

2021-22 ANNUAL REPORT INDEPENDENT ENVIRONMENTAL MONITORING AGENCY

A PUBLIC WATCHDOG FOR ENVIRONMENTAL MANAGEMENT AT EKATI DIAMOND MINE



Message from the Chair



I am pleased to present the 2021-22 annual report of the Independent Environmental Monitoring Agency. The report summarizes our activities over the past fiscal year and provides recommendations on how environmental management at the Ekati Diamond Mine can be improved. The report is available for viewing and downloading from the Agency website.

This past year has again been one of change and challenge for Ekati and the Agency. In February 2021, Arctic Canadian Diamond Company Ltd. completed purchase of the Ekati mine from Dominion Diamond Mines and acceptance of its assets and liabilities. Mining and processing of ore from Sable and Pigeon open pits and Misery underground project immediately re-started with a renewed focus on returning operations of the mine to pre-sale conditions.

While COVID-19 continued to impact our daily lives and how we conducted business, this past year saw the company take major steps to extend the life of Ekati through the permitting and licencing of the Point Lake open pit project and announcement of a partnership with the Dutch company Royal IHC, a supplier of maritime technology, to investigate the use of underwater remote mining in existing flooded open pits. The Agency looks forward to learning more and working with the company and regulators as this new mining technology is explored and tested.

From a personal perspective, I look forward to once again being able to meet face to face with company representatives, regulators, Indigenous governments, and community members to discuss the opportunities and challenges associated with the Ekati mine. And on behalf of the Agency Directors and staff, I welcome you back to our offices in Yellowknife and encourage you to contact us if you have any questions, comments, or concerns about Ekati, or if you wish for us to visit your community.

Marsi, mahsi, quiannamik, quana, merci, thank you

Emery Paquin www.monitoringagency.net

Plain Language Executive Summary

ACRONYMS

AEMP = Aquatic Effects Monitoring	EQC = Effluent Quality Criteria	PLP = Point Lake Project
Program		
	FAA = Fisheries Act Authorization	TRSP = Two Rock Sedimentation
the Agency = Independent		Pond
Environmental Monitoring Agency	GNWT-ENR = Government of the	
OR IEMA	Northwest Territories-Environment	WLWB = Wek'èezhìi Land and
	and Natural Resources	Water Board
AQMP = Air Quality Monitoring		
Program	KPSF = King Pond Settling Facility	wmt = wet metric tonnes (of waste
		rock)
CKRSA = Coarse Kimberlite Rejects	LLCF = Long Lake Containment	
Storage Area	Facility	WRSA = Waste Rock Storage Area



Underground drilling operations, photo courtesy of Ekati Diamond Mine

The following summary section was written to provide you, the reader, a summary of the highlights of all the chapters enclosed in this year's annual report. The full details of each topic and event are discussed in their respective sections throughout the report.

OVERVIEW 2021 ACTIVITIES AND EXPLORATION

Arctic Diamond continued to produce ore from Sable and Pigeon open pits, and Misery underground.

While no exploration was undertaken at the main Ekati site, Glowworm Lake, and the Harry Winston/Lac de Gras claim blocks in 2021 it is expected to resume as Arctic Diamond looks for more kimberlite pipes to develop. In 2021, Arctic Diamond began working on a new mining method called 'underwater remote mining'. This involves digging ore out from existing open pits filled with water. They intend to test equipment during summer 2024 and, if it works, will use this method to extend Ekati's life of mine beyond 2029.



THE POINT LAKE PROJECT

Point Lake is an open pit project located along the Lac du Sauvage Road, between Misery Pit and Lac du Sauvage. Three kimberlite pipes under the lake will provide up to five years of mining, extending the life of the mine to 2029. To access the kimberlite, the lake water will need to be pumped out, fish habitat destroyed, and the fish removed.

Applications to allow the Point Lake Project to proceed were submitted to the Wek'èezhìii Land and Water Board (WLWB) and Fisheries and Oceans Canada (DFO) in June 2021. During the reviews, the Agency raised concerns about actions to monitor and lessen the impacts on caribou, the waste rock and overburden storage areas, long-term water quality, plans for closure and the absence of directly relevant traditional knowledge used in Project planning and the need for community-driven methods to gather and use traditional knowledge.

In response, Arctic Diamond agreed to do a study using caribou collar data to evaluate how caribou movement may be affected by the mine. They also met with federal and NWT regulators, Indigenous governments and stakeholders to discuss the shape and location of the waste rock and overburden piles, which were then changed to reduce possible barriers to caribou movement. Arctic Diamond also agreed to undertake additional studies into possible long-term acidic conditions in the waste rock pile and seepage, collect any water coming out of the waste rock pile, increase the number of caribou

crossings over the temporary de-watering pipelines, update the traditional knowledge management framework and \$28 million for final closure security for the Point Lake Project.

An amended water licence and new Fisheries Authorization were issued in spring 2022, which enables construction of the Point Lake open pit to proceed.

Caribou, photo courtesy of Ekati Diamond Mine

WILDLIFE EFFECTS

The 2021 Wildlife Effects Monitoring Program (WEMP) documents wildlife presence and Arctic Diamond's wildlife management at site. The information comes from surveys, incidental observations and management actions. Many of the monitoring activities are required under the Caribou Road Mitigation Plan (CRMP).

In 2021, there were 22 reported interactions between wildlife and humans, mostly involving grizzly bears. Arctic Diamond's caribou monitoring for the year included incidental observations (5,203 documented), road and Misery power line surveys (10,801 documented), wildlife cameras and more. While these data and observations are well reported, the Agency believes there are opportunities to integrate datasets which will provide a more complete picture of caribou distribution and help make monitoring more efficient.

Arctic Diamond released their latest Wildlife Camera Monitoring Study in July. This report covers the time frame from 2011-2020 and uses motion-triggered cameras to detect caribou within 30 m of roads. The report suggests that roads are not a barrier to caribou movement. The Agency is concerned that the design of the study does not enable accurate conclusions. This was evident in the Agency's report¹ that looked at the movement of collared caribou in relation to mine infrastructure from 2010 to 2019. That report concluded that caribou move

more slowly as they approach the mine, and often changed their movement pathway within three kilometers of the mine and roads. This means caribou are spending more time within the vicinity of, but are avoiding close contact with, the mine. Of these collared caribou, 75% of them did not cross through the mine, suggesting that current monitoring and mitigations are not as effective as intended.

AGENCY RECOMMENDS

The Agency recommends that Arctic Diamond work with stakeholders to assess how effective the current mitigation measures are under the CRMP. This could include the use of collar data to analyze caribou movements and distribution and invite chosen community members to observe and document caribou movements and interaction with roads and crossing ramps, when caribou move through the site.

¹ Poole, K.G., A. Gunn, and G. Pelchat. 2021. Influence of the Ekati Diamond Mine on migrating tundra caribou movements. August 2021. Report prepared from the Independent Environmental Monitoring Agency, Yellowknife, NT.

AQUATIC EFFECTS

Arctic Diamond monitors and reports changes to the downstream aquatic environment from the mine in the Aquatic Effects Monitoring Program (AEMP).

Through the AEMP, they collect samples to identify changes and trends related to water and sediment quality, tiny plants and bugs in lakewater, bugs, worms, snails and clams living on or in lake bottom mud, and fish populations and health. In 2021, there were no new increasing trends in water quality downstream from the Long Lake Containment Facility (LLCF) or King Pond Settling Facility (KPSF). As a component of the AEMP, the Aquatic Response Framework is an early warning system to alert the company and government regulators when an amount of a contaminant that, if left unchecked, could reach levels that may harm fish or their food. When monitoring shows an action level for a contaminant has been passed, a response plan is prepared to outline what actions Arctic Diamond will take to reduce or eliminate the problem. Two water quality variables (chloride and potassium) exceeded an action level in 2021. Plankton action level exceedances were also detected in the Koala-Lac de Gras watershed and King-Cujo watershed. Selenium levels continue to rise in lake bottom sediments in Leslie, Moose and Nema lakes. Small-bodied fish (slimy sculpin) in lakes closest to the LLCF showed high concentrations of selenium and mercury but were reduced in lakes further downstream. Currently, the concentrations are within Health Canada Guidelines. The AEMP also notes a tapeworm infestation in lakes in the Koala and King-Cujo watershed that showed a strong connection to lower reproductive capacity and smaller livers in slimy sculpin.

AIR QUALITY

The Air Quality Monitoring Program (AQMP) outlines how ambient air quality is monitored at the Ekati mine. The program includes monitoring meteorological conditions (temperature, wind and precipitation), air emissions and dustfall.

Overall, ambient air quality remains good at Ekati. In 2021, Arctic Diamond reports only a few air quality variables exceeded standards, greenhouse gas emissions were lower than average compared to normal operating years and, while dust and metal concentrations remain higher in areas immediately surrounding the mine, they decrease with distance from the mine. The Agency is concerned that the Point Lake Project may further impact air quality in the southern half of the Ekati claim block. For this reason, we suggest Arctic Diamond improve the dustfall monitoring stations in the vicinity of Point Lake and continue operating the Lynx Road stations. We also suggest the AQMP be updated to establish air quality thresholds which, if exceeded, would trigger additional mitigative measures. The Agency also acknowledges the WLWB's precedent-setting decision to require emissions testing of Ekati's solid waste incinerators every three years.

WASTE ROCK MANAGEMENT

Rock that does not contain diamonds and has been mined from a pit to access kimberlite ore is classified as waste rock.

This material is trucked from the pit to large piles called Waste Rock Storage Areas (WRSA) which will remain after mining is completed as permanent structures on the landscape. In 2021, Arctic Diamond deposited more than 17 million tonnes of waste rock in 4 locations.

The waste rock is regularly sampled and monitored to determine if it has the potential to produce acid. Acid drainage from waste rock has the potential to enter nearby land and water bodies creating a major environmental concern. Acid rock drainage can take many years to occur, however if rocks contain enough carbonate and other minerals the acid will be neutralized over time. Seepage is water that contacts waste rock and drains from the WRSA. There are increasing trends and concentrations in 2021 of metals and other variables in some seeps that are worrisome and require ongoing attention. The seepage is compared to nearby sites that are not impacted by mining activities. Two reference sites have begun to show minor influences from the mine. This raises the question of whether they are still appropriate as reference sites.

Seeps are monitored twice each year. In 2021, Arctic Diamond developed a new Seepage Management Framework to evaluate the risk seeps present to the surrounding environment.

AGENCY RECOMMENDS

The Agency believes mined waste rock from each of the pits and underground needs to be regularly tested. Currently, this is not occurring at the Sable pit which, we suggest, is not consistent with good planning and modern mining practices.

AGENCY RECOMMENDS

The Agency recommends that Arctic Diamond evaluate and identify alternative reference sites to measure seepage as they continue to show influence from nearby mining activities.

Under the framework, seep water quality would continue to be monitored and an action would be taken when it exceeds thresholds relevant to a downstream lake or stream.



AGENCY RECOMMENDS

The Agency recommends Arctic Diamond install instruments to monitor surface and subsurface flow as selected long-term seepage locations. They should also investigate other key factors that influence water balance in waste rock piles.

WASTEWATER AND PROCESSED KIMBERLITE

The Wastewater and Processed Kimberlite Management Plan describes site-wide wastewater and fine processed kimberlite (FPK) management.

Managing wastewater and FPK are closely linked activities. Most of the site wastewater comes with FPK that leaves the process plant as a slurry of fine ground up rock mixed with water.

All wastewater is sent to one of four wastewater management facilities where the water is tested before being discharged to adjacent lakes and streams. In 2021, Arctic Diamond discharged water from the Two Rock Sedimentation Pond for the first time. This was an emergency discharge as water levels in the pond rose to a level that could have adverse affects on the frozen core dam. Arctic Diamond was late in submitting the required Two Rock Outfall Report which delayed approval for planned discharges. The WLWB and the Agency agree this emergency discharge could have been avoided through better regulatory planning. In 2021, Arctic Diamond continued to deposit almost all FPK and process plant liquids into the mined-out Panda-Koala pits. Only a small amount went to the LLCF. This approach helps to lower water levels in the LLCF which means less discharge to Leslie Lake in the short-term. However, in the longer term Arctic Diamond will need to consider how to manage the water stored in the Panda-Koala pits.

CLOSURE AND RECLAMATION

As Ekati's current 2029 end-of-mine life gets closer, it is important to have a complete and workable plan for closure and reclamation in place.

In 2021, important steps were made in planning for closure and reclamation despite delays in submitting the next version of the Interim Closure and Reclamation Plan (ICRP). Since ICRP version 3.0 was conditionally approved in 2020. Arctic Diamond has hosted two workshops dealing with closure objectives and criteria. The outcomes of both workshops have helped participants work collaboratively to define closure objectives and discuss closure criteria that will help people know when closure objectives have been met. The deadline to submit ICRP version 3.1 is October 31, 2022.

The Agency is concerned that Arctic Diamond does not plan to develop numerical closure criteria until it prepares the final closure and reclamation plan

AGENCY RECOMMENDS

The Agency recommends Arctic Diamond develop and include numerical closure criteria in an updated ICRP version. These criteria would support decision-making about closure methods and activities. At the least, they should deal with criteria related to dust, water quality, sediment quality and erosion rates.

approximately 2 years before the mine closes. The lack of numerical criteria makes it hard to plan and design closure activities. The Agency is concerned there has been little progressive reclamation completed on the site to date. These activities would help deal with environmental impacts in areas no longer needed for mining

AGENCY RECOMMENDS

Arctic Diamond should work with regulators to set up more effective ways and regulatory conditions to schedule and implement progressive reclamation. This will help ensure that they complete the work according to a planned schedule. and provide valuable knowledge to guide future planning. Arctic Diamond should work with regulators to set up more effective ways and and regulatory conditions to schedule and implement progressive reclamation. This will help ensure that they complete the work according to a planned schedule.

As of December 2021, the total reclamation security was about \$282 million. This is what GNWT estimates it will cost to close and reclaim the Ekati mine.

TRADITIONAL KNOWLEDGE & COMMUNITY ENGAGEMENT

Concerns and conditions related to COVID-19 continued to impact Arctic Diamond's engagement with communities, including in-person meetings.

As a result, few traditional knowledge (TK) projects and preservation programs happened. As COVID-19 restrictions are removed, the Agency would like to see more TK and community input applied in more programs. This includes assessment and monitoring of aquatic and wildlife effects and closure planning. The Point Lake Project application incorporated TK that was previously collected for the Jay project. Although no new TK was collected prior to the application, Arctic Diamond later held workshops with communities to gather specific knowledge related to caribou movement, waste rock management and fish-out and fish offsetting plans for the project.

ASSESSMENT OF REGULATORS

As a public watchdog for environmental management at Ekati, the Agency assesses the performance of the mine operator and the federal and territorial agencies that regulate the mine.

This includes the Government of NWT (GNWT), Fisheries and Oceans Canada (DFO), Crown-Indigenous Relations and Northern Affairs Canada, Environment and Climate Change Canada and the Wèk'eezhìu Land and Water Board (WLWB). This summary includes our assessment of DFO and GNWT-Environment and Natural Resources' (ENR) Wildlife and Fish Division. Although DFO did provide some comments related to fish during the Point Lake Project, they continued to have minimal involvement in the overall regulation of the mine. DFO also met with the Agency to discuss the openness of the Fisheries Act Authorization process to community reviewers. We hope DFO will engage more in the future. Many participants expressed concerns during the Point Lake project review over impacts the project may have on caribou movement. Since the GNWT-ENR is responsible to protect and manage wildlife in the NWT, the Agency expected more involvement by the Department in the caribourelated issues associated with the project. The GNWT-ENR Wildlife and Fish Division has committed to a rigorous review of the WEMP during its upcoming renewal in 2023. The Agency looks forward to participating in this process.

ASSESSMENT OF ARCTIC DIAMOND

Arctic Diamond continues to comply with its water licence and land use permits.

Despite COVID-19 restrictions and outbreaks, and limits to travel, it deserves credit for continuing with most of its monitoring programs. This includes wildlife, aquatic, seepage, and air quality monitoring. However, the Agency continues to be concerned over delays in submitting important reports and updated plans.



Caribou approaching water, photo courtesy of Ekati Diamond Mine



INDEPENDENT ENVIRONMENTAL MONITORING AGENCY

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Table of Contents

Plain Language Executive Summary	4
Current Activities and Exploration	
Point Lake Project Application Overview	
Wildlife Effects	
Aquatic Effects	
Air Quality	
Waste Rock Management	
Wastewater and Processed Kimberlite Management	
Closure and Reclamation	64
Traditional Knowledge and Community Engagement	74
Assessment of the Regulators	
Assessment of Arctic Diamond	
Agency Activities	
Appendix A: Tables & Figures	
Appendix B: Responses to Recommendations	
Appendix C: Acronyms and Glossary	
Directors Biographies	
Life of mine plan	

Ekati Diamond Mine Site Map

LEGEND



Northwest Territories Nunavut SABLE **MAIN CAMP** MISER **AUGUST 2021**



Land Disturbance and Road Length

The Ekati Diamond Mine has occupied approximately 39km² of land since the project first started in 1997. The following is the total estimated footprint of near by communities in comparison to the amount of land disturbed by mining activities.



Direct habitat loss caused by the Ekati mine project since 1997 **39 km**²

Total roads at Ekati 141 km

30km²

City of Yellowknife



2.4km² Behchoko estimated footprint

2.5km² Kugluktuk estimated footprint-

		APPROX LAND DISTURBANCE	HOW MUCH BIGGER IS THE EKATI MINE?
	Yellowknife	30 km ²	x 1.3
	Kugluktuk	2.5 km ²	x 15
	Behchokò	2.4 km ²	x 16
	Cambridge Bay	1.6 km ²	x 24
	Łutselk'e	1.3 km ²	x 29
	Whati	0.8 km ²	x 47
	Gameti	0.8 km ²	× 47
	WekweètÌ	0.5 km ²	x 76



Current Activities and Exploration

HIGHLIGHTS

- The Point Lake Project amendment application was submitted June 2021 and received ministerial approval in May 2022
- Similar to 2020, there was no exploration in 2021 at the main Ekati site, Glowworm Lake or Harry Winston/Lac de Gras claims blocks.
- Arctic Diamond

 announced their intention
 to investigate and
 transition to Underwater
 Remote Mining (URM)
 as the means to extend
 mining of some existing
 kimberlite pipes, as well
 as future pipes



Lac du Sauvage road, photo courtesy of Ekati Diamond Mine

CURRENT MINING ACTIVITIES

Throughout 2021, production of ore continued from Sable and Pigeon open pits, and Misery underground. Arctic Diamond submitted an application for a water licence amendment to include the Point Lake Project as an open pit development in Ekati's life of mine plan. The Point Lake Project is a 4 to 5-year operation that will allow Arctic Diamond to explore other potential developments and future mining opportunities. To read more information about the Point Lake Project and the Agency's Assessment refer to the Point Lake Project chapter.



EXPLORATION

There were no exploration activities conducted on the Lac de Gras/Harry Winston and Glowworm Lake exploration claims blocks east and south of Ekati, or at the main Ekati claim block. To see a map of these claim blocks, refer to Apprendix A, figure A-1. Exploration drilling will likely resume in future years as Arctic Diamond looks for additional kimberlite pipes to develop.

FUTURE MINING

According to the life of mine plan conventional open pit mining at Ekati will be winding down in most pits by 2024, leaving only Point Lake operating until 2029. In 2021, Arctic Diamond informed regulators of their intent to pursue Underwater Remote Mining (URM) as a way to extend the life of mine beyond 2029. This potential mining method is described as a more efficient and cost-effective mining process, as it would operate in existing flooded open pits and eliminates the need to excavate additional waste rock. The URM is a remotely operated 'crawler' that has been used in other mining operations however, it has not been previously used for mining kimberlite pipes or in northern climates.

Arctic Diamond intends to test URM technology over the next few years (2024-26) in the Lynx pit, and if successful to operationalize this technology in existing pits to extend the life of mine beyond 2029.





Beartooth Pit, photo courtesy of Ekati Diamond Mine

Point Lake Project Application Overview

In June 2021, Arctic Diamond applied for a water licence amendment to develop the Point Lake Project (PLP) and mine 3 kimberlite pipes located under the lake. The proposed open pit is located between the Misery Pit and Lac du Sauvage. The PLP would be an economic bridge allowing Ekati to continue to operate after current deposits are exhausted around 2024 and when new deposits can be brought online.

The open pit development will result in a single waste rock pile and overburden stockpile, each located near the pit. Dewatering of Point Lake is scheduled for the summer of 2022. Arctic Diamond has proposed the use of a dewatering pipeline that will transport surface water from Point Lake to Lac du Sauvage during phase 1, while the pipeline will be relocated to the King Pond Settling Facility (KPSF) to transport the remaining water. Ore that is mined from the Point Lake Pit will be processed through the main process plant located at Main Camp, while surface wastewater and seepage from the open pit and waste rock storage area (WRSA) will be sent to the KPSF.

As with all Water Licence amendments or applications the PLP underwent a preliminary screening process to determine if the application should go to Environmental Assessment or go directly to the water licencing and permitting stage. After receiving reviewers input, the WLWB determined that it did not need to go to environmental assessment and could proceed directly to the licencing stage. In their application Arctic Diamond made it clear that the timelines required for PLP permitting were very tight.

The main topics raised by the Agency during the water licence regulatory process included: the mitigation and monitoring of caribou, the proper use and collection of Traditional Knowledge (TK) based on community protocols, the configuration and location of the waste rock and overburden stockpiles, long-term water quality concerns due to potentially acid generating waste rock, and plans for closure.

WILDLIFE

The PLP licencing process provided opportunities for the Agency and other intervenors to evaluate and contribute to the mitigation of potential impacts to caribou from the proposed project and for the mine site in general. From a caribou perspective, the Agency was primarily concerned with the effectiveness of current caribou mitigation measures and the impact the project may have on caribou movement. The proposed PLP is within an important caribou movement corridor and is one area where caribou currently move through when deflected around mine infrastructure. In response to intervenor concerns, Arctic Diamond organized intensive discussions and consultation

with regulators, Indigenous governments and stakeholders to ensure the final Point Lake waste rock storage area (WRSA) and overburden stockpile designs minimize the barrier effect on caribou movement through the Lac du Sauvage isthmus and agreed to increase the number of ramps over the dewatering pipelines to be used in 2022.

WASTE ROCK MANAGEMENT

There will be a single waste rock pile and a separate overburden stockpile located next to the open pit (Figure 1). Point Lake waste rock is different from other waste rock at Ekati in two important ways: it is almost all metasediments rather than granite; and geochemical testing has demonstrated it has a greater potential to generate acid than other metasediments at the Ekati mine. Currently available testing results indicate that acid-generation and metal leaching from the WRSA will likely occur over time unless mitigative measures are taken.



Point Lake looking northwest prior to construction, photo courtesy of Ekati Diamond Mine

Additional kinetic humidity cell testing of the metasediments is underway to provide a better understanding of the geochemistry of the rock and the amount of time it will take for the metasediments to turn acidic. The testing results will enable Arctic Diamond to recalculate seepage water quality predictions using more relevant data and will inform the design, operation and closure planning of the facility.

Seepage from the waste rock pile will be collected in sumps along the access road and pumped to the KPSF. During the PLP licencing process concerns were raised regarding the quality and quantity of seepage from the waste rock pile over the life of the Project.

AQUATICS

Before open pit mining at Point Lake can begin, all fish and water within Point Lake must be removed. Arctic Diamond has developed a Dewatering Plan which outlines the company's plans to use a pipeline to drain water from Point Lake to Lac du Sauvage and later to the KPSF when the pumped water becomes murky (i.e., higher in Total Suspended Solids than the water license allows).

At the same time, a Fish-out Plan outlines how the existing fish in Point Lake will be removed. A limited number of lake trout and whitefish will be assessed for basic health indicators, including parasites, to help improve the general understanding of baseline conditions in tundra lakes.

Since de-watering will result in the death of fish and the destruction of fish habitat, Fisheries and Oceans Canada (DFO) requires a Fisheries Act Authorization (FAA). In addition, this loss of habitat must be compensated for (offset) by creating or enhancing similar fish habitat elsewhere. Arctic Diamond has proposed to offset the project by improving the connectivity between lakes along the Ingraham Trail near Yellowknife and stocking them with native fish species.

Concerns were also raised during the water licencing process regarding possible reduction in flows to lakes downstream of Point Lake which could adversely affect fish. To address this, Arctic Diamond is required to pump water from Lac du Sauvage to Connor Lake to ensure downstream water levels are maintained.

Unlike the currently impacted watersheds at Ekati, Arctic Diamond argued that there is no need for Aquatic Effects Monitoring Program (AEMP) monitoring for the Point Lake watershed. Instead, the company suggested the Surveillance Network Program (SNP) is a suitable mechanism to monitor downstream impacts. In its decision, the Wek'èezhìi Land and Water Board (WLWB) disagreed with Arctic Diamond and directed that lakes downstream of Point Lake will have to be included in the current AEMP which, unlike the SNP, tracks changes in biota as well as water quality.

CLOSURE AND RECLAMATION

The PLP will require additional security to cover the costs of closing the waste rock pile, open pit and related infrastructure. The closure activities and associated security costs will be incorporated into the updated Interim Closure and Reclamation Plan which is anticipated to be submitted by October 2022. The security amount for the PLP is set at \$28,101,255 and will be posted and held by the GNWT before any work can begin.

AGENCY ASSESSMENT

The Agency believes that the effectiveness of current site-wide monitoring and mitigation for caribou movement has not been adequately demonstrated. As a result of intensive discussions and consultation, Arctic Diamond agreed to undertake telemetry studies using caribou collar data to examine caribou movement pathways in relation to the mine site and traffic levels, building on the exploratory work conducted by the Agency in 2021.

The Agency suggests additional caribou mitigation actions need to be implemented including analysis of possible benefits from greater periods of 'no heavy haul truck' traffic (i.e., longer break intervals) during periods when caribou are migrating through the mine site. Arctic Diamond is encouraged to work with stakeholders to assess the effectiveness and update the current Caribou Road Mitigation Plan (CRMP) and Wildlife Effects Monitoring Program based on available data, including the pending analysis of caribou movements using caribou collar data and TK.

The Agency remains concerned with the potential for acidic conditions to develop in the waste rock pile seepage over the long-term, and the lack of understanding in regards to active layer subsurface water flow and overall water balance of the rock pile. We are hopeful that additional kinetic humidity cell testing and the requirement for shallow ground water monitoring (i.e. in the active layer) at Point Lake will help address some of these concerns.

The initial licence application had no Point Lake-specific TK input, instead it used information gathered for the Jay water licence application. The Agency was very concerned that Point Lake-specific





Point Lake observed from the laydown pad. photo courtesy of Ekati Diamond Mine

FIGURE 1: PROPOSED FOOTPRINT OF THE POINT LAKE PROJECT



Wildlife Effects

DEFINITIONS

Adaptive management:

a management system with continual monitoring. If a mitigating action does not work, additional actions are used to keep the impacts within accepted levels or below thresholds

Focal surveys: documenting observations of a single animal and the proportion of time it spends doing different behaviours, i.e., feeding, bedding, alert, etc

Incidental observations: records of observations of any wildlife by any persons and in all areas at the mine

Mitigation, mitigating: an action that is supposed to reduce the negative impacts of a condition or situation. To make something less harmful. In this case, to make sure environmental impacts from the mine are as minimal as possible

Monitoring: collecting and analyzing repeated observations and measurements to evaluate change and impacts of change. Watching habitat and wildlife, and 'keeping an eye' on things all the time.

Scan surveys: observations of the behaviours of a group of animals for quantifying the frequencies of dominant behaviours in a group over a period of time

Systematic surveys: surveys conducted by the Ekati Environment Department using specific methods and covering an established area, such as all main roads and the Misery power line

Threshold: a defined point, level or condition where, if things change beyond that point, further change can cause lasting harm

Zone of influence (ZOI): is the area around a development where caribou distribution and abundance are less than what would be expected based on the habitat alone

Caribou

A caribou crossing sign, photo courtesy of Ekati Diamond Mine



Caribou walking, photo courtesy of Ekati Diamond Mine



Snowshoe Hare, photo courtesy of Ekati Diamond Mine

HIGHLIGHTS

- Caribou documented at the mine in 2021 included 5,203 incidental observations, and 10,801 caribou during road/power line surveys, mainly during fall migration.
- The camera study report, released in June 2021, concluded that less than 3% of caribou deflected from crossing the roads, and that *"roads do not appear to be barriers to caribou movement"*. The Agency believes these conclusions are unwarranted given the sampling design.
- The Agency's caribou movement report suggested that current caribou monitoring and mitigation measures are not effective at facilitating caribou movement through the mine.



Grizzly bear, photo courtesy of Ekati Diamond Mine

ACTIVITIES 2021

Arctic Canadian Diamond Company Ltd.'s (Arctic Diamond) Wildlife Effects Monitoring Program (WEMP) documents wildlife presence and wildlife management responses at the Ekati mine. The 2021 WEMP is the 24th annual program and report for the Ekati diamond mine. This annual report focuses on wildlife habitat and caribou, grizzly bears, wolves, wolverines, foxes, raptors and breeding birds, detailing compilations of various surveys, incidental observations, incident reports and management actions. Activities documented in 2021 included systematic road/ Misery power line and Long Lake Containment Facility (LLCF) surveys, behavioural monitoring and camera surveys along infrastructure and adjacent areas. Many of the activities are required for management of caribou under the Caribou Road Mitigation Plan (CRMP).

THE EKATI MINE FOOTPRINT

Habitat loss in 2020 and 2021 was restricted to a small increase (17 ha) in the Sable Waste Rock Storage Area. The amount of direct habitat loss caused by the project footprint since development began in 1997 is 3,915 ha (39 km²). As of 2018 (the last year of reporting), 141 km of roads have been constructed.

WASTE MANAGEMENT

Arctic Diamond continues its efforts to improve waste management practices and reduce food-related attractants at landfills, to reduce wildlife incidents, and to deter wildlife from areas of danger (e.g., the airstrip, high traffic areas, active pits). The quantity of misdirected wastes and attractants reported in 2021 was comparatively low and in keeping with the general decreasing trend over recent years. Over 125,000 kg of wet and dry biodegradable material was composted, saving an estimated 340.000 L of diesel fuel compared to if the material was incinerated.

WILDLIFE MANAGEMENT AND INCIDENTS

Wildlife incidents involve direct interactions between wildlife and humans or infrastructure. Nineteen of the 22 wildlife incidents reported at the Ekati mine during 2021 involved grizzly bears, all but one which required use of deterrents. Work stoppages or short-term road closures occurred on 21 occasions; almost all were traffic delays related to caribou on roads (primarily Sable Road) with delays ranging from 10 minutes to 6.5 hours in length. Blasting in pits did not occur if wildlife, including nesting raptors, were within 1 km of the area. Six blasts were delayed in 2021 due to caribou, although Arctic Diamond did not report how much blasting took place. No caribou mortalities as a direct result of mine activities have occurred since 2010.



Caribou observed near the mine, photo courtesy of Ekati Diamond Mine



CARIBOU MONITORING

Caribou-related activities for 2021 included examining distribution from collared cows monitored by Government of the Northwest Territories – Environment and Natural Resources (GNWT-ENR), incidental caribou observations, behaviour surveys, LLCF monitoring, systematic (and recently combined) road and Misery Road power line surveys, and wildlife camera monitoring. With the resumption of operations, road train and haul truck traffic volumes increased in 2021 on Misery (approx. 3,200 round trips in total) and Sable roads (approx. 20,000 round trips). The maximum monthly traffic occurred on the Sable Road in November, averaging a road train or haul truck passage every 6.3 minutes. No data for trends over time, light vehicles (mainly pickup trucks) or trucks related to the Tibbitt–Contwoyto winter road haulage were presented, the latter a concern because of greater numbers of caribou present during winter in recent years.

Arctic Diamond monitors numbers and distribution of caribou using primarily two main methods: incidental observations reported by all personnel on site, and systematic surveys by Ekati Environment Department staff of all main roads and the Misery power line. In 2021, 5,203 caribou were recorded incidentally on 107 separate days. Most sightings were recorded during the fall migration (62%), followed by spring migration (17%) and during winter (10%). About 2,150 caribou (from the Bathurst herd, based on collar maps) were observed in late October. Collar data from GNWT-ENR indicated that caribou from the Beverly/Ahiak herd were present at Ekati during winters 2019-20 and 2020-21. Caribou were seen distributed throughout the mine site except for fewer observations along mid-sections of the Misery Road (as shown in Figure 2.

Over 10,800 caribou in 403 observations were counted during combined road and Misery power line surveys with about 70% occurring on the Misery Road (as shown in Figure 3). This includes the largest group of approx. 2,000 caribou from late October. Through these observations, the WEMP concludes that "Observations of caribou near and crossing all roads/power line suggest that the roads and power line do not impede caribou movement at the local scale". By comparing daily observations from road and Misery power line surveys among the years of 2019-21, the WEMP concluded that "the total number of caribou were generally higher in years when the mine

FIGURE 2 - INCIDENTAL CARIBOU OBSERVATIONS AT THE EKATI DIAMOND MINE, 2021 (FIGURE 5.3-1 FROM THE 2021 ANNUAL WEMP REPORT)



was operating [2019 and 2021] compared to years when the mine was in Care and Maintenance [2020]".

There were 2 types of behavioural surveys conducted in 2021, 9 focal surveys and 5 scan surveys. Surveys of the LLCF were conducted on 80 days, with 237 caribou observed on 26 separate days, most of which occurred within Cell B.

WILDLIFE CAMERA STUDY

The Wildlife Camera Monitoring Study initiated at Ekati in 2011 uses motion-triggered cameras to better understand how caribou respond to mine infrastructure and in particular to roads. One of the objectives for this component of the WEMP is to "determine caribou (and other wildlife) responses to roads and the Misery power distribution line (i.e., crossing or deflecting) and identify those factors that contribute to the permeability of site roads". Eightynine infrared motion-triggered cameras have been deployed in recent years along Misery, Sable and Lac du Sauvage roads, as well as at the Lac du Sauvage

Narrows and the esker near the Lac du Sauvage Road. The camera section in the WEMP report summarized key results from a 2021 comprehensive report written by ERM (referred to as 2020a, released in June 2021) covering camera data up to 2019. The 2021 report concluded that specific roadside slope or rock sizes did not affect caribou crossing behaviour (success), that less than 3% of caribou deflected from crossing the roads, and that "roads do not appear to be barriers to caribou movement".

FIGURE 3 - CARIBOU OBSERVATIONS DURING ROAD AND MISERY POWER LINE SURVEYS AT THE EKATI DIAMOND MINE, 2021 (FIGURE 5.6-1 FROM THE 2021 ANNUAL WEMP REPORT)



Red Fox,



Rock ptarmigan

Following our review of the 2021 WEMP report, the Agency recommended that the 2021 ERM camera report be withdrawn and revised and had a number of specific concerns with the analysis and conclusions of the

report: 1. Its conclusions about rates of deflection are unwarranted given the sample design and definitions since the cameras are only sampling caribou that come within 30 m of the roads, ignoring those individuals

who may have deflected at greater distances.

2. If one were to assume that traffic intensity and spacing are major determinants in caribou crossing success, the camera data should have been examined in relation to road traffic levels.

The 2021 WEMP partially acknowledges these concerns by stating "The ERM report (ERM 2020a) supported the conclusion that roads did not appear to be barriers to caribou movement at the local scale".

ZOI RE-EXAMINATION

In 2021, Arctic Diamond released a report prepared by ERM that re-examined the Zone of Influence (ZOI) around the Ekati and Diavik diamond mines and

evaluated potential reasons for the observed patterns. The ZOI is used to determine whether development is causing caribou to avoid areas near the mine they would otherwise use. The

ERM report concluded that the distribution of high-quality caribou habitat alone in the vicinity of the Ekati mine was sufficient to reasonably explain the observed caribou distribution around the mine, and that earlier studies by Boulanger and colleagues (2012) were compromised due largely to the statistical methods used in the analysis. Although the statistical discussion back and forth is beyond what can be described here, Boulanger and colleagues disagreed with the conclusions of the ERM report, suggesting that both examinations do indeed show a ZOI around the diamond mines averaging about 7 km and acknowledging that ZOI distance and strength vary among years.

GRIZZLY BEAR MONITORING

Grizzly bears were monitored at Ekati through incidental observations. There were 191 individuals sighted on 170 occasions during 2021, including 16 observations of family groups (any group of two or more bears). As with all incidental observations many sightings were likely the same individual(s) recorded on multiple occasions. These are the highest number of bear sightings since records began in 2001.

OTHER WILDLIFE

In 2021, 93 wolves were sighted on 63 occasions, similar to the high numbers documented in recent years. Wolf observations were more frequent between the main camp complex and the Sable Pit. Incidental sightings of 14 wolverines, 52 foxes and 9 moose occurred in 2021. Despite persistent monitoring and the bird deterrent program, nesting by a pair of peregrine falcons and two pairs of rough-legged hawks occurred at the Sable and Pigeon pits in 2021. On approval from ENR, blasting within 150-200 m of the nests occurred on 14 occasions while the sites were monitored. Reactions by the adults ranged from remaining on the nest (peregrine falcons) to flushing from the nests but returning within a few minutes (rough-legged hawks). Chicks successfully fledged from all nests. For the second year in a row, the North American Breeding Bird Survey was not conducted.



Arctic wolves, photo courtesy of Ekati Diamond Mine



Caribou grazing, photo courtesy of Ekati Diamond Mine



AGENCY COLLARED CARIBOU MOVEMENT REPORT In 2021, the Agency released a report¹ that examined collared caribou movements (pathways) in relation to mine infrastructure from 2010-19.

Examining collared caribou data provided by GNWT-ENR, the report concluded that caribou approaching the mine site slowed their speed of movement and made more sharp turns, thus spending more time closer to the mine when they should have been more readily moving through. Caribou were delayed on their movements on over half of encounters within 3 km of the mine and major roads, and of these, over three-quarters of collared individuals did not cross the mine and its roads. Caribou delayed on average 1.5 days when they eventually crossed the mine/ roads and 4.5 days when they did not eventually cross the mine/roads. The rate of crossing either through the mine site or across the roads was about 25%.

These delays in movement and low road crossing rates by collared caribou occurred despite the current caribou mitigation plans. Our study suggests that the current mine plans to help caribou cross the mine and roads are not working well, and that changes to these plans are needed.

¹ Poole, K.G., A. Gunn, and G. Pelchat. 2021. Influence of the Ekati Diamond Mine on migrating tundra caribou movements. August 2021. Report prepared from the Independent Environmental Monitoring Agency, Yellowknife, NT.

AGENCY ASSESSMENT

The 2021 WEMP provided detailed reporting on incidental sightings, monitoring programs, waste management, and wildlife incidents and management actions. The data and observations were reported clearly, and the figures and tables – especially the trends over time – were generally well presented. The integration of the Misery Road and power line surveys was a welcome change.

However, there are important changes and additions to the report that are required. There is still no apparent integration of datasets from incidental observations, road/Misery power line survey data, or LLCF monitoring surveys, integration of which would lead to a more comprehensive picture of caribou distribution at the mine site and possibly make monitoring more efficient. Broad comparisons of the number of caribou observed during road and power line surveys between years of operation (2019 and 2021) and when the mine was in Care and Maintenance (2020) were provided, but the comparison would have been strengthened by examining the percentage of observations that occurred within 250 m of the roads. Caribou herds shift their broad movements annually, so daily numbers or groups observed among years may not be the most useful metric of comparison to examine the potential effects of mine activity on caribou presence.

The company appears to have acknowledged that the camera data do not accurately reflect deflection rates for all caribou approaching mine infrastructure, missing animals that chose not to approach at greater distances than the cameras can detect. This acknowledgement was provided with the addition of *"at the local scale"* to statements on the permeability or acceptance of caribou to mine activity. As the Agency has brought up repeatedly in recent years and demonstrated in our exploratory report released in 2021, proper examination of collared caribou movement pathways at the larger mine scale is required to evaluate the effectiveness of mitigation methods and to begin to address statements such as *"Observations of caribou near and crossing all roads suggest that the roads do not impede caribou movement*".



Caribou crossing structures (ramps) have long been claimed by the mine as an effective mitigation strategy to facilitate caribou movement through the mine site, yet there has been no robust examination of the effectiveness of these structures; the current camera study is not designed to examine this question. The effectiveness of caribou ramps is especially questionable given the findings of the camera study that indicated roadside slope or rock sizes did not affect caribou crossing success. Since the caribou ramps are designed with low side slope and finer surface crush, then the camera study findings do not directly support caribou ramps as an effective mitigation tool for caribou movement. As it stands now, current mitigation does not appear to be effective at facilitating caribou movement through the mine site.

As the Agency has noted previously, the CRMP uses collared caribou as an Action Level (trigger) to initiate intensified levels of monitoring and mitigation, but how often and when these collars have been used as triggers have never been provided. Table 4.1-3 in the WEMP indicates that the Red alert level (Level 3 – high risk) was in place for 320 days (88%) of the year "due to caribou presence (collar data and/or observations". Red alert level is triggered by "0.25% of total cows in Bathurst herd within 200 m of roads, \geq 1 caribou group sighting within 500 m of roads during northern migration (May) and/or \geq 1 caribou crossing road". Better presentation of the trigger to changes in or maintenance of alert levels would be useful for assessing monitoring effectiveness. As it is, there is no way to evaluate the effectiveness of monitoring methods to trigger enhanced mitigation and of the applied mitigation, limiting the ability to evaluate adaptive management.

As noted in our review of the 2020 WEMP, the 2021 report does not incorporate data from collared male caribou because *"male caribou were not historically included in monitoring of the Bathurst herd, and as they use different ranges than females at some periods within the year"*. Given the number of males collared since 2015 and the fact that a caribou is a caribou regardless of its sex from a disturbance and mitigation stand-point, we repeat that there is no ecological reason not to incorporate data from male collars in the program.

The 2022 WEMP will be the 25th annual program and report, a milestone in wildlife monitoring programs.

Caribou calf, photo courtesy of Ekati Diamond Mine


A caribou grazing near the mine, photo courtesy of Ekati Diamond Mine



AGENCY RECOMMENDATION:

The Agency recommends that Arctic Canadian Diamond Company work with stakeholders to assess the effectiveness of mitigation measures currently used under the Caribou Road Mitigation Plan. This can be done at different scales; the larger scale could include the analysis of caribou movements from collar data and the smaller scale could include Traditional Knowledge by having chosen community members observe and document caribou movements and interaction with roads and crossing ramps when caribou are moving through the site.

To see Arctic Diamond's response to the Agency's recommendations, please see Appendix B

Aquatic Effects

DEFINITIONS

Action level: when the concentration of a substance exceeds a level defined in the Aquatic Response Framework, where the company must take precautionary action in order to reduce or remove the potential for impending harm

Benchmark: a standard against which to compare or assess a monitored parameter

Benthic macroinvertebrate: all life forms without bones living on lake and stream bottoms (i.e. clams, snails, crustaceans, insect larvae and worms)

Benthos: animals and plants that live at the bottom of a lake, wetland or stream

Discharge: to allow wastewater to flow out or be pumped out from where it was held

Gonadosomatic index (GSI): represents the energy allocated to reproduction and is calculated as gonad weight/body weight x 100

Liver Somatic Index (LSI): a metric tied to healthy metabolism, calculated as liver weight/body weight x 100

Phytoplankton: microscopic plants (e.g., algae) found in freshwater and ocean environments. They are an important food source for zooplankton

Zooplankton: small, mostly microscopic animals that live suspended in freshwater (and ocean) environments. Zooplankton feed on phytoplankton and small particles in the water. They are an important food source for fish



Water sampling, photo courtsey of Ekati Diamond Mine

HIGHLIGHTS

- Selenium levels increased in Leslie, Moose and Nema Lake sediments and may mirror selenium total body concentrations in slimy sculpin living on the bottom of these lakes.
- Infestation with the tapeworm Ligula shows a statistically significant correlation to lowered reproductive capacity and smaller livers in slimy sculpins in Koala and King-Cujo watershed lakes.

Each year monitoring programs and studies are conducted at Ekati to determine if changes in the aquatic environment downstream of operations are occurring as a result of mining activities. There are five watersheds which may be affected by mining operations: Koala-Lac de Gras, King-Cujo, Carrie Pond, Pigeon-Fay-Upper Exeter and Horseshoe. Figure 1X illustrates the locations of these watersheds. Lakes and streams in these systems, as well as background sites, are sampled each year under the Aquatic Effects Monitoring Program (AEMP), as required in Arctic Diamond's water license. Using information collected through the AEMP, changes and trends in water and sediment quality, benthic macroinvertebrate communities, phytoplankton and zooplankton, as well as fish populations and fish health, can be identified.

AQUATIC EFFECTS MONITORING PROGRAM

The year 2021 was the 24th consecutive year of aquatic effects monitoring in the Koala Watershed, the 20th consecutive year in the King-Cujo Watershed, and the 3rd consecutive year in the Horseshoe Watershed. In 2021, Carrie Pond Watershed was no longer monitored because discharge from Desperation Sump is no longer occurring and was discharged to the inactive Lynx Pit instead. If discharge from Desperation Sump to the Carrie Pond Watershed was to occur in future years, AEMP monitoring at Mossing Outflow would resume.

WATER QUALITY

Every year the annual AEMP data is examined for any changes to water quality. The results are summarized in Table A-1 in Appendix A. Overall, there were no new increasing trends in water quality variables reported in 2021 that were downstream of the Long Lake Containment Facility (LLCF) or King



Nearby stream, photo by Ekati Diamond Mine

Pond Settling Facility (KPSF). For the first time in 10 years, under-ice oxygen levels in Cujo Lake improved. Most lake basins in Cujo experienced good oxygen levels necessary for fish health, however sufficient oxygen levels for fish were not maintained in the shallowest lake basin. In 2020, Arctic Diamond installed an aerator to pump air into the lake that operated from November through to mid-December to help increase the dissolved oxygen concentrations. Arctic Diamond will continue to aerate Cujo Lake in 2022. At the time of writing, there are no definitive conclusions as to whether or not the low under-ice oxygen concentrations are related to mining activities.

AQUATIC RESPONSE FRAMEWORK

The Aquatic Response Framework is a planning document that uses quantitative action levels, or benchmarks, to provide an early warning to Arctic Diamond and regulators about changes in the downstream aquatic environment that may become a concern. A series of benchmarks are set below the specific thresholds that indicate a possible negative impact on the downstream environment.

WATER QUALITY EXCEEDANCES

Two water quality variables exceeded an action level in 2021: chloride and potassium. The table below identifies three lakes in the Koala-Lac de Gras watershed that are downstream from the LLCF. Each lake experienced one or

THERE ARE THREE TIERS OF ACTION LEVELS, EACH WITH ASSOCIATED TRIGGERS, FOR WATER QUALITY VARIABLES OTHER THAN DISSOLVED OXYGEN:



more exceedances in open water (summer) or under-ice (winter) water conditions. The map in figure A-2 shows how these lakes are connected.

PLANKTON EXCEEDANCES

There were four lakes affected by

plankton action level exceedances in 2021. While there were no phosphorus exceedances for this year, it is possible that the higher concentrations in previous years may persist in the lake and could be a key driver for changes in the plankton metrics. Table 2 shows the affected lakes and which plankton metrics were exceeded for 2021.

The company believes that minerelated nutrient enrichment has caused effects in phytoplankton biomass in both the Koala and King-Cujo watersheds. The

TABLE 1: WATER QUALITY EXCEEDANCES FOR 2021

	AFFECTED LAKES				
Water quality variable	Leslie	Moose	Nema		
chloride	LAL winter	LAL winter			
potassium	LAL summer and winter MAL winter	LAL summer and winter	LAL winter		

Winter = under-ice season | Summer = open water season

Phosphorus Response Plan (Section E.2.4) now specifies that future effluent discharge from the KPSF will consider total phosphorus concentrations in both the KPSF and the Receiving Environment before implementing discharge to Cujo Lake.

UPDATED RESPONSE PLANS

The following Response Plans, developed to address action level exceedances, were updated in 2021):

Phosphorus (Version 2.1)

Plankton and Benthos (Version 2.0)

SEDIMENTS

Sediment sampling occurs every three years in the AEMP lakes. It is used to assess the impact on the organisms that live in and feed off the sediments.

There are three variables showing significant trends in 2021: molybdenum, arsenic and selenium.

Concentrations of molybdenum have been steadily increasing in sediments of Koala Watershed lakes over the last five years. In





Graph provided from the 2021 AEMP report Figure 3.3-9

the graph above Leslie, Moose and Nema lakes are illustrated in the red, orange and green lines respectively. As the concentration of molybdenum increases over time, the lines in the graph will move higher. There are currently no sediment quality guidelines for molybdenum.

Arsenic concentrations remain elevated above the Canadian Council of Ministers of the Environment (CCME) Interim Sediment Quality Guideline (ISQG) in the sediments of all mineaffected and reference lakes. This suggests the increases detected in lakes downstream from the LLCF and the KPSF are not due to mine activities. Furthermore, these elevated levels in sediment likely did not influence the levels detected in slimy sculpin (sculpin) as the mean whole body arsenic concentrations declined by 67% from 2007 to 2021. Selenium levels continue to rise in the sediments in Leslie, Moose and Nema lakes. In Leslie and Moose lakes, selenium concentrations exceeded or approached levels that could adversely impact aquatic life (means of 2.15 and 1.99 mg/kg, respectively). For comparison, both the BC Ministry of Environment and the US EPA screening benchmark concentration is 2.0 mg/kg. Figure 5 illustrates a sharp increase in selenium concentrations detected in the sediments in Leslie and Moose lakes from 2014 to 2021 (shown in red and orange lines respectively).

SMALL BODIED FISH (SLIMY SCULPIN)

Sculpin were the only fish monitored in 2021. Small bodied fish are monitored every three years while the larger, longer-lived species are monitored every six years. Sculpin are monitored more frequently than trout and whitefish as it is felt slimy sculpin populations can withstand sampling pressures better than the larger fish.

SELENIUM

The concentration of selenium detected in sculpin appears to be influenced by their proximity to the LLCF discharge. Sculpin in lakes closest to the LLCF have higher selenium concentrations in their tissues than those found in lakes further downstream in the watershed. This is reflective of the concentrations also detected in lake water and sediment. No sculpin in any of the lakes had selenium at concentrations above USEPA guidelines for whole body selenium, although levels did exceed the LAL. An updated Fish Response Plan is due to be





Graph provided from the 2021 AEMP report Figure 3.3-13

submitted to the WLWB in May 2022 that will address this new Action Level exceedance for sculpin.

MERCURY

Similar to selenium, sculpin in Leslie Lake, closest to LLCF, had the highest mean (0.071 mg/kg wet wt.) and maximum (0.153 mg/kg) mercury wholebody concentrations of all Koala watershed lakes. Sculpin in all monitored Koala watershed lakes had higher mercury concentrations than those in their three reference lakes. However, none of the 2021 sculpin sampled in any of the AEMP lakes contained mercury above Health Canada guidelines.

In Kodiak Lake, which is

downstream of the Panda Diversion Channel but not downstream of LLCF, there was a statistically significant increasing trend of mercury concentration in sculpin from 2007 to 2021, the only AEMP lake showing this result. Mercury in sculpin increased by 0.012 mg/ kg over this period. It is unclear how increasing concentrations of mercury were found in fish that feed off of invertebrates on lake bottom sediments since the mean mercury concentrations in Kodiak Lake sediments have been in decline since 2011 and are well below the CCME sediment guidelines. This makes it difficult to establish a correlation between the mercury measured in sediments and in sculpin. The level of mercury in benthic invertebrates that sculpin consume could help provide clarity however these organisms are not monitored for metals.

TAPEWORM

Since 2007, tapeworm (Ligula) infestation has been monitored in sculpin in Koala and King-Cujo watershed lakes. The AEMP report notes that Ligula infestation can interfere with biological processes in sculpin. For the first time, Ligula infestation showed a statistically significant correlation to lowered female reproductive capacity (GSI) in infested sculpin compared to Ligula-free sculpin in all lakes except one reference lake.

Similarly, a correlation was found between smaller livers (LSI) in infested sculpin compared to noninfested sculpin for all lakes except for two lakes furthest downstream of LLCF (Nema and Slipper) and one reference lake.

No direct effects on slimy sculpin GSI and LSI from LLCF or KPSF effluent can be concluded as GSI increased over the last 10 years in lakes downstream of both LLCF and KPSF and no pattern for LSI was found. (statistically corrected for Ligula infestation).

All lakes downstream of the LLCF in 2021 had increased infestation over the past two monitoring years (more than double the percentage of sculpin infected since 2015). However, there were no significant correlations between the proportion of slimy sculpin infested and spatial proximity to the LLCF or to mine infrastructure, and all these infestation rates were within the range of rates found in reference lakes in 2021 (17-46% in reference) except for Slipper Lake where

TABLE 2: PLANKTON EXCEEDANCES IN 2021

	KOALA-LAC DE	KING-CUJO WATERSHED		
Plankton metrics	Leslie Lake	Moose Lake	Kodiak Lake	Cujo Lake
Phytoplankton Biomass	x		x	X
Community composition of Phytoplankton	х	х		
Community composition of zooplankton	х	х		х
Density				X

73% of samples were infested. Conversely, in Cujo Lake Ligula infestation rates were the second lowest since 2007 and were lower compared to reference lakes.



AGENCY ASSESSMENT

The Agency is pleased to see that individual Response Plans within the Aquatic Response Framework are improving with every revision to these plans. Arctic Diamond has been complying with WLWB's expectations for new information in every update.

Given the elevated levels of selenium in sculpin from lakes downstream of the LLCF and mercury in Kodiak Lake, the Agency will be keenly interested to see monitoring results for these metals in lake trout and round whitefish, fish that are higher up the food chain, which were not monitored in 2021. Monitoring of these fish species is scheduled for 2024.

As was the case in our previous reporting year (2020-21), the Agency is concerned about possible long-term impacts on aquatic life in the Koala watershed from the prolonged exceedances of potassium action levels over the past 6 open-water seasons and 10 under-ice seasons. If these exceedances persist into next year's monitoring season, the Agency believes the company should consider whether constant excessive potassium loading in the watershed could create future chronic toxicity in the most sensitive aquatic life such as clams and crustaceans.



Water sampling, photo courtesy of Ekati Diamond Mine

Air Quality

DEFINITIONS

Ambient air quality: the concentration of pollutant in the surrounding air

Concentration: the amount of a substance in the defined space; the amount of different pollutants in the surrounding air

Dust suppression (or suppressants): actions that prevent or reduce the amount of dust spreading into the air

Greenhouse gases: gases in the atmosphere that trap heat. They allow sunlight to pass through and warm the earth, but prevent the warmth from leaving. Most common GHGs are water vapour, carbon dioxide, methane, ozone, nitrous oxide and chlorofluorocarbons. **Meteorological:** the science of weather and climate; the conditions of the atmosphere in an area.

Monitoring: collecting and analyzing repeated observations and measurements to evaluate change and impacts of change. Watching habitat and wildlife, and 'keeping an eye' on things all the time.

Particulates/particulate matter:

Very tiny bits of dust, smoke, and other materials in the air. Some are big enough to see with your eyes; others are so small you need a microscope. Particulate matter is a mix of particulates and liquid droplets.



Photo courtesy of Ekati Diamond Mine

HIGHLIGHTS

- Ambient air quality remains good at the Ekati mine with only a few exceedances of relevant air quality standards being reported in 2021.
- The Wek'èezhìi Land and Water Board has concluded there is sufficient evidence to require periodic testing of stack emissions from the solid waste incinerator operating at the mine site.

AIR QUALITY MONITORING AT THE EKATI MINE

The Air Quality Monitoring Program (AQMP) was started in 1998 as a requirement under the Environmental Agreement and is comprised of:

- daily meteorological monitoring;
- annual greenhouse gas (GHG) emission calculations;
- ambient monitoring of total suspended particulate (TSP) and fine particulate matter with a diameter less than 2.5 μm (PM_{2.5}), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), nitric oxide (NO), and oxides of nitrogen (NO_x) levels;
- dust deposition (dustfall) monitoring in summer including total dustfall, acid deposition, and metal deposition;
- snow chemistry monitoring (every three years); and
- lichen tissue monitoring (every three years).

Results are reported and assessed every three years, including 2021, while annual data reports are released in the interim years.

METEOROLOGICAL MONITORING Meteorological data are collected year-round from the Koala station near the Ekati airport and during open water season at the Polar Lake station. In 2021 however, the Polar Lake station was not operated because of limited resources caused by COVID-19 safety measures as well as frequent bear activity in the area.

The average daily air temperature at the Koala station during 2021 was -9.0°C, which is almost the same as the annual average temperature since monitoring began in 1995 of -8.9°C. Daily mean temperatures generally rose above 0°C in early June, marking the start of the open-water season, and dropped below 0°C by early October, marking the start of winter. The total precipitation in 2021 was 246 mm, which is 24% or 80 mm below the 1994 to 2021 average of 326 mm. **GREENHOUSE GAS EMISSIONS**

Diesel fuel used in vehicles and for heating buildings is the main source of GHG emissions at Ekati with other sources being the combustion of Jet fuel, waste incineration, composting and sewage. GHG emissions are estimated to be 150.8 ktCO₂e (kilotonnes of carbon dioxide equivalent) in 2021. This is 83% higher than annual GHG emissions in 2020 when the mine was in Care and Maintenance, and 26% lower than the average annual emissions between 2017 and 2020 when the mine was under normal operating conditions.

SUSPENDED PARTICULATE (DUST) MONITORING

TSP levels are monitored at the Cell B station (near the Long Lake Containment Facility) and the Grizzly Lake station while PM_{2.5} and TSP levels are monitored at the CAMB air quality monitoring station (near the Polar Explosives site). Samples are obtained over a 24-hour period from midnight to midnight every six days. There were no exceedances of either the Government of the Northwest Territories (GNWT) or the Canadian Council of Ministers of the Environment (CCME) 24-hour and annual mean standards for PM_{2.5} and TSP in 2021.

DUSTFALL MONITORING

Commercial dust suppressants and water is used at Ekati to reduce fugitive dust emissions from roads and the airport runway. In 2021, EnviroKleen products already on site were applied to areas surrounding the camp infrastructure, airport, and main haul roads, while water was used to suppress dust on the Fox, Misery, and Sable haul roads.

Dustfall monitoring was conducted at 31 locations in 2021, including five transects along the Sable, Misery, Lynx and Lac du Sauvage haul roads, three stations at the airstrip, and two at the LLCF. Each haul road transect consists of five stations (30 m upwind, and 30, 90, 300, and 1,000 m downwind), except the Lac du Sauvage transect that consists of four stations (30 m upwind, and 30, 90 and 300 m downwind).

Similar to other years, dustfall rates were highest close to haul roads and the airport, and decreased with distance, generally

approaching background levels at approximately 300 m distance. While dustfall concentrations were above the GNWT interim seasonal dustfall objective of 1.53 mg/dm²/d at two stations 300 m from the Misery and Sable roads during July and August respectively, all 300 m haul road stations met the objective when adjusted on a seasonal basis. Dustfall rates measured at the airstrip and LLCF stations were generally 25-75% of the GNWT interim objective, except for one station near the airstrip that exceeded the interim objective in July 2021.

NITROGEN DIOXIDE AND SULPHUR DIOXIDE MONITORING

NO2 and SO2 levels are monitored continuously at the CAMB monitoring station. The average hourly, daily, and annual concentrations of these gases in 2021 were well below the relevant GNWT and CCME air quality standards.

SNOW CHEMISTRY MONITORING

Snow chemistry surveys are conducted every three years to determine the quality of winter precipitation (snow) in those areas further away from mining activities. These surveys also provide supplementary information for the meteorological monitoring program and support hydrological modelling used in the interpretation of water quality in the receiving environment. Thirty-one snow samples were collected in 2021. As in previous years, chemical analysis suggests that winter loading of TSP and some metals associated with fugitive dust and fine particulates were elevated in the area immediately surrounding the mine footprint but decreased with distance.

LICHEN TISSUE MONITORING

Lichen tissue is an indicator of the distribution of dust, particulate, metals and other air emissions from a variety of sources, including roads, stationary emission sources (i.e., waste incinerators and buildings), vehicles and heavy equipment, and is an indicator of air emission impacts over time and distance. Results in 2021 confirm previous findings that concentrations of elements in lichen tissue decrease with distance from the mine and, similar to dustfall, the concentrations decrease at a greater rate near the mine as compared to further distances.



Dust suppression, photo courtesy of Ekati Diamond Mine

AGENCY ASSESSMENT



Overall, ambient air quality remains good at the Ekati mine with only a few exceedances of relevant air quality standards being reported in 2021.

With the planned expansion of mining into the Point Lake area, the Agency is concerned ambient air quality in the southern half of the Ekati claim block may now be impacted by dust from the construction of roads and pads, pit blasting and increased use of haul trucks. As a result of this increased activity, the Agency suggests that the Lac du Sauvage dustfall monitoring transect be expanded from four-stations to five stations. This change would be consistent with all other transects currently being operated at Ekati.

The current dustfall monitoring program includes a 5-station monitoring transect adjacent to the Lynx haul road. Arctic Diamond has suggested this transect no longer provides useful information due to the limited traffic occurring along the Lynx Road. Current expansion planning suggests however, the Lynx pit haul road could see increased traffic over the next two years with the planned testing of underwater remote mining (URM) at the pit. The Agency suggests the current dustfall monitoring transect continue to be operated until the URM testing program is complete and future of the Lynx pit is known.

Arctic Diamond currently operates two Westland CY-130-CA-O-D waste incinerators equipped with venturi scrubbers to dispose of burnable food, plastic and paper waste at the mine site. In March 2022, the Wek'èezhìi Land and Water Board concluded, based on evidence provided by the Agency and the GNWT, that there is sufficient evidence to require periodic incinerator stack testing and directed that testing take place every three years and results communicated to the GNWT. In the absence of territory-wide air quality regulations, this decision establishes a significant precedent, and one that is fully endorsed by the Agency.

The AQMP outlines Arctic Diamond's commitment to monitoring and reporting on ambient air quality. In 2021 the Agency suggested that, while air quality at the mine site continues to be good, the AQMP should establish air quality thresholds or early warning levels which, if exceeded, would trigger additional mitigative measures. This approach is consistent with the adaptive management approach for surface water outlined in the Aquatic Effects Monitoring Program and measures outlined in the GNWT draft Air Quality Monitoring Guidelines for Diamond Mine Operators.

Waste Rock Management

HIGHLIGHTS

- Over 17 million wet metric tonnes of waste rock were deposited at four locations in 2021. This is similar to volumes deposited during normal operating years.
- A better understanding of the factors that influence the Effective Neutralization Potential of waste rock is beginning to emerge.
- The emergence of increasing trends and concentrations of metals and other variables in some Waste Rock
 Storage Area seepage sampled in 2021 is worrisome and requires continued attention.

DEFINITIONS

Acid [rock] drainage: Outflow of water that has become acidic due to exposure to exposed rock surfaces in waste rock piles, open pits and underground workings

Landfarm: a place to treat contaminated soil

Mitigation, mitigating: an action that is taken to reduce the negative impacts of a condition or situation. To make something less harmful. In this case, to make sure environmental impacts from the mine are as minimal as possible

Metasediment: a type of metamorphic rock transformed by heat, pressure, other natural actions **Neutralize:** to make something ineffective or harmless. In this case, to make an acid or alkaline substance chemically neutral

Overburden: rock or soil covering a mineral deposit. It is removed to get to the ore or rock that contains the desired mineral(s)

Seepage: the slow escape of liquid or gas through a porous material or small holes. In this case, liquids escaping from waste rock piles that may contain contaminants

Till: a coarse collection of clay, sand, gravel and boulders mixed together and deposited by glaciers



LLCF in 2019, photo courtesy of Ekati Diamond Mine

WASTE ROCK STORAGE AREAS

Large quantities of overburden material and adjacent rock must be removed to access kimberlite ore. This waste material is transported from the open pits and underground by truck and deposited in large areas referred to as Waste Rock Storage Areas (WRSA).

There are currently five WRSAs at the Ekati mine. These are located near the Panda/Koala/ Beartooth, Fox, Sable, Pigeon and Misery open pits. Another large pile of waste rock, known as the Coarse Kimberlite Reject Storage Area (CKRSA) and comprised of kimberlite ore rejected from the process plant, is located within the Panda/Koala/Beartooth WRSA and is managed separately. A description of each storage area is provided in Table 3.

The WRSAs are permanent landscape structures that will remain in place following closure of the mine site. They are designed to be physically stable both during mine operations and in the long term, to promote the establishment of permafrost, and to achieve a reasonable balance between footprint area and height.

There were more than 17 million wet metric tonnes (wmt) of waste rock deposited at four locations in 2021. This compares to less than 4 million wmt deposited in 2020 due to the temporary suspension of mining activities but is similar to volumes deposited during normal operating years. The quantities and location of waste rock produced and deposited is provided in Table 4.

TABLE 4 -WASTE ROCK AND COARSE KIMBERLITE REJECT MATERIAL DEPOSITED IN 2021 (WMT)

WASTE PRODUCED	DEPOSIT LOCATION	QUANTITY (WMT)
Sable Pit	Sable WRSA	13,442,120
Pigeon Pit	Pigeon WRSA	2,373,366
Pigeon Pit	CKRSA	818,264
Misery Underground	Misery/Lynx WRSA	94,297
Central Mill Processing Facility	CKRSA	883,334





Sable Waste Rock Storage Area

Panda Waste Rock Storage Area

WASTE ROCK MONITORING

Waste rock and course kimberlite reject material is routinely sampled and analyzed for acid base accounting (ABA) and major and trace elements, including metals, as set out under the Waste Rock and Ore Storage Management Plan. Eight samples from six benches in the Pigeon Pit, three samples from Misery Underground and two samples of coarse kimberlite reject material were collected and analyzed as part of the 2021 waste rock monitoring program. No samples were collected from the Sable Pit as this is not a current requirement under the Management Plan.

Arctic Diamond reports that no major changes in waste rock and coarse kimberlite reject material characteristics were noted in 2021 from previous years. Each sample collected was classified as being non-potentially acid generating (non-PAG).

WASTE ROCK GEOCHEMICAL TESTING

A significant focus of the Agency over the past couple years has been on how Arctic Diamond measures the potential for waste rock to neutralize acidic conditions caused by its weathering. Until recently, the Standard Sobek testing method, which is a very chemically aggressive analysis, was used to estimate the Neutralization Potential Ratio (NP/ MPA). This ratio compares the neutralization potential of the rock to its maximum potential acidity - the higher the ratio, the more likely the acidity can be neutralized and impacts on the environment minimized. Our concern, and

WHY IS ACID ROCK DRAINAGE AND NEUTRALIZATION POTENTIAL IMPORTANT?

The formation of acid mine drainage from waste rock and the contaminants associated with it has been described as the largest long-term environmental problem facing the mining industry. Acid drainage is a major potential water quality problem because the acidity can cause metals that are normally bound in the waste rock to be dissolved and released in seepage to adjacent lands and water bodies. These dissolved metals are then available for uptake by vegetation, aquatic organisms and fish, which can be a pathway to the human food chain.

Acid mine drainage is especially important because it can occur over a very long period of time – long after mining has ended.

Fortunately, rocks contain varying amounts of carbonate and other minerals that can neutralize the acid produced. This is referred to as the neutralization potential of the rock. When there are sufficient minerals present to neutralize the acid produced, this rock is referred to as being 'non-potentially acid generating', or non-PAG. Likewise, when there are not sufficient minerals present to neutralize the acid being produced, the rock is referred to as being 'potentially acid generating', or PAG.

that of others, has been that the Standard Sobek method may be over-estimating the neutralization potential of the rock. As a result, in 2020 Arctic Diamond changed its testing to the Modified Sobek method. Although this method is a less chemically aggressive analysis, it remains unclear whether its results accurately reflect natural conditions found in the environment. Caution must be



initiated a study to investigate factors that influence the neutralization potential of waste rock. The study was designed to assess what effects temperature,

uncertainty, Arctic Diamond





minerology, particle size and other factors have on the acid generation and neutralization reaction rates and compare test results with the broader Ekati mine geology dataset.

Results from stage 1 of the study were released in October 2021. They confirm that mineralogical composition of the rock is the main factor that influences neutralization potential and suggest that the Modified Sobek method is a reasonable predictor of mineralogical neutralization potential. The exception is metasediment waste rock where a correction factor should be applied because of elevated concentrations of magnesiumcontaining silicate minerals. Kinetic testing of waste rock, which remains the preferred means of confirming Effective Neutralization Potential (ENP), is part of stage 2 of the study. These results will be used by Arctic Diamond to calculate ENP in waste rock that generates net acidity, validate the suggested neutralization potential correction factor for metasediment and evaluate the influence of temperature, minerology and particle size on ENP.

WASTE ROCK GROUND TEMPERATURE MONITORING

Ground temperatures within the WRSAs were again monitored in 2021 using ground temperature cables (GTC) installed at various locations. Arctic Diamond reports that ground temperatures within the WRSAs in 2021 show similar trends to those observed in previous years. Although the number of GTCs are limited in some locations and some cables that were previously installed are no longer operable, the measurements indicate the Panda/ Koala/Beartooth WRSA and toe berm, Misery WRSA and Fox toe berm are, except for the active layers, in a permafrost condition while large portions of the Fox WRSA remain unfrozen. Ground temperatures in the Sable WRSA are not being monitored as no GTCs have been installed and ground temperature data in the CKRSA is limited to readings taken prior to spring 2014 as there are no longer any functioning cables.

SEEPAGE MANAGEMENT

Water that contacts waste rock or drains from WRSAs is referred to as seepage. Where the quality of the seepage does not meet acceptable standards, the Water Licence requires it be managed and mitigation measures taken to reduce any potential environmental risks.

Samples from 51 identifiable seeps were collected in June and September of 2021 and analyzed as part of ongoing seepage management, 14 of which were newly identified and two of which were reference sites.

Monitoring results demonstrated there are no significant changes in seepage quality from previous years, with the following notable exceptions. In the Panda/Koala/ Beartooth area, an increasing trend in total and dissolved metal concentrations and Total Suspended Solids (TSS) was observed in some seeps draining away from the WRSA in a northeast or southwest direction. In Misery and Lynx area seeps, sulphate concentrations and conductivity generally showed increasing trends while one new seep in the Lynx area was acidic. In the Pigeon area, one seep had reduced buffering capacity relative to other seeps in the area while in the Sable area, several water quality variables, including TSS and metal concentrations, exceeded area background concentrations. The identification of water quality trends at the newly identified seeps is not possible because of the lack of historical data.

Results from samples collected from the two reference sites located in the Panda/Koala/ Beartooth and Misery areas continued to show minor influence from mining activities.

A 'seep of potential concern' (SoPC) is defined as seepage where the concentration exceeds Effluent Quality Criteria (EQC) as defined in the Water Licence or where it exceeds the 95th percentile value of the WRSAs historical dataset more than once during a two-year sampling period. When this happens, the cause of the exceedance must be investigated and mitigative measures taken to manage the risk. A total of 12 of the 51 seeps were identified as being a SoPC in 2021, compared to 5 being identified in 2020.

It is widely recognized by the Agency and regulators that the EQC contained in the Water Licence are not appropriate criteria for evaluating the risk from seeps. These criteria have been developed for large points of controlled discharges, such as water from the Long Lake Containment Facility. Seepage fundamentally differs from these large sources because of their inconsistent and often intermittent occurrence, short surface flow paths and multiple flows to a single receiving waterbody. In an attempt to develop a more appropriate approach to evaluating whether seepage causes an undue risk to the environment, Arctic Diamond proposed a Seepage Management Framework in 2021. Under the Framework, monitoring of seep water quality would continue but mitigative measures would only be taken when seep water quality exceeds new ecologically relevant thresholds within the nearest downstream lake or stream. This approach differs significantly from the current approach where seepage criteria are applied at the location seepage first emerges from the WRSA.



AGENCY ASSESSMENT

The management of waste rock and its associated seepage continues to be a challenge for Arctic Diamond, the Wek'èezhìi Land and Water Board and regulators.

Progress on the issue of waste rock neutralization potential has been mixed. While a better understanding of the factors that affect acid generation and neutralization reaction rates has been achieved through the Effective Neutralization Study, estimates of the Effective Neutralization Potential of waste rock have not been established. And while the Modified Sobek testing method has been demonstrated to be a more reasonable predictor of mineralogical neutralization potential, kinetic testing remains the preferred means of confirming Effective Neutralization Potential. Unfortunately, kinetic testing is costly to perform and can require up to a year to complete.

Unlike waste rock from Pigeon pit and Misery underground, Sable waste rock is comprised only of granite and diabase, and because of this, the requirement to sample and analyze the rock for acid base accounting and major and trace elements, including metals, was discontinued in 2019. The Agency is concerned this lack of sampling is inconsistent with modern best mining practices and could result in poor, or indefensible, WRSA operational and closure planning.

It is difficult to draw conclusions from the comparatively large number of SoPC identified in 2021 compared to



Land train traveling along the Sable Road, photo courtesy of Ekati Diamond Mine

previous years, however, the increasing trends and concentrations of total and dissolved metals and other variables in some seeps is worrisome as it has implications for water quality in lakes and streams as well as the prediction of future water quality. These apparent changes need continued attention and consideration as WRSA construction nears completion and closure planning continues.

The Agency acknowledges the need for a better approach to managing seepage and work undertaken by Arctic Diamond on the Seepage Management Framework, however its approval and application would be premature because, as the Wek'èezhii Land and Water Board has confirmed, the proposed Framework is not in compliance with the Water Licence.

The Seepage Management Framework is only one of several possible approaches to seepage management. Others include amendments to the Water Licence that would apply specifically to seeps and the development of ecologically relevant EQC for seeps. The Agency looks forward to further discussions with Arctic Diamond and other parties on alternative approaches to seepage management.

As discussed in the Agency's 2020-21 Annual Report, the environmental risk from seepage is dependent upon three major factors: the water quality of the seepage; the volume of flow; and the sensitivity of the adjacent environment. The current seepage monitoring program provides valuable information on what variables are present and their concentration in seeps while the Aquatic Effects Monitoring Program assesses the state of adjacent lakes and streams. However, information on the annual and seasonal volume of seepage flow and other factors that influence water balance within WRSAs remains limited. The Agency suggests the installation of surface and subsurface flow instrumentation at selected locations and investigation into factors that influence water balance would help to provide information needed to better assess the environmental risk from seeps

Although Arctic Diamond has stated permafrost conditions are not required to ensure the long-term physical and geochemical stability of WRSAs, the Agency suggests waste rock ground temperature monitoring is essential to understanding the physical and chemical processes taking place within the rock piles. For this reason, Arctic Diamond is encouraged to install additional GTCs in the Misery, Pigeon and Sable WRSAs as well as the CKRSA once their construction has been completed. This is particularly important for the Misery and Pigeon WRSAs because of the presence of co-placed PAG metasediment and non-PAG waste rock.

Results from samples collected in 2021 from the two seepage reference sites located in the Panda/Koala/Beartooth and Misery areas showed continued minor influence from adjacent mining activities. This raises the question of whether these sites remain appropriate as reference sites and whether alternative sites should be evaluated.



RECOMMENDATIONS:

Monitoring of Sable Waste Rock

The Agency recommends that Canadian Arctic Diamond Company re-initiate the monitoring of Sable pit waste rock for acid base accounting and major and trace elements, including metals, which would be consistent with modern best mining practices

2 Factors that Influence WRSA Water Balance

The Agency recommends that Canadian Arctic Diamond Company install and monitor surface and subsurface flow instrumentation at selected long-term seepage locations and investigate other key factors that influence waste rock storage area water balance. 3 Alternative Seepage Reference Sites

The Agency recommends that Canadian Arctic Diamond Company identify and evaluate alternatives to the existing seepage reference sites (REF-005 and REF-040) which continue to show minor influence from nearby mining activities.

to see Arctic Diamond's response to the Agency's recommendations, please see Appendix B

TABLE 3 - WASTE ROCK STORAGE AREA PHYSICAL CHARACTERISTICS 1

WRSA	PANDA KOALA BEARTOOTH	FOX	SABLE	PIGEON	MISERY/LYNX	COURSE KIMBERLITE REJECT ²
Operational Status	Complete	Complete	Active	Active	Active	Active
Rock Types	Granite, Diabase, Till	Granite, Diabase, Kimberlite, Till	Granite, Diabase	Granite, Metasediment, Till	Granite, Diabase, Metasediment	Kimberlite
Planned Footprint (square kilometers)	3.4	3.2	1.8	0.8	1.5	1.2
Planned Height (m)	50	50	65	70	65	50
Internal Facilities	Overburden Stockpile, Quarry, Landfill, Landfarm	Overburden Stockpile, HC Impacted Material ³	None	None	Overburden Stockpile, Landfill, HC Impacted Material ²	None

Notes

1. Source – Interim Closure and Reclamation Plan v3.0.

2. The Course Kimberlite Storage Area is located within the Panda/Koala/Beartooth WRSA and is managed separately.

3. Hydrocarbon Impacted Material is rock and soil greater than 4 cm in diameter that contains spilled hydrocarbons.

Wastewater And Processed Kimberlite Management

DEFINITIONS

Fine processed kimberlite: very small particles (sand, silt, claysized) less than 0.5mm diameter, left over as waste from the process to remove diamonds from the kimberlite ore **Slurry:** fine processed kimberlite mixed with water

Surface minewater: Water that flows or is pumped from surface mine infrastructure, e.g., roads, waste storage areas, truck wash bays, collection sumps **Wastewater:** water that has been affected by mining processes, activities or wastes



Beartooth pit, photo courtesy of Ekati Diamond Mine

HIGHLIGHTS

- Arctic Diamond discharged approximately 217,000 m³ of water from the Two Rock Sedimentation Pond on an emergency basis in the fall of 2021. The water levels in the pond had risen to the point that could adversely affect the integrity of the frozen core dam. Arctic Diamond's delay in submitting the required Two Rock Outfall Report delayed approval for planned discharges, leading to the emergency situation.
- In 2021, almost all Fine Process Kimberlite and process plant liquids were deposited into the Panda-Koala Processed Kimberlite Containment Area, with only small amounts to the Long Lake Containment Facility.



Sable Pit and Two Rock Sedimentation Pond, photo courtesy of Ekati Diamond Mine

WASTEWATER AND FINE PROCESSED KIMBERLITE

The Wastewater and Processed Kimberlite Management Plan (WPKMP) describes sitewide wastewater and fine processed kimberlite (FPK) management. Wastewater and FPK management are closely linked activities because much of the site wastewater is a result of FPK that leaves the process plant as a slurry of fine ground up rock mixed with water. Table 5 summarizes the types of wastewater and processed kimberlite (PK) at the Ekati mine site.

TABLE 5 - WASTEWATER AND PROCESSED KIMBERLITE TYPES.

CATEGORY	ТҮРЕ	DESCRIPTION/SOURCE	
Minewater Runoff from facilities and water pumped from mines	Surface Minewater	Water that flows or is pumped from surface mine infrastructure, e.g., roads, waste storage areas, truck wash bays, collection sumps.	
	Open Pit Minewater	Water that flows or is pumped from open pits.	
	Underground Minewater	Water that flows or is pumped from underground workings.	
Sewage Toilet waste and greywater	Sewage – Main Site	Sanitary sewage system at the main site.	
	Sewage – Remote Sites	Sewage from remote work sites, e.g., Sable Camp, Misery Camp.	
Processed Kimberlite Material rejected from process plant after diamond recovery	Coarse Processed Kimberlite	Coarse kimberlite (> 0.5 mm diameter particles) rejected from the process plant. Trucked to waste rock storage areas (See Waste Rock section of this report for more information).	
	Fine Processed Kimberlite (FPK)	Fine kimberlite (< 0.5 mm diameter particles) discharged from the process plant in a slurry mixture of FPK and water.	

WASTEWATER MANAGEMENT

WASTEWATER DISCHARGE AND CONTAINMENT

Water Management Facilities

Ekati mine discharges water from three water management facilities. Before discharge to adjacent lakes, Arctic Diamond collects and analyzes water samples to confirm compliance with the Water Licence Effluent Quality Criteria (EQC). Long Lake Containment Facility (LLCF) manages water from the Main Camp, Panda/Koala/ Beartooth area, Ammonium Nitrate Storage Facility, Polar Explosive Building, Fox site and Pigeon site, with discharge to Leslie Lake in the Koala watershed. Between June 18 and November 5, 2021, Arctic Diamond discharged approximately 7.5 million m³ of water from the LLCF to Leslie Lake. This was much less than the 2020 discharge of over 16 million m³.

King Pond Settling Facility (KPSF) at the Misery site currently manages water from the Misery and Lynx sites, with discharge to Cujo Lake in the King-Cujo watershed. Beginning in 2022, KPSF will also manage water from the Point Lake project. Between July 22 and August 10, 2021, Arctic Diamond discharged approximately 300,000 m³ of water from KPSF.

Emergency Discharge

Two Rock Sedimentation Pond (TRSP) manages water from the Sable site, with discharge to Horseshoe Lake in the Horseshoe watershed. After receiving approval on September 30, 2021, Arctic Diamond discharged 217,171 m³ of water from TRSP between October 2 and October 25, 2021. This was the first discharge from TRSP.

The WLWB granted approval for discharge of water from TRSP based on the Two Rock Outfall Report Version 3.0 submitted in July 2021. The WLWB granted approval through an expedited review process in order to avoid potential damage to the frozen core dam due to elevated water levels in TRSP. In its September 30, 2021 decision letter the WLWB states:

"It is the company's responsibility to ensure adequate time is provided to reviewers and the Board. The Board should not be pressured into making rushed decisions as a result of the Company's late submissions."

TRSP discharge began at 15 L/s but was eventually increased to 520 L/s, the maximum allowed under the water licence, in order to lower water levels to a safe level for the frozen core dam. As part of its decision the WLWB directed Arctic Diamond to complete a plume delineation study, aimed at understanding dilution of TRSP effluent in Horseshoe Lake. Arctic Diamond did not complete the plume delineation study in 2021 because weather conditions at the time of discharge were not safe for sampling on Horseshoe Lake. In December 2021 Arctic Diamond requested a delay in the submission date for the plume delineation study – from January 2022 to August 2022. The WLWB granted approval for this request.

Containment and Management of Wastewater

Some mined out pits also provide for containment and management of wastewater.

The Beartooth Processed Kimberlite Containment Area (PKCA) and Panda/Koala PKCA, in Beartooth, Panda and Koala Pits, provide temporary storage for wastewater before transfer into the LLCF.

Lynx Pit currently provides interim storage during mining of the Misery Underground for wastewater that does not meet EQC. The 2020 installation of additional equipment for removal of suspended solids (referred to as the "Mud Wizard") from Misery Underground water has improved water management at the Misery site and reduced the amount of water that does not meet EQC. Lynx Pit will also serve as interim storage for water from the Point Lake Project. Once mining is completed at Misery and Point Lake, the water will be transferred back to the Misery Underground and Pit. Fox Pit collects and stores local runoff including surface minewater from the Fox area.

Arctic Diamond manages most surface minewater by temporary collection in sumps, followed by pumping or trucking to one of the three primary water management facilities. However, surface mine water runoff from some roads, laydowns, and waste rock storage areas follows natural flow paths or is directed into the tundra.

The 2021 management of open pit and underground water is summarized in Table 6. All sewage wastewater from the site is treated in the sanitary sewage treatment plant located at the main camp. Sewage from washroom facilities elsewhere on the site is trucked to the sewage treatment plant. Treated effluent from the sewage treatment plant flows through a pipeline to the process plant, where it is mixed with FPK and then discharged to one of the PKCAs. In 2021, Arctic Diamond discharged 69,617 m³ of sewage effluent.



A dike separating cells in the LLCF

MINE AREA	SOURCE	WASTE MANAGEMENT ACTION	2021 VOLUMES (M ³)
Panda-Koala	Open Pit	Pumped to LLCF or Process Plant	0 to LLCF or Process Plant
Beartooth	Open Pit	Pumped to LLCF	0 to LLCF
Fox	Open Pit	Pumped to LLCF during operation. Currently accumulating in pit	0 to LLCF
Pigeon	Open Pit	Pumped or trucked to LLCF or Beartooth PCKA	20 to LLCF 42,880 to Beartooth PKCA
Sable	Open Pit	Pumped or trucked to TRSP	64,478
Lynx	Open Pit	Pumped or trucked to KPSF Storage of non-compliant water from KPSF	0 to KPSF 525,057 from KPSF, Desperation Sump and Waste Rock Dam
	Mine Sumps	Pumped to KPSF.	21,402
Misery	Underground	Pumped to KPSF.	66,295
	Desperation Sump and Waste Rock Dam	Pumped to Lynx Pit.	154,876
	KPSF	Cujo Lake where EQC are achieved or to Lynx pit	370,181

FINE PROCESSED KIMBERLITE MANAGEMENT

In March 2019, WLWB granted approval for Dominion to begin depositing FPK in Panda and Koala pits – the Panda-Koala PKCA. In 2021, more than 95% of FPK and process plant liquids were placed in the Panda-Koala PKCA, with the LLCF receiving the remaining portion. Nonetheless, the LLCF remained as the source of water for the process plant, with approximately 5 million m³ of water withdrawn from the LLCF in 2021. Similar to 2020, the approach transferred water from the LLCF to the Panda-Koala PKCA, reducing the volumes requiring discharge from the LLCF. Table 7 lists volumes of FPK and process plant water deposited in each storage facility in 2021. The LLCF has five cells (A through E) separated by Dikes B, C and D (see Figure A-2). Arctic Diamond monitors compliance with Water Licence EQC at the Outlet Dam for Cell E, and discharges compliant water to Leslie Lake after approval by the water licence inspector. Arctic Diamond has only deposited

TABLE 7 -	FPK AND	WATER VC	DLUMES DEP	POSITED INT	O PK CO	NTAINMENT	FACILITIES IN	2021
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FACILITY	PROCESS PLANT SOLIDS - FPK (M ³)	PROCESS PLANT LIQUIDS (M ³)
LLCF	41,752	212,398
Panda Pit	206,821	1,138,828
Koala Pit	914,820	4,768,329
Beartooth PKCA	0	0

The Agency agrees with the WLWB that the emergency discharge at TRSP could likely have been avoided through better regulatory planning. The requirement and timing for submission of the Two Rock Outfall Report was well defined and should have been addressed in a more timely way.

PK in Cells A, B and C. Cell B has been filled while Cells A and C have remaining space for FPK storage.

AGENCY ASSESSMENT

Arctic Diamond continued to use the LLCF as the source for process water, while most FPK and process liquids were directed to the Panda-Koala PKCA. This approach assists in lowering water levels in the LLCF (resulting in less discharge to Leslie Lake) while consuming storage space in the Panda-Koala PKCA. Future water management actions may be required to address the water stored in Panda-Koala PKCA. According to the WPKMP v9.0 the closure plan for pits containing FPK relies on freshwater caps to address potential long-term surface water quality concerns. Predictions about water quality for the freshwater caps and the depth of caps required to provide suitable water quality rely on water quality modelling. Current models predict long-term concentrations of some parameters that exceed operational water quality benchmarks in the proposed 30 m freshwater caps. WRSAs are considered to be the source of contaminant loading. The Agency has previously expressed concern that the models' assumptions and estimates of source loading leave significant uncertainty about the long-term predictions of water quality in pit lakes and may

underestimate future loading and concentrations. There are limited or no data to support estimates of source loading for some contaminant sources, e.g., runoff from disturbed areas like roads and laydowns. The critical estimates of loading from WRSAs assume that the data about runoff and seepage conditions available at the time of modelling are representative of long-term conditions. However, current seepage data indicate that concentrations of some parameters may be increasing in some areas. Focused data collection efforts are needed to better characterize the sources and the conditions in pits containing FPK. Data about conditions and trends in contaminant sources will be required to support reclamation research.

Closure and Reclamation

DEFINITIONS

Adaptive management:

a management system with monitoring, defined thresholds for action and planned responses that can address unexpected conditions. If a mitigating action does not work, other actions are used to keep the impacts within accepted levels or below thresholds **Benchmark:** a standard against which to compare or assess a monitored parameter

Contingencies: methods to fix future events or situations that are possible but not certain

Financial security: funds accessible by government to cover the total expected cost of closing and reclaiming a mine site if a proponent is unable or unwilling to complete the reclamation **Reclamation:** the process of returning areas of land and waterdisturbed by mining operations-to conditions that are consistent with closure objectives

Mitigation, mitigating: an action that is supposed to reduce the negative impacts of a condition or situation. To make something less harmful. In this case, to make sure environmental impacts from the mine are as minimal as possible Monitoring: collecting and analyzing repeated observations and measurements to evaluate change and impacts of change. Watching habitat and wildlife, and 'keeping an eye' on things all the time

HIGHLIGHTS

- Submission of Interim Closure and Reclamation Plan v3.1 was delayed to October 31, 2022.
- The WLWB approved closure objectives for the Ekati Mine in July 2021.
- There was substantial progress in 2021 on development of closure criteria. However, the Agency is concerned that Arctic Diamond does not plan to propose numerical criteria for key environmental values (e.g., water quality) until the final Closure and Reclamation Plan.
- No progressive reclamation activities were undertaken in 2021. There should be additional focus on planning and implementing
 progressive reclamation.

CLOSURE PLANNING PROGRESS IN 2021

As mining progresses at the Ekati Mine, the importance of having a comprehensive, executable plan for closure and reclamation of the site increases. Arctic Diamond expects that the currently active mining areas (Pigeon, Sable and Misery) will provide for continued mining and processing through 2023, at which time the recently approved Point Lake Project will become the feed source for the process plant through to approximately 2029¹.

While Arctic Diamond expects to seek approval for additional mining activities, completion of the current mining operations without additional authorizations would lead to implementing closure and reclamation activities sooner. Effective implementation of closure and reclamation activities, whenever mining is complete, will require a well-developed, comprehensive Closure and Reclamation Plan. Arctic Diamond's work in 2021 led to important progress in planning for closure and reclamation, but there were also some delays.

In February 2020, WLWB conditionally approved the August 2018 Interim Closure and Reclamation Plan (ICRP) v3.0 and set out requirements and timing for Arctic Diamond to develop and submit ICRP v3.1.

The approval required Arctic Diamond and WLWB to jointly host a workshop by November 16, 2020 to discuss closure objectives and waste rock effective neutralization potential (NP). After considering and incorporating the input received at the workshop, Arctic Diamond was required to submit ICRP v3.1 no later than March 16, 2021. However, the COVID-19 pandemic, the 2020 Ekati Mine shutdown, and other factors led to delays and changes in the schedule and plan.



Inside an open pit, photo courtesy of Ekati Diamond Mine

¹Arctic Canadian Diamond Company Ltd. April 2022. Ekati Diamond Mine Environmental Agreement and Water Licence Annual Report 2021.

The current schedule envisions submission of ICRP v3.1 no later than October 31, 2022, more than 18 months later than the schedule envisioned in the ICRP v3.0 approval. Nonetheless, some important work on closure planning has progressed.



Arctic Diamond submitted revised closure criteria, the Effective Neutralization Potential Investigation Report, and other closure related documents, in preparation for the upcoming closure workshop. Arctic Diamond requested delay in submission of ICRP v3.1 to October 2022, to allow for incorporation of input about closure criteria. The WLWB approved the delay in February 2022, but noted that it "does not anticipate any further extensions to the deadline will be warranted."

OCT 2021

DEC 2021

SEPT 2021

Arctic Diamond requested delay for submission of ICRP v3.1 to July 2022, to provide time to incorporate changes arising from revised mining plans – i.e., removal of Jay and inclusion of Point Lake. The WLWB approved the delay.

NOV 2021

From November 30 to December 2, 2021, Arctic Diamond convened a workshop to discuss closure criteria and effective NP. A key outcome of the workshop was a requirement for Arctic Diamond to provide revised closure criteria for review prior to finalization of ICRP v3.1.

APRIL 2022

Arctic Diamond submitted revised Closure Criteria, Criteria Work Plan, and Reclamation Research Plans, as well as a work plan for a Returning Land Use Plan (previously referred to as an end land use plan).



Truck hauling ore from Pigeon Pit, 2018

CLOSURE OBJECTIVES AND CRITERIA

Much of the closure planning work in 2021 focused on closure objectives and closure criteria. These are important foundations for planning mine closure, when following the "Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories"²:

- Closure objectives define what the closure plan and activities are expected to achieve for each mine component – i.e., what do we expect the outcomes of the closure plan to be?
- Closure criteria describe how the achievement of the closure objectives will be measured and confirmed – i.e., how will we know that the closure plan has met the expected outcomes?

Both objectives and criteria are critical for closure planning because we can only make decisions about what closure activities are needed once we know what outcomes we have to achieve.

CLOSURE OBJECTIVES

In February 2020, the WLWB recognized the need for more discussion and work on closure objectives and criteria. It excluded them from its approval of ICRP v3.0, and the Reasons for Decision required a workshop to discuss closure objectives, and a workplan for developing closure criteria. The March 2021 workshop on closure objectives provided an opportunity for a constructive twoway discussion. One overarching outcome of the workshop was the need for objectives to be more aspirational (i.e., define outcomes) rather than procedural (i.e., define processes). Following the workshop, Arctic Diamond prepared an improved set of closure objectives with a more aspirational focus. The WLWB coordinated a review of the revised closure objectives, and after considering input from reviewers,

approved closure objectives in July 2021. The approved objectives include many for which the WLWB agreed with Arctic Diamond's proposed objectives, but the approval also included revisions to some objectives and some new objectives. Based on reviewer feedback, WLWB added objectives to address future land use, aesthetics and site-wide water quality. Another key outcome of the July 2021 WLWB decision was the requirement for a workshop to discuss closure criteria.

²Mackenzie Valley Land and Water Board and Aboriginal Affairs and Northern Development Canada. 2013. Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. November 2013.

CLOSURE CRITERIA

The November/December 2021 workshop on closure criteria provided an effective venue for parties to discuss Arctic Diamond's draft closure criteria, the workplan for developing criteria, and effective NP. As required in the WLWB's February 2020 approval of ICRP v3.0, updated closure criteria were to focus on defining performance rather than on completion of planned designs. Supporting materials for the workshop included:

- Draft closure criteria
- Criteria Workplan a plan for developing and refining closure criteria
- Revised Reclamation Research Plans
- Template for an Erosional Framework that, when developed, will help to define closure criteria for the mine closure landscape
- Effective Neutralization Potential Investigation Report (see Waste Rock chapter of this report for discussion of effective NP).

A key concern identified by parties at the workshop was timing for development of numerical criteria for important environmental closure objective outcomes (e.g., water quality, sediment quality, air quality). Arctic Diamond has not yet developed these numerical criteria, and proposes that they will be developed for the final Closure and Reclamation Plan. Reviewers expressed concern that these criteria are needed much sooner to guide closure planning.

Based on input received at the workshop, the WLWB defined a process for further review of closure criteria prior to submission of ICRP v3.1. To support this review, Arctic Diamond submitted additional information in April 2022 including revised closure criteria, criteria work plan, and reclamation research plans, and an outline for an end land use plan (now referred to as a Returning Land Use Plan).

PROGRESSIVE CLOSURE AND RECLAMATION ACTIVITIES

In December 2021, Arctic Diamond submitted its 2021 Closure and Reclamation Progress Report (2021 Progress Report), including information about reclamation research program progress and results, and progressive reclamation activities. Arctic Diamond did not undertake any progressive reclamation activities in 2021. It did continue reclamation research programs and conduct monitoring of previously completed reclamation



Director Tim Byes on site, 2019



Long Lake Containment Facility, photo courtesy of Ekati Diamond Mine

activities at Old Camp. The 2020 Closure and Reclamation Progress Report proposed progressive reclamation by capping vent raises for the Panda, Koala and Koala North underground workings in 2021. These activities were not completed in 2021 and are now proposed for 2022. No other progressive reclamation activities are proposed for 2022.

2021 water quality monitoring results at Old Camp showed exceedance of Water Licence Effluent Quality Criteria for dissolved aluminum in one out of two samples, similar to results from 2019 and 2020. Previously observed (2018 and 2019) exceedances for arsenic concentrations were not repeated in either 2020 or 2021. Arctic Diamond plans to continue monitoring the area until 2024 but asserts that natural attenuation and dilution along the flow path will reduce contaminant concentrations before the water enters Larry Lake and that monitoring for longer periods is not warranted.

In support of vegetation reclamation research, the 2021 Progress Report includes results of vegetation monitoring at Old Camp as well as several topsoil stockpiles. Monitoring focuses on ground cover, survival rates and plant size. Reclamation research also continued on the LLCF, but no results were reported in 2021.

FINANCIAL SECURITY AND CLOSURE PLANNING

FINANCIAL SECURITY

To manage public liability and risk, at any point in time the GNWT needs to hold financial security equal to the total anticipated cost of closure and reclamation of the Ekati mine at that time. According to the 2021 Annual Closure and Reclamation Progress Report, the total reclamation security held by the GNWT as of December 31, 2021 was approximately \$282.1 million, held predominantly under the water licence as indicated in Table 8.

TABLE 8 EKATI MINE RECLAMATION SECURITY HELD (DECEMBER 31, 2021)

SECURITY ITEM	AMOUNT HELD
Water Licence Security W2012L2-0001	\$260,020,369
Ekati Environmental Agreement	\$19,991,424
Jay Early Works Land Use Permit W2016F0007	\$659,280
Misery Underground Land Use Permit W2017D0004	\$1,397,982
Point Lake Early Works Land Use Permit W2021X0004	\$57,720
TOTAL:	\$282,126,775

Many of the 2021 changes in the amounts of security are in accordance with a May 2020 WLWB decision about the proponent's April 2020 request for security adjustment arising from ICRP v3.0 and the Misery Underground approval. Actual adjustments were delayed due to discussions related to whether security should be held in the water licence exclusively, or partially in land use permits. These included adjustments made in February 2021:

- \$1,397,982 increase in security for Misery Underground Land Use Permit
- \$427,000 reduction in security for the Pigeon Land Use Permit
- \$820,720 reduction in security for the Jay Land Use Permit

Additional 2021 adjustments in security included:

- \$57,720 increase for liability associated with early works for the Point Lake Project
- \$548,474 reduction to account for progressive reclamation at Old Camp.

For Old Camp, the WLWB required a holdback of \$492,492 for remaining liabilities for reclamation of the North Pond.



LLCF discharge point



Filter dikes in the LLCF

AGENCY'S ASSESSMENT

The Agency considers advancement of closure and reclamation planning as a critical need for the Ekati Mine. Arctic Diamond predicts that the Point Lake Project will extend mining operations to 2029, approximately seven years from now, at which time closure plans would be implemented unless new mining projects are approved. Also, mining activities are now or will soon be complete for many facilities, and progressive reclamation can be started soon once closure plans are developed. Finally, as highlighted in Arctic Diamond's July 2021 letter to the WLWB about preliminary screening of the Point Lake Project, the possibility of early, permanent shutdown could lead to early requirements for implementation of closure plans: "...even a one-year delay would cause an interruption in process plant feed in 2024, which would result in a loss of cashflow and a likely shutdown with layoff of employees. Arctic has no other sources of cashflow to address fixed costs and continue development work during a shut down and, therefore, a shutdown

under these circumstances would be at high risk of leading to permanent closure."²

While the Point Lake Project has been approved on a schedule that is consistent with that requested by Arctic Diamond, the identified financial challenges and constraints could still affect project viability if other circumstances lead to increased costs or delayed cash flow. Arctic Diamond further highlighted the narrow margins for project viability at the Point Lake Project water board hearings, for example noting that all waste rock placement "must be at the Point Lake Site for the Project to be economically viable."³ The fragility of economic viability increases the potential for early closure. As stated in the 2019 and 2020 Agency Annual Reports, it remains critical for Arctic Diamond to make substantial progress in the level of detail of its closure and reclamation plans, and the Agency is hopeful that ICRP v3.1 now due in October 2022 will demonstrate this progress.

²Arctic Canadian Diamond Company. July 29, 2021. Letter to Mr. Joseph Mackenzie, Chair, Wek'èezhii Land and Water Board. ³ Arctic Canadian Diamond Company. November 2021. Point Lake Project, Public Hearing Presentation: Water Licence Amendment and Land Use Permit. Part 2: Project Overview, Slide 10.



Open pit mining, September 2018

In light of the critical need for advancing closure planning, the Agency is concerned about delays in submission of ICRP v3.1. However, the Agency is pleased that Arctic Diamond and the WLWB have continued to advance closure planning despite the overall ICRP delays. The closure objective workshop and review of revised closure objectives led to approval of improved objectives that are more aspirational. These objectives now provide more clear guidance about the expected outcomes for closure and reclamation. Discussions and the workshop on closure criteria have led to a better understanding of how to define and measure performance of closure plans against the closure objectives.

The Agency is concerned that numerical closure criteria have not been defined and are only planned as part of the final closure and reclamation plan. The lack of numerical closure criteria will make it difficult to plan closure activities and measures, or to understand and predict whether the activities and measures will be effective for achieving closure objectives. The Agency is concerned that progressive reclamation activities did not advance in 2021. Progressive reclamation reduces site liabilities while also addressing effects of mining related activities and facilities. It also provides valuable knowledge and experience that helps guide future closure and reclamation plans.

At the end of 2021, the financial security appears to be consistent with that required by the water licence and Land Use Permits. Financial security can provide resources for governments to complete closure and reclamation activities if the proponent, for some reason, is unable to do so. However, the Agency believes that the preferred path for closure and reclamation is for the proponent to complete the activities and seek return of security, an approach that requires that the proponent have sufficient cash flow and/or financial reserves to conduct closure and reclamation activities at the conclusion of mining. Given that the Ekati Mine is Arctic Diamond's only source of cash flow, the necessary funds for reclamation and closure must be accrued during the operational period.


Hauling ore from Pigeon Pit, 2018

RECOMMENDATIONS:

The Agency recommends that Arctic Canadian Diamond Company develop numerical closure criteria for inclusion in ICRP v4.0. These numerical criteria are needed to support decision-making about closure methods and activities. At the least, numerical criteria should address dust (Closure Criterion SW-8), water quality (Closure Criteria SW-10, WR-1, LLCF-1, and OP-1), sediment quality (Closure Criterion SW-10), and erosion rates (Closure Criteria LLCF-3, WM-3 and BI-3).

2 The Agency recommends that Arctic Diamond and regulators establish more effective mechanisms and requirements for scheduling and implementing progressive reclamation, and ensuring that the work gets completed in accordance with the planned schedule.

To see Arctic Diamond's response to the Agency's recommendations, please see Appendix B

Traditional Knowledge and Community Engagement

DEFINITIONS

Knowledge holders: Indigenous people recognized within their own communities for their expertise and depth of knowledge and experience.

Traditional knowledge; Indigenous knowledge: The entire, interconnected knowledge system of a group of indigenous people: spirituality, values and beliefs, environmental knowledge, transmission of knowledge and the codes of practice.

ACTIVITIES 2021-22

COMMUNITY ENGAGEMENT Arctic Diamond's engagement

with communities during 2021 continued to be impacted by concerns and conditions related to COVID-19 as in the previous year.

USE OF TRADITIONAL KNOWLEDGE IN OPERATIONS

TRADITIONAL KNOWLEDGE ELDERS GROUP (TKEG)

The Ekati TKEG was originally established to provide Traditional Knowledge (TK) input for the design of the mine, mine operations and closure plans of the Jay Project. The scope of the TKEG was subsequently expanded and applied to the entire mine site.

The TKEG did not hold any meetings in 2021 and the last time the TKEG met was in 2018.

ENVIRONMENTAL MONITORS

Community members had the opportunity to participate in several environmental monitoring programs at the Ekati mine prior to 2020. Similar opportunities were limited in 2020 and 2021. Overall, there were reduced opportunities for Indigenous community members to interact with the company during 2021.

COMMUNITY-BASED TRADITIONAL KNOWLEDGE PROJECTS

The company has previously supported various communitybased TK projects and community outreach programs that are Indigenous driven and implemented by the communities. This past year, the company did not contribute to the same number of programs as they had in previous years. In 2021 the company supported school cultural programs and Lutsel Ke firewood harvesting for bush camps.

HIGHLIGHTS

- The management of COVID-19 concerns and restrictions continued to impact in-person engagement with communities.
- Minimal Traditional Knowledge (TK) projects and TK preservation programs occurred throughout 2021-22.



Directors during Point Lake Project ublic hearing, November 2021

AGENCY ASSESSMENT

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Arctic Diamond's Point Lake Project application only incorporated TK that was previously gathered for the nearby Jay project. The company subsequently held workshops in fall 2021 to gather TK on Caribou movement through the minesite, waste rock management and fish-out and fish offsetting plans for Point Lake.

The Agency believes that TK and community input should have been gathered in a more timely manner to provide input for the design and development of the Point Lake Project mine components. Enough time is required to solicit and verify TK useful to a project. Although travel restrictions due to COVID-19 have limited interactions with community members and on-site visits, the company should prioritize gathering and applying TK where applicable.

The Agency would also like to see TK input and community member participation in more programs including the assessment and monitoring of aquatic and wildlife impacts and closure planning.

The Agency is disappointed that TK from Aboriginal Society members does not appear to have been used in the 2021 AEMPs. This suggests a need for exploring with communities how TK can be used to inform non-fish components of the monitored lakes and stream ecosystems at Ekati.

Assessment of the Regulators



- The Department of Fisheries and Ocean's Fisheries Act Authorization process needs to be more transparent and inclusive.
- The GNWT Wildlife
 Division's involvement
 in the Point Lake Project
 was poor.
- ECCC's response to Arctic Diamonds request to reduce Metal and Diamond Mining Effluent Regulations sampling frequencies was appropriate, clear and well supported.

THE REGULATORS AND OUR MANDATE

As the public watchdog for environmental management at the Ekati mine, the Agency monitors the performance of the operator as well as the agencies that regulate the mine. The following are our comments regarding the regulators' performance in 2021-22.

AGENCY'S OVERALL ASSESSMENT

As in previous years, the regulators generally remain effective in ensuring that the company operates the Ekati mine in an environmentally sound manner. Some of the key submissions reviewed for the past year include the Point Lake Project (PLP) licencing application, the continuation of work on the Interim Closure and Reclamation Plan approval process, and the annual Aquatic Effects Monitoring Program (AEMP).



Ekati main camp, photo courtesy of Ekati Diamond Mine

GOVERNMENT OF THE NORTHWEST TERRITORIES

DEPARTMENT OF LANDS:

The continuation of COVID-19 restrictions made it more difficult than during previous years for land and water Inspectors to visit the mine site to conduct inspections. In total, five water licence and two land use permit inspections were conducted from April 1, 2021 to March 31, 2022. Typical pre COVID-19 inspection numbers ranged from 10 to 14 water licence inspections annually. Although some of the decrease can be attributed to COVID-19 travel limitations, the Agency would be concerned if the frequency of inspections remained low.

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (ENR):

The PLP application was submitted for regulatory review and screening in June 2021 (refer to the Point Lake Project Application chapter for more information). Overall, ENR's involvement was good and consistent with past participation, with the notable exception of caribou and wildlife.

Water Management and Monitoring Division:

In general, the WMM Division continues to provide detailed comments and analysis including technical consultant reviews. Despite limited comments during the environmental assessment component of the PLP Application process, valuable input was provided during the subsequent Regulatory review and public hearing processes.

Arctic Diamond is required to monitor the condition of the aquatic systems potentially effected by the mine. Overlapping monitoring requirements exist between the Water Licence's AEMP and the Fisheries Act's Metal and Diamond Mining Effluent Regulations. In order to reduce duplication, the Government of Canada and the Government of the Northwest Territories (GNWT) negotiated an equivalency agreement entitled the Agreement on the Equivalency of Laws Applicable to Certain Metal and Diamond Mines Located in the Northwest Territories whose purpose is to

eliminate duplication of regulatory requirements between the federal and territorial regimes. The Federal Government has determined that the GNWT regime is "equivalent in effect to the Metal and Diamond Mining Effluent Regulations once some gaps are addressed by the [GNWT]". The GNWT is making the necessary changes to the water licences for all three diamond mines in NWT.

Environmental Stewardship and Climate Change (ESCC):

This Division is responsible for administering Ekati's Environmental Agreement (EA). The 2019 Environmental Impact Report (EIR a requirement of the Environmental Agreement) review process has not yet been completed. The 2019 EIR has been delayed for so long that the next 3 year EIR (2022) is expected to be submitted before the 2019 EIR is finalized. Although much of the delay can be attributed to COVID-19, insolvency protection and Arctic Diamond, ESCC could have been more effective in their requests and efforts to get Arctic Diamond to finalize the 2019 EIR.

Wildlife and Fish Division:

As the territorial authority for wildlife, the GNWT has the responsibility to protect and manage wildlife in the NWT. Given these responsibilities the Agency expected much greater involvement from the Wildlife Division during the PLP review process where several organizations expressed major concerns over impacts the Project may have on caribou movement. The Wildlife Division's participation in the process was poor and considering the importance of caribou to communities and NWT as a whole, this was very disappointing.

In previous Annual Reports the Agency has commented on the lack of rigorous review of the Wildlife Effects Monitoring Program (WEMP) and the Wildlife Effects Monitoring Plan (WEM Plan). During the PLP review process there was much discussion and emphasis placed on the WEM Plan and WEMP. The GNWT, authority for the Wildlife Act, agreed to have a rigorous review of the WEM



Long Lake Containment Facility - Cell B, photo courtesy of Ekati Diamond Mine

Plan beginning in October 2022. The Agency looks forward to participating in this process and is hopeful that the upcoming WEM Plan renewal process will result in a rigorous review of the wildlife monitoring program and ultimately result in improved monitoring, mitigation and evaluation of impacts of the Ekati mine on caribou movement.

Environmental Protection and Waste Management Division:

The EPWM Division circulated draft Air Quality Monitoring Guidelines for Diamond Operators in January 2022. The Agency views this as a positive development for the management of air quality in the NWT and provided comments on the draft document. However, in context, the NWT continues to lack a clear territory-wide, comprehensive air quality management regime.

CROWN-INDIGENOUS RELATIONS AND NORTHERN AFFAIRS CANADA

Following devolution of its land and water management responsibilities to the GNWT, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) has a muchdiminished role in environmental regulatory processes, including involvement with the Environmental Agreement.

FISHERIES AND OCEANS CANADA

Fisheries and Oceans Canada's (DFO) involvement with the regulatory process continues to be minimal, although they provided limited comments on fish-related review items during the PLP review process. While DFO has valuable expertise locally and nationally, their interpretation of its mandate under the Fisheries Act limits its ability to participate in reviews and evaluate possible effects of the Ekati mine on fish in the downstream environment.

The Agency met with DFO to discuss the transparency of the Fisheries Act Authorization (FAA) process. The Agency was encouraged by the meeting and hopes to continue improving dialogue between the Agency and DFO.

Following these discussions, the Agency became aware that the PLP FAA application was not circulated to all interested parties. Indigenous Governments and organizations (IGO) were sent a letter by DFO confirming that they had received the application but did not request comments, specify a review process, ask if they wanted to schedule a meeting or, if they required additional information, to contact DFO. In the Agency's opinion, this does not represent an appropriate level of engagement regarding the dewatering of a lake and destruction of fish habitat. The Agency is hopeful that DFO will

improve how it engages IGO's and reviewers regarding Fisheries Act Authorizations in the future.

ENVIRONMENT AND CLIMATE CHANGE CANADA

With the exception of Environment and Climate Change Canada's (ECCC) full involvement in the PLP review process, their involvement in other regulatory processes for the Ekati mine continued to be helpful but limited. In particular the Agency notes ECCC's clear and well supported response denying Arctic Diamond's request to reduce radium 226 testing and acute lethality testing which is required under MDMER. ECCC reviewed the request to reduce acute lethality testing at a number of seepage sites, and determined that Arctic Diamond has not fulfilled the regulatory requirements and were not eligible for reduced frequency of acute lethality testing.

WÈK'EEZHÌI LAND AND WATER BOARD (WLWB)

Overall, the WLWB continued to ensure effective and diligent management of the water licence, land use permits and management plans associated with the operation of the Ekati mine. In particular, the Agency notes efforts by WLWB staff to ensure progress continues to be made on updating the Interim Closure and Reclamation Plan. The PLP water licence amendment was an important regulatory process for the company on a tight schedule. The WLWB did a good job ensuring that the process was able to move forward effectively and efficiently.

The detailed analysis provided in each of its Reasons for Decisions continues to be very helpful to the Agency in understanding why decisions were made and clarifying requirements of Board directives.



Ice road, photo courtesy of Ekati Diamond Mine

Assessment of Arctic Diamond

Arctic Diamond continues to operate the Ekati mine in compliance with its water and land licences and permits.

HIGHLIGHTS

- The majority of wildlife, aquatic, seepage and air quality monitoring was able to continue despite significant difficulties posed by COVID-19.
- The Ekati Mine Interim Closure and Reclamation Plan suffers from a consistent lack of detail that should exist for a mine that has been in operation for over 20 years.

Similar to last year, Arctic Diamond deserves credit for maintaining compliance and continuing with the majority of their monitoring programs despite COVID-19 restrictions, covid outbreaks and limitations to travel. Specifically, the Agency commends Arctic Diamond for ensuring that the large majority of wildlife, aquatic, seepage and air quality monitoring was able to continue despite significant difficulties posed by COVID-19.

COMMUNICATIONS

The weekly meetings between Arctic Diamond and the Agency that occurred in 2020 have been reduced to monthly. Although the reduction to monthly and the move to remote meetings was not ideal, the Agency continues to see real benefit to these regular meetings.

CLOSURE PLANNING

The ICRP is a critically important plan that details how the mine will be closed and reclaimed and what environmental standards it will have to meet post-closure. The current version, ICRP v3.1, submitted in August 2018 required many changes, and an updated version addressing several issues raised by reviewers (ICRP v3.1) was to be submitted in July 2021. ICRP v3.1 has been delayed twice with the current due date being October 2022. Some of the delays have been warranted, resulting in the approval of the Closure Objectives which allowed for focus to begin on the development of Closure Criteria. Both of which are important developments. However, some of the delays could be attributed to a consistent lack of detail in the ICRP for a mine whose current end-of-mine life is 2029. In the Agency's opinion, it is clear that critical parts of the closure plan, such as closure criteria, should be much more advanced than they currently are. The importance

and urgency to move the closure plan closer to finalization was highlighted in 2020 by the insolvency and temporary care and maintenance status of the mine.

POINT LAKE PROJECT

The Point Lake Project (PLP) is critical to the continuation of mining at Ekati and is expected to extend the mine life out to 2029. In general Arctic Diamond's involvement and engagement during the process was poor. In the Agency's opinion, the application and company responses lacked detail. Of particular concern was the lack of Point Lake specific TK or community input prior to the application. These concerns were raised early on in the review process and community involvement and engagement with reviewers improved towards the end of the process.

ENVIRONMENTAL IMPACT REPORT

The Environmental Impact Report (EIR) is required under the Environmental Agreement to be submitted every three years. It is a single report that looks at all monitoring plans for the past three years focusing on trends and compares them to initial predictions. The current iteration of the EIR was scheduled to be submitted and reviewed in 2019 (2019 EIR), however, due to delays and the onset of the COVID-19 pandemic the review and required workshop discussions were cancelled. The 2019 EIR will not be finalized until after the next. 2022 EIR. is due. The EIR is an important part of the Environmental Agreement that serves important regulatory functions. The Agency hopes that the 2022 EIR process will not have similar delays.

TWO-ROCK SEDIMENTATION POND

The company had not discharged water from Two-Rock Sedimentation Pond (TRSP) since it was built, however water levels reached critical levels in 2021. As a result, the company informed the WLWB fo the need for an emergency increase of effluent pumping rate in October 2021 to lower water levels. The Agency believes this emergency pumping rate increase reflects poor water management at the Sable project. Pumping had to be increased to 35 times the initial rate to relieve dangerously high water levels in TRSP that could cause irreparable damage to effluent containment infrastructure, if the maximum designed water level was exceeded.



Ekati main camp

Agency Activities



This past fiscal year, the Agency's activities continued to be affected by COVID-19. Many of the restrictions put in place by Public Health prevented the Agency from hosting workshops or visiting communities due to travel constraints and gathering sizes.

There were limited opportunities for Directors to meeting in person due to COVID-19 restrictions. Since early spring of 2022, many of the restrictions from 2021 were lifted. The Agency looks forward to returning to normal operations, including visiting communities very soon.

MEETINGS

The Agency held four meetings in Yellowknife during the 2021-22 fiscal year. Only local Directors were able to attend in person while maintaining physical distancing, the remaining Directors participated remotely. The Agency's AGM was held in November 2021 and was also held in a hybrid fashion with both remote and in person participation.

EKATI SITE VISIT

The Agency was unable to participate in on-site visits in 2021. Since our last visit in the fall of 2019, the mine started the preconstruction phase for the Point Lake Project and mining at the Pigeon open pit was completed.

Directors during 2019 site visit

AGENCY WORKSHOP

Similar to the previous year, the Agency was unable to host workshops or visit communities. As COVID-19 restrictions start to ease, the Agency looks forward to continuing this activity.

OTHER INITIATIVES

DEVELOPMENT OF THE SITE-WIDE MODEL

The Agency worked with Selkirk Technology Access Centre (Selkirk) to develop and build a 3-dimensational landscape model of the Ekati mine and surrounding area. Using computergenerated images and video, a digital projection of the site is displayed on the model. To help highlight areas of the mine, interchangeable inserts are used to 'zoom in' to specific pit areas. With the announcement of the Point Lake application, the Agency worked with Selkirk to develop an insert specific to the Point Lake Project to help Society Members and the public visualize the area in the absence of being able to

physically travel to the mine site. In addition, the Agency has used data from radio-collared caribou to demonstrate their movements through the mine site, as well as clearly show avoidance behaviour to disturbance from the mine. This has helped Society members and others visualize the caribou's interactions in and around the Ekati mine.

DEVELOPMENT OF THE AGENCY'S RESOURCE ROOM

The Agency has been actively reviewing historic reports and communications that are currently stored in the office. Over the past year, we have started to better inventory files that are there and find ways to catalogue them. The files will be uploaded to a digital library which will be accessible through the Agency's website.



Executive Director Marc Casas explaining the features of the site model to MLA Kevin O'Riley



The Agency's Resource Library



Director Ron Allen discussing a projection on the site model to an observer, Point Lake Technical Session, September 2021

WORKSHOPS

The Agency had the opportunity to participate in seven workshops this past year. Many of which took place online, however there were a few that were in person. Here are some of the workshops the Agency participated in:

POINT LAKE PROJECT WATER LICENCE PROCESS

As part of the water licence process, there were 2 workshop sessions: a 3-day technical session in September 2021 and a 4-day public hearing in November 2021. Both workshops had hybrid participation with attendees joining in person and virtually through Zoom. This made the workshops more accessible for community members and allowed for open discussions among participants.

ICRP CLOSURE CRITERIA

The Agency participated in Arctic Diamond's closure criteria workshop in November 2021. The workshop covered topics such as closure criteria, effective neutralization potential (NP) of waste rock, reclamation research, and the Return to Land Use Plan. This was a hybrid workshop where participants joined the discussion in person and online.

DFO ENGAGEMENT SERIES

The Agency participated in DFO's online workshop series in June 2021 and January 2022. This was a national workshop that discussed topics such as the identification, establishment, and management of ecologically significant areas, offsetting under the Fisheries Act for habitat destruction and the death of fish and the management of existing facilities and structures located in or near water.

DIAVIK CLOSURE WORKSHOP SERIES

The Agency had the opportunity to observe Diavik's Closure workshop series twice within this fiscal year. It helped highlight the similarities and differences between the two mines' closure plans and approaches. Diavik and their society members participated in the discussion and reviewed Diavik's plans for closing the mine.



Panda Diversion Channel



Previous site visit, July 2019

TECHNICAL REVIEW AND INPUT

The Agency participated in 15 document reviews through the Wek'èezhìi Land and Water Board review system over the past year. In addition, the Agency commented on wildlife reports and participated in the review for Arctic Diamond's application for a Water Licence amendment for the Point Lake project.

SOME SIGNIFICANT REVIEWS THE AGENCY TOOK PART IN ARE:

- 1. Aquatic Effects Monitoring Program Annual Report 2020 (May 2021)
- 2. EA/WL Annual Report (July 2021)
- 3. Misery Powerline LUP Renewal (July 2021)
- Draft Updates to The Guidelines for Closure and Reclamation Cost Estimates (July 2021)
- 5. WROMP and Seepage Report (August 2021)
- 6. Wildlife Camera Monitoring Report (August 2021)
- 7. Two Rock Lake Outfall Design Report (August 2021)
- 8. Recirculated Eir 2019 (September 2021)
- 9. WROMP 'Unauthorized Discharge' (November 2021)

- 10. Effective NP Study (November 2021)
- GNWT Air Quality Monitoring Guidelines for Diamond Mines (February 2022)
- 12. Fish Response Plan Extension Request (February 2022)
- 13. Phosphorus Response Plan (February 2022)
- 14. Plankton & Benthos Response Plan (February 2022)
- 15. Re-examination of Caribou Zone of Influence (November 2021)



Main Camp, Panda and Koala Open Pits, Photo courtesy of Ekati Diamond Mine

INTERIM CLOSURE RECLAMATION PLAN

After Arctic Diamond's workshop for identifying closure objectives in March 2021, the WLWB conditionally approved the proposed objectives and requested an additional workshop be held to review the closure criteria. The company requested delay of the submission of ICRP v3.1 from October 2021 to July 2022 and committed to continuing the process by holding a second workshop in late November 2021 to discuss closure criteria. In addition to this topic, the company also discussed the Effective NP Report and Reclamation Research Plans during the workshop. The workshop helped initiate discussions with Society Members about their expectations for closure criteria and following the workshop, an additional extension was granted to delay the submission of the ICRP v3.1 to October 2022. A second information package was delivered to participants in April 2022 to further improve and refine the closure criteria before the next full submission of the ICRP v3.1 is submitted in October of this year.

POINT LAKE PROJECT

Throughout the course of the past year, the Agency spent a significant amount of time and resources participating in the water licence and land use permit amendment process for the Point Lake project. The application process involved a preliminary screening and regulatory review. Read more information on this process and the Agency's assessment in the Point Lake chapter of this annual report.

AGENCY COMMUNICATIONS

In addition to this annual report, the Agency communicates with our Society Members and the public using our website, social media and our biannual newsletter, the Ekati Monitor.

The Agency website is a resource that houses information for all things related to environmental management at the Ekati mine. Resources are added as they become available, and our latest news is easily accessible on our website homepage. The Agency is always looking for ways to make the website more accessible and up-to-date ensuring transparency in the work we do.

The Agency presence on social media includes a Facebook (Meta) page and a Twitter account. Our followers on both platforms are slowly growing as we strive to increase our online presence.

The Agency published one issue of our newsletter, the Ekati Monitor, this fiscal year. Issue 23 was published in the early spring of 2022. Digital copies were distributed to our subscriber list and Society Members. Printed copies are available for those who would like a copy.



Agency Directors and Staff during spring board meeting, 2022

Appendix A: Tables & Figures

FIGURE A-1 : EKATI MINE SITE AND EXPLORATION CLAIM BLOCKS



TABLE A-1: MINING EFFECTS ON WATER QUALITY FLOWING THROUGH THE KOALA AND KING-CUJO WATERSHEDS

Reading the table from left to right, water flows in the Koala watershed from Leslie Lake to Lac de Gras and in the King-Cujo watershed from Cujo Lake to Lac de Sauvage. The solid dot represents water quality variables that continue to increase over time over time in comparison to their reference sites.

Flow from effluent source to ultimate receiving lake in watershed				VARIABLES ELEVATED IN KOALA WATERSHED							V/ KI	VARIABLES ELEVATED IN KING-CUJO WATERSHED			
Increased over time in comparison to relake/stream or different from a constant	Increased over time in comparison to reference lake/stream or different from a constant					LONG LAKE CONTAINMENT FACILITY> LAC DE GRAS								KING POND 🔶 LAC DU SAUVAGE	
 O Elevated but not changing through time Upper bound of 95% exceeded the SSWQO, water ♦ quality benchmark, or CCME guideline during ice-covered or open water season 					7		7		7	JS	7	/	7	4	
				ų	2	,	1	ж,		4	2	ċ		AS STAND	
Indicates observed mean exceeded the water quality benchmark or CCME guiduring ice-covered or open water seas	CIF. MO		OSE WE		den ba	di la	P C C C	CPF CPF	S S		ALL COMPANY	75 ¹ 0,			
PARAMETERS MONITORED	> ~ ジ	I I	A.	4	\sim	$\widetilde{\prec}$	\$	\mathcal{S}	/ V	0	70	ð	y y		
рН	0	0	0	0	0	*	*	*	*	0	0	*	*		
Alkalinity	0	0	0	0	0	0	0	0	0	0	0	0	0		
Hardness	•	•	•	•	0	0	0	0	0	0	0	0			
Total Dissolved Solids	0	0	0	0	0	0	0	0	0	0	0	0			
Chloride	0	0	0	0	0	0	0	0	0	•	•	•	0		
Sulphate	0	0	0	0	0	0	0	0	0	0	0	0	0		
Potassium	•	0	•	0	0	0	0	0	ο	0	0				
Total Ammonia	•	•	0	•	0					•	0	0	0		
Nitrite	0	0	0	0	0	0									
Nitrate	0	0	0	0	0	0				0	0				
Total Phosphate-P										0			0		
Total Organic Carbon	0	0	0	0	0	0	0	0	0	•	0	0	0		
Antimony	0	0	0	0	0	0	0								
Arsenic	0	0	0	0	0	0				•	•	•	•		
Barium	0	0	0	0	0	0	0	0	0	0	0	0			
Boron	0	0	0	0	0	0				•	•	•	0		
Molybdenum	0	0	0	0	0	0	0	0	0	0	0	0	•		
Nickel	0	0	•	0	0	0	0	0	0	0	0	0	0		
Selenium	0	0	0	0	0	0				0	0				
Strontium	•	0	0	0	0	0	0	0	0	0	0	0	0		
Uranium	0	0	0	ο	ο	ο	0	0	ο	0	0				



FIGURE A-2 : EKATI MINE WATERSHED MAP WITH FLOWS AND SAMPLING SITES

FIGURE A-3: WASTEWATER AND PROCESSED KIMBERLITE AT THE EKATI MINE SITE



Appendix B: Responses to Recommendations

The following are Arctic Canadian Diamond Company Ltd. (Arctic Diamond) responses to Independent Environmental Monitoring Agency (IEMA) Annual Report 2021-2022 recommendations.

1) Effectiveness of Mitigations

Recommendation: Arctic Canadian Diamond Company should work with regulators to establish more effective mechanisms and requirements for scheduling and implementing progressive reclamation and ensuring that the work gets completed in accordance with the planned schedule.

Arctic Diamond Response:

Arctic Diamond has undertaken advanced technical analyses of collar data as part of the process to assess the effectiveness of current mitigations, including the CRMP. Arctic Diamond circulated its proposed research objectives and methods for stakeholder feedback on May 30, 2022 and hosted a workshop meeting on the topic with IEMA, ENR, and Tlicho Government on June 17 2022 in an attempt to foster agreement on the research questions and approach to the analyses in the hope of more widespread acceptance of the preliminary results expected in the fall of 2022.

2) Monitoring of Sable Waste Rock

Recommendation: Arctic Diamond should work with stakeholders to assess the effectiveness of mitigation measures currently used under the Caribou Road Mitigation Plan. This can be done at different scales; the larger scale could include the analysis of caribou behavior, movements and distribution from collar data and the smaller scale could include Traditional Knowledge by having chosen community members observe and document caribou movements and interaction with roads and crossing ramps when caribou are moving through the site.

Arctic Diamond Response:

The sampling at Sable pit was completed in 2019 after two years of sampling as required. Supporting evidence and rationale relating to the cessation of ABA sampling from the Sable Pit is as follows:

Annual monitoring has included the collection of waste rock at a rate of three samples per rock type per bench per year for two years. This requirement ended in 2019 given that monitoring commenced in 2017. In 2019, 20 samples of granite and 3 samples of diabase were collected. Two samples of granite (SG.470.38.01, SG.470.38.02) had high calcium, magnesium, iron, and nickel concentrations compared to the other granite samples, indicating that they were likely diabase or a mix of diabase and granite; these samples were reclassified as diabase and the update is reflected in the results below.

GRANITE

Results of paste pH, total sulphur, NP, and CO₃ NP for the 18 granite samples collected in 2019 were all within the range observed in the 2017-2018 Sable samples (Error! Reference source not found.). The median values of paste pH (9.8), total sulphur (0.01%S), NP (9 kg CaCO₃ /t) and CO₃ NP (2.3 kg CaCO₃ /t, which represents half the detection limit) were similar to the historical results from 2017-2018. All samples were classified as non-PAG according to the NP/ MPA whereas all but three samples were classified as non-PAG according to the CO₃ NP/MPA criteria established in Section 2.1.2 of the 2019 Seepage. This was mainly due to the very low sulphur content (range of <0.01 to 0.02%S), except for two samples that were classified as uncertain according to CO₃ NP/MPA criteria (range of 0.03 to 0.04%S).

The major and trace element median values were similar to the 2017-2018 Sable granite samples. Molybdenum and zinc concentrations were slightly higher in 2019 relative to the 2017-2018 samples, while copper concentrations were slightly lower. In summary, the comparison of granite datasets yields the following conclusions:

- Results of paste pH, total sulphur, NP and CO₃ NP, as well as NP/MPA and CO₃ NP/MPA, for the Sable monitoring samples were all within the historical range of the Panda, Koala, and Fox granite monitoring results.
- Minimum values of various elements in the Sable dataset were below the historical minima of the Panda, Koala, and Fox monitoring results, however this is likely a result of lower detection limits achieved in recent years.
- Maximum values of a few elements in the Sable dataset were above the historical maxima of the Panda, Koala, and Fox monitoring results including:
 - * Beryllium: maximum in Sable monitoring results of 5.2 ppm compared to 2.5 ppm in the historical datasets.
 - Potassium: maximum in Sable monitoring results of 5.6% compared to 4.3% in the historical datasets.
 - * Phosphorus: maximum in Sable monitoring results of 2,200 ppm compared to 2,100 ppm in the historical datasets.
 - [°] Zinc: maximum in Sable monitoring results of 110 ppm compared to 97 ppm in the historical datasets.
- Sable granite is thus very similar to granite produced in other areas of Ekati that have been monitored extensively and deemed non-reactive.

DIABASE

Results of paste pH, total sulphur, NP, and CO₃ NP for the five diabase samples (including the two samples collected as granite) were all within the range observed in the 2018 diabase samples (Error! Reference source not found.). Despite a similar total sulphur median value (0.02%S), the range in 2019 (0.01 to 0.03%S) was more limited than 2018 (0.01 to 0.18%S), which may simply reflect the limited sample size in 2019. The median Sobek NP was similar in 2019 (14 kg CaCO₃ /t) to 2018 (16 kg CaCO₃ /t). The CO₃ NP values were below detection for all 2018 and 2019 samples. All 2019 samples were classified as non-PAG according to the Sobek NP/MPA, whereas four of the five samples were classified as non-PAG according to the CO₃ NP/MPA criteria classification with one sample of uncertain ARD potential. The major and trace element concentrations were mostly within the range observed in 2018. Molybdenum and nickel concentrations were slightly lower in 2019, likely reflecting the potentially mixed granite/diabase composition of the two samples that were reclassified. In summary, the comparison of diabase datasets yields the following conclusions:

- Results of paste pH, total sulphur, NP, and CO₃ NP, as well as of NP/MPA and CO₃ NP/MPA, for the Sable monitoring samples were mostly within the historical range of the Beartooth, Fox, Jay, Lynx, and Misery monitoring results.
 - ° The minimum paste pH value at Sable (8.0) was slightly below the minimum value of the historical dataset (8.1).
 - * The maximum NP/MPA value for the Sable monitoring samples (70) was higher than that of the historical dataset (60).
- Median total sulphur for the Sable samples (0.02%) was below that of the median of the comparative historical dataset (0.095%), while median NP was slightly higher for the Sable samples (15 kg CaCO₃ /t) compared to that of the historical dataset (12 kg CaCO₃ /t). Median CO₃ NP values were below the detection limit in both datasets. This leads to higher median values for the Sable samples of NP/MPA (26) and CO₃ NP (3.6) compared to the historical datasets from the other pits (NP/MPA of 4.3 and CO₃ NP of 0.93).
- Maximum concentrations of a few elements in the Sable dataset were above the maxima of the comparative historical dataset including:
 - Aluminum: maximum in Sable monitoring results of 9.4% compared to 8.2% in the historical dataset.
 - Barium: maximum in Sable monitoring results of 930 ppm compared to 800 ppm in the historical dataset.
 - Potassium: maximum in Sable monitoring results of 2.9% compared to 2.8% in the historical dataset.
 - Sodium: maximum in Sable monitoring results of 3.3% compared to 2.9% in the historical dataset.

Nickel: maximum in Sable monitoring results of 100 ppm compared to 97 ppm in the historical dataset.

- Strontium: maximum in Sable monitoring results of 690 ppm compared to 470 ppm in the historical dataset.
- Titanium: maximum in Sable monitoring results of 2.5% compared to 2.0% in the historical dataset.
- Vanadium: maximum in Sable monitoring results of 530 ppm compared to 440 ppm in the historical dataset.

Overall, Sable diabase samples have similar characteristics as previous samples collected from other areas at Ekati. Samples collected to date from Sable are on the lower end of the range present for risk of ARD potential, compared to the compiled historical dataset, mainly due to the low total sulphur content. Diabase is estimated to be less than 5% of the material within the proposed pit limit.

Only granite and Lynx diabase materials have been approved by the Board to be designated as suitable for general construction and reclamation at Ekati. Based on this, all Sable diabase will be contained within the WRSAs. Seepage surveys around the Sable WRSAs will continue to be conducted twice a year, in accordance with the requirement in the water licence. The analysis of Seepage chemistry from the Sable piles will be the best method of detecting any potential changes that may affect the Receiving Environment.

3) Factors that Influence WRSA Water Balance

Recommendation: Arctic Diamond should re-initiate the monitoring of Sable pit waste rock for acid base accounting and major and trace elements, including metals, which would be consistent with modern best mining practices.

Arctic Diamond Response:

The 2019 Annual Closure and Reclamation Progress Report, Appendix F therein a technical memo issued on December 19, 2019, stated that "surface flow is considered to be the likely transport mechanism for most seepage from the waste rock piles at Ekati site and only a limited quantity is transmitted via subsurface flow. This conclusion is supported by site observations and established permafrost hydrology:

- During freshet most surface water and seepage occurs overland when the active layer is still frozen;
- Measured hydraulic conductivities are low to moderate and calculated flow velocities are far less than associated surface flow velocities;
- Surficial geology shows the waste rock piles are surrounded by glacial material whose seepage potential is far from overland flow potential;
- Electromagnetic geophysical (EM) surveys show subsurface flow velocities around the waste rock piles to be relatively slow; and
- WRSA seepage is typically observed as ponding water at the toe or as visible surface flow."

Based on this technical memo and site observations installing flow instrumentation would not capture the whole picture of seepage volume over the freshet and fall seepage program. The practicality of maintenance and logistics of installing a permanent instrumentation in tundra poses challenges as well as the tundra is known for large stretches of rock and boulder fields. By nature, seep flow paths may vary from year to year, which would require take down and installation of a flow instrument on a regular basis.

4) Alternative Seepage Reference Sites

Recommendation: Arctic Diamond should install and monitor surface and subsurface flow instrumentation at selected long-term seepage locations and investigate other key factors that influence waste rock storage area water balance.

Arctic Diamond Response:

From the 2021 Waste Rock and Waste Rock Storage Area Seepage Survey Report: "During the 2021 Seepage surveys, 51 seeps were sampled; 14 of which were newly identified in 2021 and two of which were reference sites. Samples were collected during freshet (June) and fall (September). The two reference sites sampled, REF-005 and REF-040, were located in the Panda/Koala/Beartooth and Misery areas respectively. REF- 005 was reported to show minor influence from mining in the area, and continued to appear to do so, with some variables exceeding the 95th percentile of the site's historical dataset for the first time since monitoring began in 2000; including cadmium, chromium, and molybdenum."

"Field pH continued to decrease, as did the major ion concentrations in general. REF-040 has been monitored since 2019 and so did not have a historical dataset to refer to. Therefore, the Sable reference station dataset was used for comparative purposes. Initial results for REF-040 appeared to indicate the site is influenced by the Misery camp pad upstream as several of the water quality variables, including major ions and total and dissolved metals, exceeded the 95th percentile of the Sable reference dataset." In the 2022 fall seepage program Arctic Diamond will attempt to identify alternative reference seep sites. Depending on heavy or light precipitation and seep characteristics, it may be difficult to identify alternative reference seeps in pristine tundra (i.e., a suitable distance as to not be influenced by any disturbance), however, an attempt will be undertaken by the site team.

5) Inclusion of Numerical Criteria

Recommendation: Arctic Diamond should evaluate and identify alternatives to the existing seepage reference sites REF-005 and REF-040 which continue to show influence from nearby mining activities

Arctic Diamond Response:

While Arctic Diamond acknowledges that establishing criteria earlier has some benefits related to planning for closure, there are also benefits associated with taking more time. This provides operational flexibility and a larger dataset for use in developing final closure criteria. In the criteria work plan, Arctic Diamond has identified the priorities to be advanced in the next few years, and those that are better addressed closer to final closure. Arctic Diamond has outlined steps to develop final criteria for individual mine components that are to be decommissioned progressively.

6) Progressive Reclamation

Recommendation: Arctic Canadian Diamond Company should develop numerical closure criteria for inclusion in ICRP v. 4.0. These numerical criteria are needed to support decision-making about closure methods and activities. At the least, numerical criteria should address dust (Closure Criterion SW-8), water quality (Closure Criteria SW-10, WR-1, LLCF-1, and OP-1), sediment quality (Closure Criterion SW-10), and erosion rates (Closure Criteria LLCF-3, WM-3, and BI-3).

Arctic Diamond Response:

In the criteria work plan, Arctic Diamond has identified the priorities to be advanced in the next few years, and those that are better addressed closer to final closure. The priority activities that will be advanced in the next few years include:

•	Metasediment humidity cell test work	•	Returning Land Use Plan	•	RP8 – LLCF Stabilization Cover
•	Pigeon Pit FCRP	•	RP1 – Wildlife Safety	•	Preliminary species list for revegetation
•	Beartooth Pit littoral zone conceptual design	•	Fox Pit Flooding Plan		
•	Advance erosional framework	•	Misery WRSA Final Plan		

Advance erosional framework

These activities will support planned progressive reclamation activities at Pigeon Pit, Fox Pit, and Misery WRSA. They will also advance important decision making related to Pigeon WRSA cover (e.g., humidity cells, erosional framework), and provide inputs to support engagement related to the RLUP (e.g., RP1, RP8, Beartooth pit littoral zones). For components that Arctic Diamond has identified as requiring more time to address closure uncertainties, the

schedules have been advanced to allow adequate time to develop closure criteria.

The current Ekati life of mine plan for approved projects (operations to 2029) allows sufficient time to complete all critical tasks identified within the criteria workplan. Arctic Diamond is committed to finding innovative methods of extending the life of mine for Ekati. This process has already begun with permitting of the Point Lake project extending operations to 2029. Arctic Diamond has already begun engagement on the prospect of Underwater Remote Mining (URM) as a continuation of open pit mining in existing open pits. URM is expected to have reduced potential for environmental effects as there would be no new open pits or WRSAs required. URM is the current plan for obtaining further benefits from existing developments. Arctic Diamond's future development of URM at Ekati will allow for the mine life to be extended past 2029 and that timeline would allow for future iterations of the ICRP to be required in advance of the FCRP required two years ahead of final closure. Based on the current mine life and planned future planned projects there is minimal risks to all closure planning related items being completed in advance of an FCRP.

Appendix C: Acronyms and Glossary

ACRONYMS

AEMP = Aquatic Effects Monitoring Program **AQMP** = Air Quality Monitoring Facility Program **CKRSA** = coarse kimberlite rejects storage area **DFO** = Federal Department of **Fisheries and Oceans ECCC** = Environment and Climate Pond Change Canada EQC = Effluent Quality Criteria **FAA** = Fisheries Act Authorization **GNWT-ENR** = Government of the Northwest Territories-Environment and Natural Resources ICRP = Interim Closure and **Reclamation Plan** IEMA = Independent Environmental Monitoring Agency OR 'the Agency'

KPSF = King Pond Settling Facility **LLCF** = Long Lake Containment
Facility

MVRMA = Mackenzie Valley Resource Management Act

PLP = Point Lake Project

TK = Traditional Knowledge

TRSP = Two Rock Sedimentation Pond

WEMP = Wildlife Effects Monitoring Program

WLWB = Wek'èezhìi Land and Water Board

wmt = wet metric tonnes (of waste
rock)

WRSA = Waste Rock Storage Area

DEFINITIONS

Acid [rock] drainage: Outflow of water that has become acidic due to exposure to exposed rock surfaces in waste rock piles, open pits and underground workings

Action level: when the concentration of a substance exceeds a level defined in the Aquatic Response Framework, where the company must take precautionary action in order to reduce or remove the potential for impending harm

Adaptive management: a management system with continual monitoring. If a mitigating action does not work, additional actions are used to keep the impacts within accepted levels or below thresholds.

Ambient air quality: the concentration of pollutant in the surrounding air

Benchmark: a standard against which to compare or assess a monitored parameter Benthic macroinvertebrate: all life forms without bones living on lake and stream bottoms (i.e. clams, snails, crustaceans, insect larvae and worms).

Benthos: animals and plants that live at the bottom of a lake, wetland or stream

Concentration: the amount of a substance in the defined space; the amount of different pollutants in the surrounding air

Contingencies: methods to fix future events or situations that are possible but not certain

Discharge: to allow wastewater to flow out or be pumped out from where it was held

Dust suppression (or suppressants): actions that prevent or reduce the amount of dust spreading into the air **Financial security:** funds accessible by government to cover the total expected cost of closing and reclaiming a mine site if a proponent is unable or unwilling to complete the reclamation.

Fine processed kimberlite: very small particles (sand, silt, clay-sized) less than 0.5mm diameter, leftover as waste from the process to remove diamonds from the kimberlite ore

Focal surveys: documenting observations of a single animal and the proportion of time it spends doing different behaviours, i.e., feeding, bedding, alert, etc.

Gonadosomatic index (GSI): represents the energy allocated to reproduction and is calculated as gonad weight/body weight x 100

Greenhouse gases: gases in the atmosphere that trap heat. They allow sunlight to pass through and warm the earth, but prevent the warmth from leaving. Most common GHGs are water vapour, carbon dioxide, methane, ozone, nitrous oxide and chlorofluorocarbons.

Incidental observations: records of observations of any wildlife by any persons and in all areas at the mine.

Knowledge holders: Indigenous people recognized within their own communities for their expertise and depth of knowledge and experience. Landfarm: a place to treat contaminated soil

Liver Somatic Index (LSI): a metric tied to healthy metabolism, calculated as liver weight/body weight x 100

Metasediment: a type of metamorphic rock-rock transformed by heat, pressure, other natural actions.

Meteorological: the science of weather and climate; the conditions of the atmosphere in an area.

Mitigation, mitigating: an action that is taken to reduce the negative impacts of a condition or situation. To make something less harmful. In this case, to make sure environmental impacts from the mine are as minimal as possible.

Monitoring: collecting and analyzing repeated observations and measurements to evaluate change and impacts of change. Watching habitat and wildlife, and 'keeping an eye' on things all the time.

Neutralize: to make something ineffective or harmless. In this case, to make an acid or alkaline substance chemically neutral.

Overburden: rock or soil covering a mineral deposit. It is removed to get to the ore or rock that contains the desired mineral(s)

Particulates/particulate matter: Very tiny bits of dust, smoke, and other harmful materials in the air. Some are big enough to see with your eyes; others are so small you need a microscope. Particulate matter is a mix of particulates and liquid droplets.

Phytoplankton: microscopic plants (e.g., algae) found in freshwater and ocean environments. They are an important food source for zooplankton.

Reclamation: the process of returning areas of land and water-disturbed by mining operations-to conditions that are consistent with closure objectives

Scan surveys: observations of the behaviours of a group of animals for quantifying the frequencies of dominant behaviours in a group over a period of time.

Seepage: the slow escape of liquid or gas through a porous material or small holes. In this case, liquids escaping from waste rock piles that may contain contaminants.

Slurry: fine processed kimberlite mixed with water

Surface minewater: water that is pumped or flows from open pits, underground workings or other mine areas Systematic surveys: surveys conducted by the Ekati Environment Department using specific methods and covering an established area, such as all main roads and the Misery power line.

Threshold: a defined point, level or condition where, if things change beyond that point, further change can cause lasting harm.

Till: a coarse collection of clay, sand, gravel and boulders mixed together and deposited by glaciers

Traditional knowledge; Indigenous knowledge: The entire, interconnected knowledge system of a group of

Indigenous people: spirituality, values and beliefs, environmental knowledge, transmission of knowledge and the codes of practice.

Wastewater: water that has been affected by mining processes, activities or wastes

Zone of influence (ZOI): is the area around a development where caribou distribution and abundance are less than what would be expected based on the habitat alone.

Zooplankton: small, mostly microscopic animals that live suspended in freshwater (and ocean) environments. Zooplankton feed on phytoplankton and small particles in the water. They are an important food source for fish.

Directors Biographies



Emery Paquin | Chairperson

Appointed jointly by the Government of the NWT, the Government of Canada, and Arctic Diamond in 2015.

Emery is an independent environmental consultant living in Yellowknife. He has more than 35 years of environmental management experience with the northern mining industry and territorial government, and served six years as a Member on the Inuvialuit Water Board before being appointed to the Agency in 2015.



Ronald Allen | Vice-Chairperson

Appointed jointly by the Government of the NWT, the Government of Canada, and Arctic Diamond in 2017

Ron has been living and working in a variety of Arctic communities since the 1970's, and has worked with community groups and organizations on local cultural values, concerns and aspirations related to renewable resources. Ron moved to the NWT as a Renewable Resources Officer and transferred to Fisheries and Oceans Canada in the 1980's where he worked as a Fishery Officer and Habitat Inspector. Later he worked as Area Manager and Area Director, delivering and managing multiple-sector operational programs including Habitat Assessment, Fisheries Management, Conservation and Protection, Science, and Administrative Services.



Kim Poole | Secretary/Treasurer

Appointed by the Governments of Canada and NWT, and BHP Billiton in 2006, and was reappointed by the TłĮchǫ Government in 2015

Kim is an independent wildlife biologist with over 40 years of experience in the Northwest Territories, Nunavut and British Columbia in the areas of wildlife and wildlife habitat research, and assessment and mitigation of environmental impacts related to the mining, forestry, and tourism industries.



Tim Byers

Appointed by Akaitcho Treaty 8 First Nations (YKDFN and LKDFN) in 2001

Tim Byers is an independent consultant living in Manitoba. He has been working on projects in the Canadian Arctic since 1980. He specializes in studies of fish, Arctic seabirds and marine invertebrates and has assisted Aboriginal communities in documenting their indigenous environmental knowledge. He would like to see more Aboriginal youth engaged in environmental sciences and Traditional Knowledge used more effectively in environmental monitoring, research and impact assessments.



Jesse Jasper

Appointed jointly by the Government of the NWT, the Government of Canada, and Arctic Diamond in 2016

He retired from the federal government in 2011 after 39 years with Indigenous and Northern Affairs Canada and Environment Canada. He has worked in northern Canada since 1972, focusing on a variety of water monitoring and environmental studies to support the design and evaluation of northern development projects, and the characterization and monitoring of environmental conditions. He contributed to and coordinated a number of major project reviews, technical presentations to northern environmental assessment panels, and follow-up licencing of northern development projects by the NWT Water Board. This included Norman Wells Oilfield Expansion and the NWT Diamond Project (now the Ekati Diamond Mine). Jesse ended his career with a two year term as Executive Director of the Mackenzie River Basin Board.



Bill Slater

Appointed by the North Slave Métis Alliance in 2018

Bill is an independent environmental consultant with an engineering education. He is based in Whitehorse, where he has lived and worked for over 25 years. Most of his work is for First Nation governments, as a technical advisor on mining and mine closure projects. His technical focus areas include environmental effects assessment, mine closure, water quality and water management.

Life of Mine Plan

	19	97	2002	2007	2012
Panda	Panda OP				
	Panda OUG				
	Koala North OP				
Koala	Koala North Test UG				
	Koala North UG				
	Koala OP				
	Koala UG				
Beartooth	Beartooth OP				
Fox	Fox OP				
Misery	Misery OP				
	Misery OP Pushback				
	Misery UG				
Lynx	Lynx OP				10000
Pigeon	Pegeon OP				
Sable	Sable OP				
Point Lake	Point Lake OP				
Beartooth Fox Misery Lynx Pigeon Sable Point Lake	Beartooth OP Fox OP Misery OP Misery OP Pushback Misery UG Lynx OP Pegeon OP Sable OP Point Lake OP				



Notes



