larger, heavier particles settle quickly while the lighter ones, like exhaust fumes, can travel long distances. Diavik monitors dustfall at the minesite using dust gauges and snow cores. Diavik measures the amount of dustfall at different distances from the mine and tests what chemicals are in the dust. From an air quality perspective, the sampling frequency Diavik uses to monitor dustfall under the AEMP does not follow air quality monitoring guidelines nor provide enough information to analyze air quality.

RECOMMENDATION: Diavik should review the dustfall sampling frequency. Dustfall sampling should be completed monthly following standard methods, especially in the summer months to allow evaluation of dust suppression.

Go to EMAB's website – emab.ca – to see the full list of recommendations on the 2016 EAQMP Annual Report.

GNWT AIR REGULATIONS UPDATE

As discussed in our 2016-17 Annual Report, GNWT is moving forward with implementation of Air Quality Regulations in the NWT under the *Environmental Protection Act*. EMAB is generally in support of air quality regulation in the NWT but had some concern with the way GNWT was proposing to move forward, particularly with respect to Air Quality Monitoring Reporting by Diavik and other industrial operations.

As noted last year, GNWT has changed its approach with respect to industrial operations and is now working with the Land and Water Boards and Canada to include air quality in the existing co-management systems for land and water regulation. EMAB was pleased with this change. We note that this may be a complex legislative process so may take quite a bit of time.

Meanwhile, GNWT will be moving forward with setting Air Quality standards for the NWT through the *Environmental Protection Act* as part of the ENR Legislative Update process, and these amendments and regulations are expected to be considered by the NWT Legislative Assembly by fall 2018.

ENVIRONMENTAL AGREEMENT ANNUAL REPORT

As part of the EA Diavik must submit an Annual Report to the Parties, the Government of Nunavut and EMAB every year. The Environmental Agreement Annual Report (EAAR) must meet certain conditions in the Environmental Agreement and then be approved by the Minister. The main purpose of the EAAR is to summarize the mine's activities and results of its environmental monitoring programs from the past year.

Diavik submitted their draft EAAR to EMAB and the GNWT on May 21, 2018. EMAB reviewed the report in terms of how adequately it addressed conditions from the Environmental Agreement, and submitted a letter with 11 recommendations to Diavik. GNWT also submitted recommendations. Diavik then submitted the final EAAR to the Minister of ENR on June 30, 2018. After Diavik submits the report to the Minister, EMAB reviews it once more to see how our comments are addressed. EMAB found one comment that was not

addressed and recommended again that the EAAR include a summary of community concerns, and how Diavik responded to those concerns.

The GNWT reviewed Diavik's Final 2017 EAAR and gave it a Satisfactory Determination provided they address comments and recommendations in a revised version.

REPORT CARD ON DIAVIK AND THE REGULATORS

EMAB's mandate includes oversight of the regulatory process. This section summarizes how Diavik and other Parties have responded to EMAB recommendations. It also summarizes the level of engagement of the various regulators responsible for the Diavik file.

WATER LICENCE

Diavik's responsiveness to EMAB recommendations last year has been good with respect to issues related to its water licence, including closure planning. Diavik has responded promptly and thoroughly to EMAB's recommendations as made through the WLWB review process.

Regulator responses to Diavik's requests and reports have been variable (see table below). In particular EMAB continues to be disappointed by DFO's lack of substantive comment on reports that bear on fish health. A statement from DFO providing its response to EMAB's comments is included below.

ECCC commented on a majority of the reports listed; as noted in previous EMAB annual reports, ECCC has stated it reviews reports based on priority and available resources.

In 2017 the Inspector visited Diavik mine site nine times and made four presentations to EMAB throughout the year on the results of the inspections. The Inspector commented on one report during the last year.

ENR Waters commented on all the reports we looked at and we commend their continued thorough and substantive reviews of the Diavik Water Licence plans and reports.

Similarly the WLWB consistently provides detailed reviews of all documents submitted by Diavik for review.

Reviewer	ECCC	DFO	ENR	EMAB
Reference Conditions Report Supplement	No comment	No comment	Commented	Commented
Response to WLWB Directives on WRSA Ver 1.1	No comment	No comment	Commented	Commented
ICRP Version 4.0	Commented	No comment	Commented	Commented
2014-2016 Aquatic Effects Re-evaluation Report	Commented	No comment	Commented	Commented
AEMP Design Plan Version 5.0	Commented	No comment	Commented	Commented
WRMP Version 7.1 - A21 Addendum	Commented	No comment	Commented	No comment
Water Mgmt. Plan Ver 14.1 including Input Re: Definition of "Waste"	Commented	No comment	Commented	Commented
Request to Allow Ponded Water Next to PKC Dam	No comment	No comment	Commented	Commented

WILDLIFE MONITORING

Diavik's responses to EMAB's recommendations on wildlife monitoring have been variable. Diavik responded to EMAB's recommendations related to the WMP within the 60-day period. EMAB will work with Diavik to develop a more structured process for responding to WMP recommendations.

EMAB is pleased to report that ENR made comments on Diavik's 2016 WMP report. In addition, it organized a meeting of the ZOI TTG to finalize guidance on ZOI monitoring, paving the way to collecting more information on this critical area. ENR also finalized analysis of wolverine DNA sampling and organized the SGP Regional Wildlife Workshop where discussions took place on cooperation between GNWT and mining companies on monitoring caribou behaviour, grizzly bear DNA and wolverine DNA. These are all positive steps and we commend ENR for its progress on wildlife monitoring at Diavik and other mines. EMAB encourages ENR to continue providing recommendations on Diavik's WMP. EMAB also looks forward to ENR's input on closure criteria for wildlife in Diavik's ICRP as they relate to how the post-closure landscape will accommodate wildlife in the area, and monitoring effects to wildlife, post-closure.

EMAB Photo

Dustfall Gauge

AIR QUALITY MONITORING

Diavik submitted the 2016 EAQMP report and EMAB's review is discussed earlier in this report. Diavik also initiated an assessment of the EAQMP, as recommended by EMAB. We are pleased to see this assessment moving forward and look forward to reviewing the results and recommendations.

ENR did not make comments on the 2016 EAQMP report. EMAB looks forward to ENR's comments and recommendations on Diavik's future air quality monitoring reports.

INSPECTOR'S AUTHORITY TO GIVE DIRECTION

EMAB is pleased with GNWT ENR's inclusion of section 67(1) of the *Waters Act* in its initiative to update its legislation. We believe the proposed change will resolve our concern about possible limitations on the Inspectors authority to give direction to Diavik in the current wording of the Act.

DFO AND ECCC REVIEWS OF WATER LICENCE REPORTS AND MANAGEMENT PLANS

EMAB has noted lack of review of some Diavik reports by ECCC and especially DFO. The Board has met with DFO and ECCC to discuss each of their participation in review of documents for the Diavik water licence file and corresponded with Canada on our concerns. The federal government has designated ECCC as being responsible for sections of the *Fisheries Act* prohibiting putting deleterious substances into waters used by fish. DFO continues to be responsible for sections of the *Fisheries Act* prohibiting serious harm to fish, which includes fish habitat. DFO policy is that since its mandate does not include deleterious substances, it doesn't comment on any report or plan that relates to these, whether or not the activities can result in serious harm to fish or fish habitat. DFO sometimes submits a letter to the WLWB indicating it has reviewed a report and has no comments pertaining to its mandate. ECCC has stated they review reports based on priority and available resources.

EMAB notes that DFO has initiated a process to amend the *Fisheries Act* and it is our hope that this renewed interest will also result in greater DFO engagement in reviewing reports from Diavik under their Water Licence.

DFO PROVIDED THE FOLLOWING RESPONSE TO EMAB'S COMMENTS (edited to reduce size):

The mandate of the Fisheries Protection Program (DFO-FPP) is to maintain the sustainability and ongoing productivity of commercial, recreational and Aboriginal fisheries. This mandate is achieved through the administration of Section 35 of the *Fisheries Act*. Subsection 35(1) prohibits *serious harm to fish* (death of fish, permanent alteration to, or destruction of fish habitat). DFO-FPP also addresses fish passage, as described by Section 20 of the *Fisheries Act*.

Following a Designation Order on February 28, 2014, ECCC became the responsible Minister for the administration and enforcement of subsections 36(3) through (6) of the *Fisheries Act*, which prohibits the deposition of deleterious substances in waters frequented by fish. That means DFO-FPP no longer provides regulatory guidance on: the establishment of water quality guidelines for potentially deleterious substances, including suspended sediments in water; the specific techniques or methodologies by which water quality is monitored; toxicological thresholds of exposure for the protection of either fish or aquatic invertebrates; or impacts to fish as a result of exposure to deleterious substances, such as changes in fish health. Consequently, many aspects of Water Licences and associated plans, including AEMPs, waste containment facilities or discharge criteria for water quality or contaminants including total suspended solids, are not within DFO-FPP's mandate and therefore comments are not provided. DFO-FPP recommends that ECCC be consulted regarding these items.

COMMUNICATIONS

EMAB Photo

EMAB Staff and Director, Charlie Catholique, in Łutselk'e

ANNUAL GENERAL MEETING (AGM)

Each September, we hold our AGM in our Yellowknife office boardroom. Parties to the Environmental Agreement are invited to attend and provide input on EMAB's activities and direction. Napoleon Mackenzie was re-elected as Chair, Charlie Catholique was re-elected Vice Chair and Julian Kanigan was re-elected as Secretary-Treasurer.

EMAB DIRECTORS

EMAB Directors are one of the main ways EMAB communicates with Affected Communities. Our Directors are responsible for updating communities on what is going on at Diavik and bringing any concerns and questions about the environment at Diavik back to EMAB. Due to funding reductions from Diavik, and lack of uptake, EMAB has cut back the budget that covers Director consultation in communities.

COMMUNITY MEETINGS

As discussed in the section on Involving and Supporting Communities, EMAB holds public updates in the communities of the Aboriginal Parties. The goal is to keep people informed and allow them to ask questions and voice opinions and concerns.

EMAB's Executive Director participated in a Panel on Closure of Project Sites at a workshop on the Mackenzie Valley Resource Management Act put on by the


EMAB Photo

Community members in Łutselk'e hear EMAB update on Diavik Mine

Mackenzie Valley co-management boards, GNWT and INAC. The workshop took place in February 2018 and was an opportunity for industry, Aboriginal governments, regulators and other stakeholders to discuss a number of aspects of the MVRMA.

PUBLIC LIBRARY

EMAB is responsible for making sure that people have access to materials that relate to the Environmental Agreement. Anyone interested can visit our office and access plans and reports, expert reviews, correspondence, Board meeting minutes, maps and images. Our office hours are 9 a.m. – 5 p.m. Monday to Friday.

Much of this information is also available on our website.

WEBSITE

EMAB's website is another way for EMAB to reach out to the people. We use our website to post Diavik's ICRP, AEMP, WMP and EAQMP reports. We also post EMAB Annual Reports, Diavik's EAARs, meeting minutes and correspondence. You can visit us at our website, www.emab.ca and our Facebook site, www.facebook.com/EMAB2015.

ANNUAL REPORT

EMAB circulates its annual report to all Parties to the Environmental Agreement, as well as key leaders in the Affected Communities and throughout the NWT.

BROCHURE AND POSTER

EMAB has a brochure and poster summarizing our work. These are available on request.

EMAB GOVERNANCE AND OPERATIONS


EMAB Photo

EMAB staff and Directors standing on the PK beaches

The Board met six times in 2017-18; five face-to-face meetings and one conference call. The Annual General Meeting took place on September 12. The Board passed 26 email motions over the year.

BUDGET AND FINANCE

EMAB's budget for 2017-18 was $531,840; this included requesting agreement from Diavik to roll over $41,000 from 2016-17 (EMAB returned $5,673 of unspent funds from 2016-17 to Diavik), coupled with Diavik's payment of $487,140. EMAB spent $466,039 during the year and will roll over $68,744 for activities in 2018-19.

EMAB negotiates its budget with Diavik every two years, for the following two years. The Environmental Agreement says that EMAB will try to keep any increases to the rate of inflation. EMAB recommends a budget to Diavik that we both have to agree on. If there is no agreement Diavik submits its own proposed budget to the Minister and he can choose EMAB's or Diavik's. EMAB and Diavik agreed on the last two-year budget, but for the previous three budget periods EMAB and Diavik did not agree, and each time the Minister chose Diavik's budget. This has resulted in EMAB's budget being cut back from $726,000 in 2011 to $487,140 in 2017. To conduct any activities above and beyond those budgeted EMAB must submit a separate request to Diavik for approval.

DIAVIK SITE VISIT

Board members and staff took a site tour of Diavik on September 11, during the September Board meeting. Board members and staff found the tour quite useful and noted a number of changes since the previous visit, including the re-sloping work being done on the NCRP and the results of the PK study on the ground in the PKC.

The tour covered the above-ground portion of the site including: WRSA, PKC Facility, A154 and A418 pits, NI, and A21 dike construction. The Board's tour also included the WTA, Water Treatment Plant and the wind farm.

STRATEGIC PLAN

EMAB reviewed the updated strategic plan in December as part of our workplanning for 2018-19. No changes were made.

ENVIRONMENTAL AGREEMENT

EMAB notified the Parties that it would not initiate an assessment of the Environmental Agreement as provided for under section 17(2) but would be happy to be involved if the Parties chose to do so.

OPERATIONS

EMAB staffing has been consistent since 2016.

EMAB's Operations Manual was reviewed and updated.

WHAT ARE EMAB'S PLANS?

Our priorities for 2018-19 will focus on closure plan revisions along with Diavik's proposal to amend its water licence to allow PK storage in the pits and underground. Planned activities include:

OVERSIGHT AND MONITORING

Continue monitoring development of the A21 pit as water is pumped out and sediment and rock are removed to expose the kimberlite pipe. This work will include the resumption of above-ground blasting for the first time in several years.

Continue participation in ENR initiative to revise environmental legislation including the *Waters Act* and *Environmental Protection Act*.

Continue to monitor and participate in development of GNWT policy on security and long-term liability and monitoring for closed minesites.

Participate in review of Diavik water licence amendment application to place PK into the A418 pit.

Review Reports:

- 2018 AEMP Annual Report
- 2018 Annual WMP Report
- 2017 EAQMP Report
- EAQMP Assessment and Re-design
- Proposed ICRP Version 4.1
- 2018 Annual ICRP Progress Report
- GNWT Air Regulations
- 2018 EAAR
- MMER Amendments

ABORIGINAL AND COMMUNITY INVOLVEMENT

- Attend Diavik Traditional Knowledge Panel meetings
- Engage Communities through Board members and community update meetings
- Implement TK Recommendations

COMMUNICATIONS

- Annual Report
- Website
- Public Registry

GOVERNANCE

- Hold regular meetings
- Oversee EMAB operations
- Develop Action Plan for 2018-2023

AUDITED FINANCIAL STATEMENTS

Independent Auditors' Report

To the Board of Directors of Environmental Monitoring Advisory Board

We have audited the accompanying financial statements of Environmental Monitoring Advisory Board (the "Board") which comprises the statement of financial position as at March 31, 2018 and the statements of operations, changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements
Management is responsible for the preparation and fair presentation of these financial statements in accordance with Accounting Standards for Not-for-profit Organizations, and such for internal control as management determines is necessary to enable preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility
Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion

Opinion
In our opinion, these financial statements present fairly, in all material respects, the financial position of the Board as at March 31, 2018 and the results of its operations and cash flows for the year then ended in accordance with Accounting Standards for Not-for-profit Organizations.

Crowe MacKay LLP

Yellowknife, Northwest Territories
August 14, 2018

Chartered Public Accountants

Environmental Monitoring Advisory Board

Statement of Operations

For the year ended March 31,	Budget (Unaudited)	2018	2017
Revenue			
Diavik Diamond Mines Inc.	$ 487,140	$ 487,140	$ 477,590
Interest income	3,700	2,951	2,824
Transferred from deferred revenue	35,000	41,000	155,311
Transferred to deferred revenue	-	(69,254)	(41,000)
Contributions repayable	-	-	(5,673)
	525,840	**461,837**	589,052
Program expenditures			
Administration (Schedule 1)	68,785	65,289	66,101
Management Services (Schedule 2)	188,400	178,775	185,876
Governance (Schedule 3)	106,950	89,598	108,118
Oversight and monitoring (Schedule 4)	137,005	113,112	194,989
Involving and supporting communities (Schedule 5)	19,400	8,686	6,352
Communications (Schedule 6)	5,300	6,377	26,083
Amortization	-	3,692	4,945
	525,840	**465,529**	592,464
Surplus (deficit) before other items	**-**	**(3,692)**	(3,412)
Other items			
Transfer to Tangible Capital Asset Fund	-	3,692	4,945
Purchase of capital assets	-	-	(1,533)
	-	**3,692**	**3,412**
Surplus	**$ -**	**$ -**	$ -

Environmental Monitoring Advisory Board

Statement of Changes in Net Assets

For the year ended March 31,

	Operating Fund	Tangible Capital Asset Fund	2018	2017
Balance, beginning of year	$ -	$ 12,760	**$ 12,760**	$ 16,172
Surplus (deficit)	-	-	-	-
Amortization	-	(3,692)	**(3,692)**	(4,945)
Additions	-	-	-	1,533
Balance, end of year	**$ -**	**$ 9,068**	**$ 9,068**	$ 12,760

Environmental Monitoring Advisory Board

Statement of Financial Position

As at March 31,	2018	2017
Assets		
Current		
Cash	$ 99,994	$ 52,901
Restricted cash (Note 3)	496,880	533,814
Prepaid expenses	1,087	1,724
	597,961	588,439
Tangible capital assets (Note 4)	**9,068**	12,760
	$ 607,029	$ 601,199
Liabilities		
Current		
Accounts payable and accrued liabilities (Note 5)	$ 31,827	$ 54,625
Contributions repayable (Note 6)	-	5,673
Deferred revenues (Note 7)	566,134	528,141
	597,961	588,439
Net Assets		
Tangible capital asset fund	**9,068**	12,760
Operating fund	**-**	-
	9,068	12,760
	$ 607,029	$ 601,199

Approved on behalf of the Board

Director

Director

Environmental Monitoring Advisory Board

Statement of Cash Flows

For the year ended March 31,	2018	2017
Cash provided by (used in)		
Operating activities		
Excess expenditures	$ (3,692)	$ (3,412)
Item not affecting cash		
Amortization	3,692	4,945
	-	1,533
Change in non-cash operating working capital		
Prepaid expenses	638	450
Accounts payable and accrued liabilities	(22,799)	14,446
Contributions repayable	(5,673)	5,673
Deferred revenue	37,993	(104,761)
	10,159	(82,659)
Investing activity		
Purchase of equipment	-	(1,533)
Increase (decrease) in cash	**10,159**	(84,192)
Cash, beginning of year	**586,715**	670,907
Cash, end of year	**$ 596,874**	$ 586,715
Cash consists of :		
Cash	$ 99,994	$ 52,901
Restricted cash	496,880	533,814
Bank indebtedness		5,300
	$ 596,874	**$ 586,715**

1. Organization and Jurisdiction

The Environmental Monitoring and Advisory Board (the "Board") is a not-for-profit organization established as a requirement of the *Diavik Environmental Agreement*. It aims to provide a meaningful role for Aboriginal People in the review and implementation of environmental monitoring plans with respect to the Diavik Diamond Mine site in the Northwest Territories. The Board will be in place until full and final reclamation of the mine is complete.

The Board is exempt from income tax under section 149(1)(l) of the *Income Tax Act*.

2. Significant Accounting Policies

The following is a summary of the significant accounting policies used by management in the preparation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations.

(a) Financial Instruments – Recognition and Measurement

Financial assets originated or acquired or financial liabilities issued or assumed in an arm's length transaction are initially measured at their fair value. In the case of a financial asset or financial liability not subsequently measured at its fair value, the initial fair value is adjusted for financing fees and transaction costs that are directly attributable to its origination, acquisition, issuance or assumption. Such fees and costs in respect of financial assets and liabilities subsequently measured at fair value are expensed.

The Board subsequently measures the following financial assets and financial liabilities at amortized cost:

Financial asset measured at amortized cost includes cash and restricted cash.

Financial liabilities measured at amortized cost include accounts payable and accrued liabilities and contributions repayable.

At the end of each reporting period, management assesses whether there are any indications that financial assets measured at cost or amortized cost may be impaired. If there is an indication of impairment, management determines whether a significant adverse change has occurred in the expected timing or the amount of future cash flows from the asset, in which case the asset's carrying amount is reduced to the highest expected value that is recoverable by either holding the asset, selling the asset or by exercising the right to any collateral. The carrying amount of the asset is reduced directly or through the use of an allowance account and the amount of the reduction is recognized as an impairment loss in operations. Previously recognized impairment losses may be reversed to the extent of any improvement. The amount of the reversal, to a maximum of the related accumulated impairment charges recorded in respect of the particular asset, is recognized in operations.

2. Significant Accounting Policies (continued)

(b) Fund Accounting

The Board uses fund accounting to segregate transactions between its Operating Fund and Tangible Capital Asset Fund. The Operating Fund accounts for the Board's operating and administrative activities. The Tangible Capital Asset Fund reports the assets, liabilities, revenues and expenses related to tangible capital assets.

(c) Tangible Capital Assets

Tangible capital assets are recorded at original cost plus any costs of betterment less accumulated amortization and excludes any assets not in current use. Amortization is calculated when the tangible capital assets are ready in use by the declining balance at rates set out in note 4.

(d) Revenue Recognition

The Board follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and its collection is reasonably assured. Contributions which are not expensed in the current year are set up as deferred funding to be used in the future year when services are provided and goods acquired or refundable contributions that must be repaid to the contributor. Interest income is recognized on the basis of the time funds are in the account and interest is accrued.

(e) Unexpended Funds

On January 16, 2011 an Arbitration Award findings resulted in a change in accounting policy for the recognition and treatment of unexpended funds. Previously the Board classified the unexpended funds as unrestricted net assets. Beginning in 2011, unexpended funds are classified as net unexpended contributions repayable or deferred revenue. The Board may not accumulate unrestricted net assets from unexpended Diavik Diamond Mines Inc.

(f) Allocation of Expenses

The Board allocates expenditures according to its activities. Expenditures are allocated to Administration, Management Services, Board, Science Program, Involving and Supporting communities and Communication.

(g) Cash and cash equivalents

Cash and cash equivalents consist primarily of cash on hand, chequeing and saving bank accounts and restricted cash.

(h) Use of Estimates

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the updated amounts of revenues and expenses during the period. Actual results could differ from those estimates.

3. Restricted cash

Restricted cash represents cash received from Diavik Diamond Mines Inc. that is intended for a specific purpose or represents the amount to repay.

	2018	2017
Cash received in advance for the 2018/2019 fiscal year	$ 496,880	$ -
Cash repayable from 2017/2018 surplus	-	-
Cash received in advance for the 2017/2018 fiscal year	-	528,141
Cash repayable from 2016/2017 surplus	-	5,673
	$ 496,880	**$ 533,814**

4. Tangible Capital Assets

				2018	2017
	Rate	Cost	Accumulated Amortization	Net Book Value	Net Book Value
Furniture and fixtures	30%	$ 24,209	$ 20,601	$ 3,608	$ 4,961
Office equipment	30%	33,017	30,744	2,273	3,248
Computer equipment	30-100%	60,895	57,708	3,187	4,551
		$ 118,121	$ 109,053	**$ 9,068**	$ 12,760

5. Accounts Payable and Accrued Liabilities

	2018	2017
Trade accounts payable	$ 23,303	$ 45,319
Accrued payroll	7,438	7,656
Government remittance	1,086	1,650
	$ 31,827	$ 54,625

6. Contributions Repayable

	2018	2017
Diavik Diamond Mines Inc.	**$ -**	$ 5,673

7. Deferred Revenues

	2018	2017
Diavik Diamond Mines Inc. - funding for next year	$ 496,880	$ 487,140
Diavik Diamond Mines Inc. - 2017-2018 Surplus	69,254	-
Interim closure and reclamation	-	35,000
Traditional Knowledge Panel Review	-	6,000
	$ 566,134	$ 528,140

8. Economic Dependence

The Board is dependent upon funding in the form of contributions from Diavik Diamond Mines Inc. Management is of the opinion that if the funding was reduced or altered, operations would be significantly affected.

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9. Financial Instruments

(a) Credit risk

Credit risk is the risk that a third party to a financial instrument might fail to meet its obligations under the terms of the financial instrument. The Board does have credit risk in cash of $596,874 (2017 - $586,715) with a chartered bank in excess of the insurable limit throughout the year. Furthermore, the Board has a concentration of credit risk as full balance of cash is maintained with one large federally regulated financial institution. This risk has not changed from the prior year.

(b) Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. The Board's financial asset that is exposed to interest rate risk consists primarily of cash and restricted cash. The cash flow from variable rate financial instruments fluctuate as market rates of interest change. The risk has not changed from the prior year.

(c) Liquidity risk

Liquidity risk is the risk that the Agency cannot repay its obligations when they become due to its creditors. The Board does have a liquidity risk in the accounts payable, accrued liabilities and contributions repayable of $- (2017 - $60,298). The Board reduces its exposure to liquidity risk by ensuring a good budget process and by monitoring the expenses. This risk has not changed from the prior year.

Environmental Monitoring Advisory Board

Schedule 1 - Administration

For the year ended March 31,	Budget	2018	2017
Expenditures			
Audit fees	$ 10,500	$ 10,395	$ 9,000
Bank charges and interest	500	660	1,427
Bookkeeping fees	2,700	2,399	2,168
Capital equipment	1,000	-	-
Insurance	7,500	6,721	8,647
Janitorial	2,600	2,730	3,192
Library/Publications	200	-	80
Office supplies	2,500	2,083	1,853
Postage and freight	500	233	481
Printing and photocopy	2,500	2,004	2,455
Professional fees	1,000	-	-
Rent	31,500	31,500	31,500
Repairs and maintenance	285	47	-
Technical support	500	-	-
Telephone and internet	5,000	6,517	5,298
	$ 68,785	**$ 65,289**	$ 66,101

Schedule 2 - Management Services

For the year ended March 31,	Budget	2018	2017
Expenditures			
Employee benefits	$ 16,700	$ 17,338	$ 16,254
Employers costs - CPP, EI, WSCC	8,700	11,332	12,099
Professional development	5,000	-	3,741
Salaries	158,000	150,029	152,899
Travel	-	76	883
	$ 188,400	**$ 178,775**	$ 185,876

Environmental Monitoring Advisory Board

Schedule 3 - Governance

For the year ended March 31,	Budget	2018	2017
Expenditures			
Accommodations	$ 5,400	$ 5,262	$ 6,198
Annual general meeting	4,000	73	349
Board of directors - Training	1,500	-	-
Executive Committee	4,500	4,500	2,250
Food and beverage	-	688	-
Honoraria	25,300	20,813	27,375
Meeting Expenses	1,000	-	1,096
Per diems	5,250	3,707	4,834
Personnel Committee	750	-	-
Preparation	45,000	45,000	45,000
Teleconference Honoraria	3,750	-	3,472
Transportation	10,500	9,555	17,544
	$ 106,950	**$ 89,598**	$ 108,118

Schedule 4 - Oversight and Monitoring: Science Program

For the year ended March 31,	Budget	2018	2017
Expenditures			
Aquatic Effects Monitoring Program	$ 33,000	$ 17,765	$ 41,967
Air Quality Management Program	5,500	5,896	6,677
Interim Closure and Reclamation	64,005	59,490	57,111
Other reviews and reports	10,000	3,825	15,558
Traditional Knowledge Panel Review	6,500	9,331	-
Wildlife Monitoring Plan	18,000	16,805	11,840
Workshops	-	-	61,836
	$ 137,005	**$ 113,112**	$ 194,989

Environmental Monitoring Advisory Board

Schedule 5 - Involving and supporting communities

For the year ended March 31,	Budget	2018	2017
Expenditures			
Board member consultation honorarium	$ 3,000	$ 562	$ 375
Kitikmeot Inuit Association	6,000	-	5,977
Lutsel K'e	4,300	5,271	-
North Slave Metis Alliance	1,000	1,686	-
T'licho Government	2,800	1,167	-
Yellowknives Dene First Nation	2,300	-	-
	$ 19,400	**$ 8,686**	**$ 6,352**

Schedule 6 - Communications

For the year ended March 31,	Budget	2018	2017
Expenditures			
Advertising, public relations and promotions	$ 1,300	$ 504	$ 6,604
Annual report	4,000	5,243	3,981
Posters and brochure development	-	-	1,229
Website maintenance	-	-	126
Website database re-design	-	630	14,143
	$ 5,300	**$ 6,377**	$ 26,083

EMAB RECOMMENDATIONS

EMAB RECOMMENDATIONS TABLE 2017-2018

Note: EMAB made far too many recommendations in 2017-18 to list in this table. All EMAB recommendations can be found on our website – emab.ca – along with Diavik's responses.

Traditional Knowledge
EMAB submitted six recommendations to Diavik related to the Traditional Knowledge Panel and use of Traditional Knowledge in its various programs and reports. A summary of the recommendations can be found on pages 15-16 and the full listing is on our website, emab.ca.

Inspector's Authority
EMAB submitted the following recommendation to the GNWT regarding the Inspector's authority to provide direction to Diavik: section 67(1) of the *Waters Act* should be reviewed and revised at the earliest opportunity to allow the Inspector to issue a direction where there are reasonable grounds to believe a condition of a water licence has been broken, without having to meet any additional criteria. More information about this recommendation can be found on pages 19-20 and on our website, emab.ca.

Ponded Water against the PKC Facility Dams
EMAB submitted three recommendations to Diavik via the WLWB on a request from Diavik to allow ponded water against the PKC Facility dams due to snow melt, rain or excess process water. A summary of the recommendations can be found on page 20, and the full listing is on our website, emab.ca.

Water Management Plan Version 14.1
EMAB submitted three recommendations to Diavik via the WLWB on the Water Management Plan Version 14.1. Highlights can be found on pages 20-21 and the full listing on our website, emab.ca.

Reference Conditions Report Supplement
EMAB submitted 7 recommendations to Diavik via the WLWB on the Reference Conditions Report Supplement. Highlights can be found on pages 21-22. As required by the WLWB, Diavik responded to each of the recommendations. The complete list of recommendations, as well as detailed technical reviews, can be found on our website, emab.ca.

2014-2016 Aquatic Effects Re-evaluation Report
EMAB submitted 103 recommendations to Diavik via the WLWB on the 2014-2016 Aquatic Effects Re-evaluation Report. Highlights can be found on pages 22-25. As required by the WLWB, Diavik responded to each of the recommendations. The complete list of recommendations, as well as detailed technical reviews, can be found on our website, emab.ca.

AEMP Design Plan Version 5.0
EMAB submitted 19 recommendations to Diavik via the WLWB on the AEMP Design Plan Version 5.0. Highlights can be found on pages 25-27. As required by the WLWB, Diavik responded to each of the recommendations. The complete list of recommendations, as well as detailed technical reviews, can be found on our website, emab.ca.

WRSA Closure and Reclamation Plan - Diavik's response to the WLWB's Directive
EMAB submitted three recommendations to Diavik via the WLWB on Diavik's responses to the WLWB's directive. Highlights can be found on pages 30-31 and the full listing on our website, emab.ca.

Closure and Reclamation Plan Version 4.0

EMAB submitted 200 recommendations to Diavik via the WLWB on the Closure Reclamation Plan Version 4.0. Highlights can be found on pages 31-36. As required by the WLWB, Diavik responded to each of the recommendations. The complete list of recommendations, as well as detailed technical reviews, can be found on our website, emab.ca.

GNWT Policy on Security and Long-Term Closure Monitoring

EMAB submitted the following recommendation to the GNWT: GNWT should place a high priority on timely development of a policy, and any required implementing legislation, on security and long-term liability and responsibility for maintenance and monitoring at closed or abandoned mine sites. EMAB further recommends that GNWT provide a timeline for the development of the policy, and that development of the policy include consultation with organizations with an interest in mine closure, including EMAB. For clarity and consistency the policy and implementing legislation should be in place prior to submission of Diavik's Final Closure Plan to the WLWB. More information can be found on page 37 and our website, emab.ca.

2017 EAAR

EMAB submitted 11 recommendations to Diavik on their 2017 EAAR. Highlights can be found on pages 45-46 and the full listing on our website, emab.ca.

2017 WMP Report

EMAB submitted 12 recommendations to Diavik on the 2017 WMP Report (complete list below). EMAB did not receive Diavik's responses by the time this report went to print, as such they will be included in next year's annual report. The detailed technical review can be found on our website, emab.ca. Highlights can be found on pages 37-42.

- Please discuss how the information gained from various caribou datasets could be used in terms of mitigation and adaptive management for the Diavik Mine in particular and for other future projects in the region in general. Although some discussion occurred during the 2018 SGP Wildlife Monitoring Workshop, no decisions were made, and more discussion regarding potential adaptive management actions was deferred to an unspecified future date. This discussion should be prioritized.
- Please give careful consideration to the interpretation of the 14 km ZOI presented in Boulanger et al. (2012). The 14 km distance, based on presence-absence data, may actually demonstrate an aggregation of caribou that would not exist without the mines. A 2017 analysis of caribou density implied that there may not be ZOI but more rigorous analyses were requested for the density approach to ZOI evaluation. In the 2018 SGP Wildlife Monitoring Workshop, an approach to ZOI analysis was presented which evaluates ZOI on an annual basis using GPS collar data. Diavik should consider using the GPS collar data approach to analyze ZOI for the 2018 season. Given that aboveground mining in the A21 pit will commence in 2018, Diavik should resume ZOI monitoring in 2019. Diavik should confirm the status and form of caribou ZOI monitoring prior to the 2019 WMP monitoring season.
- Move forward on collaboration and coordination of efforts, including both data collection and analysis, of the caribou behaviour monitoring program. Based on a June 14th, 2018 conference call, we understand that Ekati will be shifting their data collection to include more group scans in future years. This will allow for a combined analysis of behavioural data from both the Ekati and Diavik mine in the future. If possible, please confirm that this coordination of survey types will happen for the next reporting period.
- Upon our review of DDMI's Response (14 June 2018) to EMAB's Letter regarding the Establishment of Wildlife Monitoring Program Terms of Reference, we recommend that DDMI provide summaries for activities other than just feeding time, particularly activities with a high energetic cost.
- Given that the feeding data presented by DDMI (DDMI's Response on 14 June 2018) do not appear to show the same pattern, we recommend DDMI comment on why there might be a difference in the pattern between 2011 and 2018 and discuss whether they implemented a change to mine protocol that may have minimized the impacts on caribou behaviour.
- Given that the two mines have agreed to cooperate, please provide the current sample sizes for behavioural data, perhaps in Table format, including information on: mine operator (Ekati vs Diavik), type of scan, season, distance from mine, and year.
- Please analyze a DDMI-Ekati combined dataset for the next reporting period, using all behavioural data available to date, to test how caribou behaviour changes as a function of distance from the Mine. This is particularly relevant given the change to above-ground mining at the Diavik mine.
- Provide a description of how non-parametric statistics have been or could be used in the analysis of behavioural data.
- Clearly state the assumption of no yearly variation in caribou behaviour if the data are insufficient to detect annual variation.

In the event that collaboration on/sharing of behaviour data between operators occurs, please be explicit about all assumptions made in future analyses.
DDMI should complete an analysis of the indirect (in addition to the currently presented direct) footprint effect on caribou habitat for understanding the true effects on caribou and for determining future mitigation measures. This is particularly relevant given the effects of dust deposition on local plant species, which affects both forage species composition and elevated metal concentrations in lichen near the Mine. DDMI indicated that the ZOI analysis for caribou captures the effect of indirect habitat loss. It appears that indirect habitat loss is implicitly incorporated into the ZOI modelling, but not explicitly measured on the ground. For that reason, no mitigation measure of the indirect habitat loss is discussed, to the best of our knowledge.
Please provide information on the statistical independence of the data used in the caribou distribution analysis and a discussion of the potential response actions to the departure from the prediction regarding the southern migration of caribou and changes to the timing of the migration. Please consider the use of TK to help uncover causes for unanticipated changes to the caribou southern migration and to develop adaptive mitigation measures.
Please address the possibility that grizzly bears may be becoming habituated and their presence on the site may be on the rise. We await the results of 2017 grizzly bear hair snagging data collection that can help with determining whether increases in grizzly bear observations near the Diavik mine are having population-level consequences for grizzly bears.
Please use recently available information from the DNA hair snagging program (2018) to support conclusions in the 2019 WMP report regarding the alteration of wolverine population parameters.
Please evaluate whether the increase in fox and wolverine observations in the WTA in 2017 persists in future years.
Please explore the reasons for the higher levels of misdirected food waste in the WTA and Landfill areas as this may be contributing to wildlife presence and possible habituation near the Mine site.
Please discuss the results showing an effect of the Mine on vegetation structure in reclamation and revegetation studies and discuss the implications for wildlife recolonization in terms of the likelihood for re-establishment of natural or pre-disturbance vegetation and wildlife communities. The Mine closure plan and proposed reclamation activities should ensure that forage species palatable to caribou be part of the mix of species (at a natural ratio) in the reclaimed landscape.
We recommend that the established three-year monitoring schedule for a comprehensive analysis of vegetation and lichen data be continued in order to capture changes in vegetation and lichen parameters. With a return to above-ground mining activities scheduled for 2018, dust deposition and metal concentrations in lichen are likely to increase again.

2016 EAQMP Report

EMAB submitted 13 recommendations to Diavik on the 2016 EAQMP Report. Highlights can be found on pages 43-45. EMAB's recommendations and Diavik's responses are listed below. EMAB's technical review of this document can be found on our website, emab.ca.

EMAB Recommendation	Diavik Response
It is recommended that DDMI include (and adhere to) a detailed summary of QA/QC practices in the EAQMP Report for each aspect of the monitoring program, including all laboratory procedures.	More detailed QA/QC practices will be included in the EAQMP. Please also see response to Comment 3.
Complete and final calibration records be provided for all equipment (i.e., laboratory scale, continuous monitoring equipment, etc.).	DDMI maintains calibration record for all instrumentation which will be made available for dissemination.
Final SOPs be provided for all field sampling and laboratory methods.	The DDMI laboratory is accredited by the Canadian Association for Laboratory Accreditation (CALA) and abides by all rules governing this organization and submits all SOPs for scrutiny to CALA.
The dust gauge collection SOP be updated to include QA/QC requirements similar to the QA/QC procedure used for snow core sampling (i.e., field duplicates and blanks).	The methodology for dustfall measurements as laid out by ASTM D1739-98 and is a widely accepted standard does not specify a requirement for duplicates nor blanks.

Quality checking procedures need to be added to the TSS SOP (if not already) to ensure that they meet the same standard that an accredited laboratory would meet.	The DDMI laboratory is accredited by the Canadian Association for Laboratory Accreditation and abides by all rules governing this organization and submits all SOPs for scrutiny to CALA.
Consider returning to monthly dustfall sampling or, at a minimum, perform monthly sampling during the snow-free periods, to evaluate effectiveness of dust suppression efforts.	There is currently an 18-year dataset of quarterly dustfall sampling. During this time there were a number of tests to determine if monthly sampling improved the understanding of dustfall trends. The results indicated that monthly sampling did not improve the interpretation of temporal trends in monitoring. In addition, the logistics of retrieving dustfall canisters makes monthly collection very onerous. Finally, a change in frequency of dustfall sampling requires changes to the AEMP which is governed by the Land and Water Board.
The current and historical dustfall monitoring results be used to evaluate the effectiveness of dust suppression efforts.	An analysis of dustfall stations adjacent to roads where dust suppression activities are ongoing can be conducted.
Available meteorological data and records of on-site activity be used to document the cause/rationale for events of high TSP concentration measured by the monitors.	As there was only one exceedance of TSP during 2016 the need to do extensive analysis of meteorology and onsite activities is not warranted. The winds at the time of the exceedance were analyzed and shown to originate upwind of the mine which would suggest the source of the elevated TSP concentrations were not from the mine.
A detailed comparison of monitored and modelled TSP/dustfall be included within the AQMR.	Modelling that was conducted cannot be directly compared to the results of monitoring other than to compare the expected number of exceedances per year and the annual concentrations. This analysis was carried out in the EAQMP report for 2016. It is expected that the model year and any given year of monitoring will not exactly match up as there is year to year natural variability in meteorology and differences between modelled emissions and actual emissions. The purpose of the AQMR is not to validate the modelling previously done but simply to report on the state of air quality. Year to year variations in emissions were not meant to be captured by a singular model year. The results from any given year may not exactly match the results of the models.
Details of the NPRI and GHG calculations be included, or a reference to an external document containing such details, to allow for validation of methods and quantities reported.	Environment Canada conducts their own verifications of NPRI procedures that DDMI must conform to. These details can be provided.
The TSP monitor locations be re-evaluated using historical meteorology and dustfall results, as the TSP monitor results do not appear to be correlated with the 2016, 2015 and 2014 meteorology or dustfall monitoring results presented.	The TSP Sampler Assessment Memorandum (TSPSAM) addresses the location of current monitoring. In addition, the year to year variations in wind, as seen through small changes in annual wind roses, do not justify moving monitoring stations. The winds near the mine site tend to be omnidirectional with no dominant wind directions. Therefore, there is not one dominant upwind or downwind wind direction. The current locations for monitoring were based on modelling from 2012 that used the year of maximum emissions to help site TSP monitoring stations and are well placed to assess the effects of emissions from the mine site including the A21 pit area. It is not feasible to update the modelling based on yearly changes in mine footprint or yearly variations in winds. In fact, the monitoring suggests that TSP monitoring is no longer required based on arguments made in the TSPSAM.

From 2007 to 2008, two temporary dust gauges were installed adjacent to two pre-existing dust gauges. The intent of the temporary gauges was to compare results from the same location when sample collection frequency was altered. The two temporary dust collectors were established in July 2007 and analyzed monthly to determine daily dustfall deposition. The results showed variation in the temporary dust gauges compared to the permanent gauges. Based on this information, the dustfall sampling frequency should be reviewed and completed monthly as per ASTM International methods, particularly for the summer months.	See response to Comment 6.
Diavik should update the 2012 dispersion modelling assessment to reflect current operations. This assessment should then be used to evaluate the appropriateness of TSP monitor locations and assess the observed dustfall patterns.	See response to Comment 11.

2016 WMP Report

Last year EMAB submitted 12 recommendations to Diavik on the 2016 WMP Report. Highlights can be found on pages 37-45 of the 2016-17 Annual Report. Diavik's responses to those recommendations are included below. These responses have not been edited. More information can be found in our technical review documents on our website, emab.ca

Diavik should continue to monitor and test predictions on the ZOI while they wait for ZOI guidance from ENR. This could include gathering more aerial survey data, analysis of all caribou collar data available to the present time and additional analysis of existing data, and looking at other factors that might affect caribou e.g., habitat or changing mine activity. Diavik should propose adaptive management measures to mitigate the 14 km ZOI since this area is larger than predicted.	A final version of the ZOI guidance document has not been distributed to DDMI. The intent of the ZOI guidance document is to standardize the sampling of caribou data across developments to support cumulative effects analysis by the GNWT. This was the agreed approach by regulators, mine agencies and communities at the mine monitoring workshops beginning in 2010 (Handley 2010). Diavik has already completed analyses of these data related to habitat, temporal trends and mine activity (Golder 2011b). The caribou density analysis (Golder 2017a) is an additional analysis of the aerial survey data. Boulanger et al. (2012) also examined a cumulative ZOI (i.e., Ekati and Diavik mines) for caribou using collar data. Collar analyses indicated a ZOI of 3 km (95%CI: 1.5 km-12 km), which is less than reported for aerial survey data. Due to the proximity of the Diavik and Ekati mines, the location of Diavik (i.e., on an island in Lac de Gras) and the general southern movement of caribou through the area in the post-calving to autumn period, detecting separate ZOIs from the two mines sites is likely not possible. There would likely be a large amount of overlap between the ZOIs for the two mines and an influence from Lac de Gras (Golder 2011b). The caribou density analysis in Golder (2017) suggests that there is no ZOI around Ekati and Diavik or that it is smaller than could be detected, which is less than predicted in the EER.

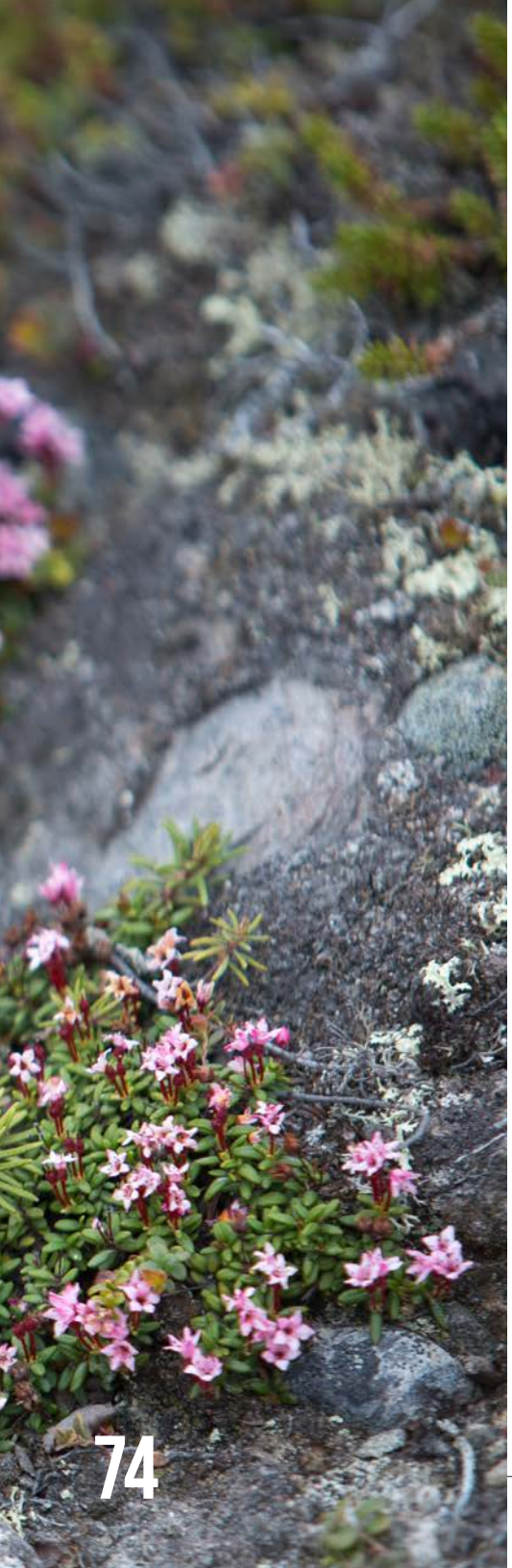
Diavik should present the reasons for the type of analysis they used and information on the power of the data to detect an effect. Future analyses using caribou density should include habitat associations and changes in mine activity, and other potential confounding factors. Non-linear relationships should also be considered.	As described in Golder (2017a), the caribou density analysis was completed to address a request by EMAB. The analysis included 142,418 sampling units (i.e., 1 km X 1.2 km survey transect segments) through time periods of 1998 to 2009 and 2012. Bergerud et al. (2008) suggested a threshold density of five caribou per km2 is necessary before demographic consequences arise, which equates to the effect size of 0.25 and is associated with ecological significance (Cohen 1988). Assuming the effect size of 0.25, an alpha-value of 0.05, and the given sample size, the observed power was 1.00. There is sufficient power and sample size to detect effect sizes associated with ecological significance (Bergerud et al. 2008; Cohen 1988). DDMI has completed analyses for a caribou ZOI using different methods and data in the most recent and past comprehensive reports. Other studies have completed similar analyses, with collared animals and aerial survey data using different statistical approaches (Johnson et al. 2005; Boulanger et al. 2012). The focus in the past has been to assume statistical effects detected from occurrence data translated to the ecological scale. However, the results on caribou density indicate this is potentially a false assumption. Although not part of the Diavik Mine WMP, further analysis using these data and density metric will include available habitat and the potential influence of natural factors in the region.
Please provide details on the methods and data collected by Diavik and Ekati both close to and far from the mines, including sample sizes, group sizes and group composition. Please explain how Diavik determines how much data are needed to do an analysis, and provide a power analysis to support the target sample size. As well please explain why there is such a large range in the number of observations per year and provide details on how Diavik decides when to collect behavioural data at distances greater than five km from the mine. Diavik should analyze caribou behavioural data from Diavik and Ekati Mines from 2012 to 2016. This type of analysis is important for guiding caribou management and mitigation actions at the Diavik mine. Diavik should consider use of non-parametric analytical techniques. Diavik should include a discussion of limitations that might result from pooling data across years.	The methods used for caribou behaviour monitoring by Diavik are reported in the WMP annually including results. Ekati mine does the same. The most recent analyses of these data were reported in 2011 (Golder 2011b). The summary on numbers of caribou in behaviour observations noted by EMAB suggests EMAB is unfamiliar with caribou behaviour monitoring methods after 16 years of reviewing reports. The sampling unit of this monitoring program is a caribou group (i.e., the number of groups reflects the sample size) and not the number of individual caribou. Since 2010, Ekati has observed seven groups of caribou and collected group behaviour data. In combination with the number of observations by DDMI, there remains insufficient data to complete analyses similar to that in previous comprehensive analysis reports. DDMI will continue to collect caribou behaviour monitoring data when caribou are present in the study area during post-calving to autumn periods because this is when cows with calves are most sensitive to effects of disturbance. Annual variation in observations is an index of caribou abundance in the RSA. There have been too few observations of caribou behaviour to generate confident conclusions from results. Analytical methods used are appropriate for these data and consistent with the scientific literature (e.g., Duquette and Klein 1987). DDMI has already responded to questions about pooling data across years (Golder 2011c). DDMI will consider including a power analysis to determine required sample sizes in the next WMP report.

Given that analyses of change in behaviour with distance are still planned for the future, we re-state, for the record, that analyses of data should address the following: Justify any pooling of data across years, or use year as a variable in the analysis, and identify what, if any, assumptions were made. Reconcile behavioural observations with the occurrence of caribou: does behaviour change with distance as occurrence does, i.e., is behaviour "normalized" past the zone of influence of 14 km? Why is there the same effect before Diavik was built (given that the years 1998/99 show the same ZOI "effect" as the years after the Mine was built)? How can the information gained from the various caribou analyses be used to adjust or develop mitigation measures if there is a larger than predicted effect of the Mine on caribou?	DDMI has responded to these comments previously (Golder 2016).
Diavik should re-do its analysis of the southern migration of caribou using collar information up to the end of November, to take into account changes in migration timing. Diavik should discuss why some caribou are not following the predicted southern migration, including a large majority in the last six years; EMAB's review indicates that since 2011, 48 collared caribou went west during the southern migration while two went east. Diavik should also discuss potential response actions to the departure from the prediction regarding the southern migration of caribou and changes to the timing of migration.	For the purpose of consistency with previous deflection analyses, the southern migration was defined from 1 July to 31 October annually (WCAR Section 2.1.5; WMP Section 3.4.1). For the purpose of the movement maps provided in the WMP, the results included data from 1 July to 30 November. Additional time has been included for mapping purposes since 2014 because most collared caribou remain north of the Lac de Gras region until late-October to November during the decline phase of this herd. Had the collar data through 30 November been included in the WCAR, the EER predictions would have still been supported. The results of the deflection analysis show that east-west movements of caribou vary through time but conform to the predictions of the EER; there is no need for adaptive management because there is no permanent fragmentation effect of the Bathurst caribou herd (i.e., caribou have moved as predicted in subsequent years and the population remains connected). This conclusion is also supported by the results of Virgl et al. (2017), which indicate seasonal range fidelity is high from year to year based on Bathurst collar data. DDMI will consider completing the suggested deflection analysis in the next WMP report.
Monitoring data has demonstrated that for the past three years at least, the prediction for the southern migration was not accurate. Therefore, one might conclude that the mitigation measures in place to manage impacts on caribou migration are not as effective as anticipated. An adaptive management process would identify and implement new mitigation measures to manage project impacts. As such, we request that DDMI discuss their adaptive management process and their response action in light of this unanticipated, potential effect of the Project.	Please refer to the results reported for 2014, 2015 and 2016 WMP's, which indicate that most collared caribou moved east of Lac de Gras from 1 July to 30 November. This supports the EER prediction. Note migration maps do not show all collar-paths because of the large seasonal range scale. When the migration period is restricted to 31 October, most collared caribou during recent years have not encountered the Lac de Gras region due to post-calving and autumn range contraction and delayed movement to below the treeline by the Bathurst caribou herd, which is a natural phenomenon during a decline phase (Virgl et al. 2017).
Diavik should include a discussion of the possibility that grizzly bears may be becoming habituated and their presence on site may be on the rise.	DDMI has responded to this previously (Golder 2016).

Diavik should describe alternative plans for evaluating wolverine abundance in the study area as per their WMP objective if they are not anticipating the analysis of the wolverine hair-snagging program to be complete in 2017.	DDMI is not aware when ENR will complete analyses of wolverine hair snagging data. DDMI monitors relative presence and distribution of wolverine using the snow track monitoring program. The 2014 WMP report demonstrated that annual measures of presence from the snow track program correspond with measures of abundance from the hair snagging program. This indicates that results of the snow track program can be used as an index of broad changes in wolverine abundance.
There may be opportunities for more systematic site surveys/checks for wolverines and waste management to mitigate instances of wolverines in waste bins. For instance, could waste collection bin checks be included in already scheduled waste inspections at the Waste Transfer Area (WTA) and Landfill?	Thank you for the recommendation. DDMI currently includes waste bin checks (although not reported) as part of waste bin inspections of the WTA and landfill.
Given that there have only been five wolverine mortalities reported since 2000, there appears to be support for the prediction that mining related mortalities are not expected to alter wolverine population parameters in the Lac de Gras area. However, it is not clear precisely how this prediction is being tested as there has been little information provided on wolverine population parameters over time in the WMRs. We recommend DDMI elaborate on how they are testing this particular prediction given the absence of data on population size.	Mortality is a population parameter and direct mine-related mortalities are annually reported. As noted by MSES, there is monitoring evidence to support that the mine-related mortality rate has been low. Results of wolverine snow track monitoring through 2016 suggest that wolverine presence (an index of abundance) in the study area may be increasing. This also supports the prediction of the EER.
Diavik should explore the reasons for higher levels of misdirected food waste in the A21 Area as this may be contributing to wildlife (particularly wolverine) presence and possible habituation near the Mine site.	DDMI reviews the results of monitoring as part of the adaptive management process. DDMI remains committed to carrying out employee education programs related to waste handling.
Diavik should explain how it will include Beverly/Ahiak caribou in its caribou monitoring program.	Mitigation used at the Diavik mine is designed to protect barren-ground caribou. The WMP is designed to monitor barren-ground caribou and is not herd-specific. Observations of caribou believed to be from the Beverly/Ahiak herd were reported in the 2016 WMP.
Diavik should discuss adaptive management actions regarding changes to caribou migration patterns as this indicates a potential mine-related effect.	DDMI has responded to this previously (Golder 2016).

TABLE OF ACRONYMS

Acronym	Definition
AEMP	Aquatic Effects Monitoring Program
AGM	Annual General Meeting
BCRP	Bathurst Caribou Range Plan
CAR	Comprehensive Analysis Report
CCME	Canadian Council of Ministers of the Environment
CSR	Comprehensive Study Report
DDEC	Dominion Diamond Ekati Corporation
DFO	Department of Fisheries and Oceans
EAAR	Environmental Agreement Annual Report
EAQMP	Environmental Air Quality Monitoring Program
ECCC	Environment and Climate Change Canada
ED	Executive Director
EEM	Environmental Effects Monitoring
EMAB	Environmental Monitoring Advisory Board
ENR	Environment and Natural Resources
EPA	Environmental Protection Act
EQC	Effluent Quality Criteria
FF	Far-Field Sampling Sites (AEMP)
GNWT	Government of the Northwest Territories
ICRP	Interim Closure and Reclamation Plan
KIA	Kitikmeot Inuit Association
LKDFN	Łutselk'e Dene First Nation
MMER	Metal Mining Effluent Regulations
MVLWB	Mackenzie Valley Land and Water Board



Acronym	Definition
NCRP	North Country Rock Pile (aka WRSA – see below)
NI	North Inlet
NSC	North South Consultants
NSMA	North Slave Metis Alliance
PHC	Petroleum Hydrocarbons
PK	Processed Kimberlite
PKC	Processed Kimberlite Containment Facility
SEC	Slater Environmental Consulting
SGP	Slave Geological Province
SNP	Surveillance Network Program
SOI	Substance of Interest
TK/IQ	Traditional Knowledge / Inuit Qaujimajatuqangit
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TTG	Technical Task Group
WTA	Waste Transfer Area
WLWB	Wek'èezhìı Land and Water Board
WMP	Wildlife Monitoring Program
WMR	Wildlife Monitoring Report
WRRB	Wek'èezhìı Renewable Resources Board
WRSA	Waste Rock Storage Area (aka NCRP – see above)
YKDFN	Yellowknives Dene First Nation
ZOI	Zone of Influence
WMR	Wildlife Monitoring Report
WRRB	Wek'èezhìı Renewable Resources Board
WRSA	Waste Rock Storage Area (aka NCRP – see above)
YKDFN	Yellowknives Dene First Nation
ZOI	Zone of Influence

HOW TO CONTACT US

ENVIRONMENTAL MONITORING ADVISORY BOARD FOR THE DIAVIK MINE

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