



INDEPENDENT ENVIRONMENTAL MONITORING AGENCY INTERVENTION | 2024

Sable Project
Underground Mining
Application Public Hearing
September 25-26, 2024

Submitted to the Wek'eezhii Land and Water Board
September 4th, 2024

INDEPENDENT ENVIRONMENTAL MONITORING AGENCY

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1. INTRODUCTION

1.1. Background and Mandate - Independent Environmental Monitoring Agency

The Independent Environmental Monitoring Agency (Agency) has provided advice on environmental management and regulation of the Ekati Diamond Mine for 27 years. The Agency was established in 1997 through a legally-binding Environmental Agreement to act as a public oversight body for the Mine.

The Agency is a non-profit society under territorial legislation with funding provided by the owner of the Ekati Diamond Mine, Burgundy Diamond Mines Limited (Burgundy), as set out by the Environmental Agreement. We report to our society members (the Tłı̨chǫ Government, Akaitcho Treaty 8 [Yellowknives Dene First Nation and Lutsel K'e Dene First Nation], North Slave Métis Alliance, Kitikmeot Inuit Association, Governments of NWT and Canada, and Burgundy) and, although our directors are appointed by these members, once appointed they operate independently. Directors are knowledgeable and experienced in fields such as wildlife, fisheries, lands, water and environmental assessment and have extensive experience with, and knowledge of, environmental management at the Ekati mine.

Our mandate as set out in the Environmental Agreement is to:

- Review, report and make recommendations on the environmental programs, reports and activities of Burgundy and government regulators and the integration of the experience and Traditional Knowledge of Aboriginal peoples.
- Participate as an intervenor in regulatory and other legal processes concerning the environment at the Ekati mine.
- Maintain a resource library of environmental information relevant to the Ekati mine.
- Distribute information about the Ekati mine to Aboriginal peoples and the general public.
- Provide an effective means to bring to Burgundy and governments the concerns of Aboriginal peoples and the general public.

1.2. Organization of the Intervention

The Agency is pleased to present our intervention on Burgundy's application to develop an underground operation at the Sable Pit. We carefully considered all of the information provided by Burgundy as part of the application process, the arguments and evidence heard during the Technical Sessions, Information Requests and responses. We have focused this Intervention on the following subject areas.

- Landfill Capacity
- Work Pad Seepage
- Mine Water Sampling Frequency
- Waste Rock Seepage Effects
- Two Rock sedimentation Pond Water Quality – Mitigation Options
- Waste Rock Sampling Frequency and Duration at Sable

2. AGENCY INTERVENTION TOPICS AND RECOMMENDATIONS

2.1. Landfill Capacity

Issue Statement:

The Sable Underground application includes the construction of a 100-person camp at Sable, which will ultimately need to be demolished as part of progressive reclamation or post closure. Burgundy's Project Description states that there will be no landfill at the Sable site but does not provide details to indicate where and how the additional inert waste generated by the eventual demolition and disposal of Sable accommodations and related infrastructure will be dealt with.

Agency's Conclusion:

Burgundy's response to Information Request 9 partially addresses our comment regarding landfill capacity, stating clearly for the first time that there will be a need for another landfill to be authorized at the Ekati mine. The currently operating landfill *"is not considered to have adequate capacity to receive demolition debris from reclamation of the Ekati mine generally."* (p. 21 Responses to Information Request). Burgundy noted that the location and design of a demolition landfill at the Main Camp site will be determined through the Interim Closure and Reclamation Plan (ICRP) (Section 5.8.5.3.1).

The Agency believes that it is not appropriate for a project to go ahead without sufficient details regarding how the site will be cleaned up and specifically that there is enough capacity to deal with the demolition debris.

Burgundy's Conclusion:

A demolition landfill is not proposed at the Sable site. A demolition landfill is planned at the Ekati Main Camp site to receive inert solid waste from demolition of buildings and equipment. The location and design of a demolition landfill at the Main Camp site will be determined through the ICRP (Section 5.8.5.3.1).

Evidence and Agency Rationale:

Part of any mining application needs to consider how the project will be closed, including details outlining how that will be achieved. In the Agency's opinion just saying that this will be addressed as part of the ICRP process is inadequate.

In recent Wek'èezhìi Land and Water Board (WLWB) decisions regarding the ICRP it has become apparent that the current ICRP lacks detail for a mine that has been operating for over 25 years. The Ekati mine should already have a detailed demolition landfill design plan to describe how and where it will deal with its waste at closure. The demolition landfill design plan should not have to wait until the revised ICRP is submitted in 2026.

Agency Recommendation 1:

Burgundy should provide details (including siting and size) of a proposed new demolition landfill through a requirement for a Demolition Landfill Design Plan within Part K of the Water License.

2.2. Work Pad Seepage

Issue Statement:

Figure 1.3.3 shows that portions of the North Work Pad and South Work Pad encroach on watersheds to the east and south of the current Sable project, watersheds that are not captured in the Seepage Surveys, Surveillance Network Program (SNP), Aquatic Effects Monitoring Program (AEMP) water quality monitoring and reporting.

Agency's conclusion:

The Agency is concerned that there is the potential for seepage from these new work pads to impact water quality in lakes downstream. This is of particular concern for the Mink Lake watershed as it has up to now not been exposed to any mining infrastructure.

Burgundy's conclusion:

These work pads were previously approved by the GNWT Inspector. Work pads are constructed out of non-reactive materials and as such, seepage sampling is not required for work pads at Ekati. Activities taking place on the work pads are governed under various environmental mitigation plans.

Evidence and Agency Rationale:

The argument that work pads are made of non-reactive rock and do not need to be monitored does not reflect best practices or the current seepage monitoring at the Ekati mine, which does monitor laydown pads. Seeps of potential concern have been identified at waste rock piles and laydown pads that only contain non-reactive rock (granite).

In the WLWB's August 28, 2024 reasons for decision regarding the Seepage Response Framework, they noted that seepage can occur from sites outside of waste rock storage areas (WRSA) such as crusher pads or overburden stockpiles, Section 3.3.1 revision D requires Burgundy to revise v1.1 of the Seepage Response Framework to reflect that seepage from waste rock crushing sites is also covered under the WRSA Seepage Response Framework. This shows that both the WLWB and Burgundy agree that infrastructure other than WRSA can have seepage issues and should therefore be included in seepage monitoring programs. This decision spoke specifically to the crusher pads, indicating that this monitoring should include all laydown, crusher or ore pads to ensure that any seepage from these mine operations going to the receiving environment are part of the seepage monitoring programs at the Ekati mine. During day two of the Technical Sessions (July 24, 2024) Burgundy confirmed that *"the north and south work pads, so, yes, the intention is for those pads to be used, yes, as a crusher or stockpile and then an extension of the kimberlite ore storage pad."* (p. 38).

Considering that parts of the new Sable work pad extensions are in new undisturbed watersheds that are not currently being monitored at all, it is even more important to monitor these new areas for potential seeps. In addition, this new receiving environment needs to be included in the AEMP to be able to detect any potential effects to the downstream receiving environment.

Agency Recommendation 2:

North and South work pads be monitored in the AEMP, Seepage Survey, and incorporated into the Waste Rock and Ore Management Plan (WROMP) and the Seepage Response Plan.

2.3. Mine Water Sampling Frequency

Issue Statement:

Burgundy is proposing to reduce the current SNP monitoring frequency during discharge of water within Sable Pit as well as in the underground mine from weekly to monthly. This reduced sampling frequency would make it harder to determine the accuracy of Sable water quality model predictions and more difficult to catch water quality issues.

Agency's conclusion:

Water quality sampling frequency in the underground and in-pit sumps at Sable should not be reduced from weekly to monthly. The benefits of consistent and frequent monitoring are worth the effort of additional sampling.

Burgundy's conclusion:

Burgundy wants to align the monitoring frequency of Sable Pit discharge (SNP 0008-Sa2) to that of the current requirements for Misery pit mine water, preferring to have regulatory consistency between its various open pits (and their respective underground workings). Burgundy is basing this request on its determination that (a) geochemical properties that influence Sable Underground water quality are less variable at Sable than at Misery and (b) there won't be blasting and dust-generating activity in the open pit.

Evidence and Agency Rationale:

Reliable, frequently-measured water quality data are imperative to identify potential water quality issues in the pit and underground and are critical in confirming and calibrating the water quality prediction models early on in a project's development and operation. It is unreasonable to reduce water sampling frequency in Sable pit. The Misery pit had a much greater database over years of water sampling to justify the reduced sampling frequency.

Agency Recommendation 3:

Burgundy should continue to monitor SNP 0008-Sa2 and the proposed new SNP station 0008-Sa2b weekly during discharge to provide a more comprehensive database to promote understanding of impacted water quality from the Sable underground mine and to identify any potential water quality issues. Similar to the Misery project, if a robust water quality data set shows low temporal variability in water quality measurements, then it may be appropriate to reduce the sampling frequency; until then the sampling frequency should remain as weekly.

2.4. Waste Rock Seepage Effects

Issue Statement:

The approach to calibration of the Sable water quality model may lead to underprediction of the loading of contaminants from underground operations.

Agency's conclusion:

The calibration of the water quality model assumes that all uncertainty in modelling is associated with loading from underground sources and does not account for any uncertainty in the prediction of contaminant loading from waste rock. This does not accurately account for the balance of uncertainties with model inputs and results in a calibrated model that likely underpredicts the contribution of loading expected from underground sources.

Burgundy's conclusion:

In its responses to Information Requests, Burgundy concludes that calibration using only the underground inputs is appropriate because the primary uncertainty in the model is related to particulate load. Burgundy asserts that model calibration only needs to address the amount of particulate removal that occurs in the first cell of the Two-Rock Sedimentation Pond (TRSP) and filter dike. Because inputs from waste rock are based on measurement of dissolved contaminant concentrations, Burgundy argues that the waste rock inputs assumptions do not contribute to model uncertainty.

Evidence and Agency Rationale:

As described in the water quality modelling report (Appendix B) the uncalibrated model did not accurately predict the contaminant loading in TRSP. The concentrations predicted in the uncalibrated model were greater than those actually measured during the calibration period (2018-2023). To make the model fit the data, model calibration "adjusted" the inputs. In this case, the calibration required adjustment to reduce contaminant inputs from some sources so that predicted concentrations would more closely match those measured in the calibration period.

Contaminant inputs during the calibration period were primarily from the open pit sumps and waste rock. The drivers of final concentrations in TRSP are both flow and concentration of source inputs. For 2018-2023 operations at Sable, the inputs from the Open Pit sump had measured flows and measured water quality using total metals. For the waste rock, on the other hand, flows were estimated using a model based on scaling of model results from Panda/Koala/Beartooth completed in 2016 and relied on "*constant monthly runoff rates, based on average annual precipitation totals*" (Appendix B). Not only were the flows not measured (i.e., they came from another model with its own uncertainties, a model that was not calibrated for Sable), but they were based on modelling for average annual conditions for all years during the calibration period, whether those years were wet or dry or average. Water quality inputs for waste rock were based on measured seepage quality (dissolved concentrations) at surface seepage locations, representing only a portion of the waste rock contaminant inputs. Also, the model does not consider any attenuation of contaminants along the waste rock flow path, or transport time for contaminants from waste rock. Given these inputs for the TRSP water quality model, the particulate matter in the Open Pit sump data is clearly not the only uncertainty in the model predictions. Flows

from waste rock sources have a high degree of uncertainty and water quality from waste rock also has some degree of uncertainty.

At the Technical Session, Burgundy stated that it is “*conservative*” to assume that there is no attenuation or time delay of contaminants along the waste rock flow path. The interpretation of what is conservative for modelling is highly context specific. Burgundy’s assumptions about waste rock are indeed conservative when used for predicting potential effects of waste rock on the aquatic environment. However, in the context of calibrating a model that is used to predict potential effects of underground mining sources, the assumptions about uncertainty for waste rock are unconservative – meaning that they result in an underprediction of the potential loading from underground sources.

In its response to Information Requests, Burgundy provided a “*calibration quality control check*” where it removed the waste rock loading inputs from the model to observe effects on model results. Burgundy asserts that “*the resulting calibration did not underpredict concentrations in the absence of WRSA seep loads.*” For many parameters, the graphs provided in Attachment 1 of the response to Information Request No. 2 do not support this assertion. The graphs show that removal of waste rock loading from the model predictions results in underpredictions for many parameters (e.g., aluminum, arsenic, boron, barium, cadmium, chromium, iron, manganese, molybdenum, nickel and zinc). For many of these parameters, the graphs also show that waste rock is a significant contributor of contaminant loads, including for several contaminants that are typically elevated in association with particulate matter (e.g., aluminum, chromium, iron and nickel). Overall, this suggests that uncertainty related to waste rock loading contributions may be relevant to model calibration, and therefore the prediction of effects from underground mining activities.

Burgundy has not provided data on the Total Suspended Solids (TSS) concentrations in the Sable Pit Sump data. It has also not provided information about any measured differences in each cell of the TRSP. Both of these may provide additional evidence to support the calibration of models.

Agency Recommendation 4:

Based on Burgundy’s modeling approach and the information provided, the Agency continues to believe that the model is underpredicting the effects of ground water on the Sable Water Quality Model.

2.5. Two Rock Sedimentation Pond (TRSP) Water Quality – Mitigation Options

Issue Statement:

Currently, with the majority of tailings being pumped to old pits, Panda and Koala, and not the Long Lake Containment Facility, there has been a gradual increase in the amount of mine-impacted water onsite. Currently, there is no specific plan in place to deal with all of the mine-impacted water. The ability of Burgundy to be able to deal with any mine water issues that could develop at Sable is a concern.

Agency’s conclusion:

The development of Sable underground further increases the risk and uncertainty around mine-impacted water at the Ekati mine. The isolated location of the Sable site limits Burgundy’s options to mitigate any water quality issues should they occur. The Agency is concerned about the impacts to water quality of mine water and the limited options to mitigate any negative effects at the Sable site.

Burgundy's conclusion:

A number of feasible adaptive management responses to poor water quality in TRSP have been identified, of which trucking is one. However, adaptive management responses, by definition, cannot be exhaustively identified ahead of time but must be determined at the time based on the circumstances at hand. Section 6.3.2 of the Project Description provides an extensive list of examples of successful implementation of adaptive management responses at the Ekati Diamond Mine, most of which were not pre-determined.

Evidence and Agency Rationale:

Burgundy states that it has assessed the potential risks to surface water quality posed by pumping underground mine water to surface and determined that negative effects are not predicted. That may be true; however, it is difficult to predict and model ground water impacts. Despite best efforts, there are examples of unpredicted water quality concerns at the Ekati mine and other mines in the north.

The responses provided by Burgundy to our original comments referred to other sites and were not specifically applicable to the Sable site. The only actual mitigation discussed was trucking water to the main site for disposal. During the Technical Session discussions (Transcript Day 1 p. 197), WLWB staff pointed out that the November 2022 Two Rock Outfall Report v 3.1 listed a number of potential mitigation options that were not included in the Sable underground application. When asked if the mitigation listed in the Two Rock Outfall report would still apply, Burgundy did not provide a firm answer, but did indicate that the mitigations listed would be the ones they would be looking at.

Agency Recommendation 5:

Burgundy should provide specific mitigation that could be implemented at the Sable site to mitigate any potential mine water effects, in addition to trucking.

2.6. Waste Rock Sampling Frequency and Duration at Sable

Issue Statement:

Burgundy's proposed sampling frequency and duration for waste rock for the Sable underground is not consistent with best practice for sampling of mine wastes.

Agency's conclusion:

To be consistent with best-practice mining guidance, waste rock sampling and analysis for acid rock drainage and metal leaching need to be conducted throughout mine operations to verify characteristics of mine wastes and prediction of effects on water quality.

Burgundy's conclusion:

Burgundy argues that Sable waste rock is well understood due to the "*well-established understanding of geology of the Sable site*" (Response to IEMA Comment 12). On this basis, Burgundy proposes that 2 years of sampling with three samples per year is sufficient to verify the waste rock conditions for all of the waste rock produced during underground mining at Sable.

Evidence and Agency Rationale:

The Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Mining Environmental Neutral Drainage [MEND], December 2009) identifies a key purpose of operational material characterization as *“verify, refine and address gaps in the characterization of materials excavated, exposed or otherwise disturbed by the project”* (p. 4-8). The MEND Manual highlights that it is *“important to check pre-development predictions of drainage chemistry properties, such as mineralogy and acid-base-accounting characteristics during development and production for the same reason that mines conduct detailed sampling and analysis during mining to check pre-mine predictions of ore grades.”*

The Waste Rock and Ore Storage Management Plan indicates that approximately 80 million tonnes of waste rock have been produced at Sable, with 47 samples analyzed for acid-base-accounting and metal leaching, approximately one sample for every 1.7 million tonnes. This compares with the suggested initial sample frequency in the MEND manual for 80 samples for 10 million tonnes, or one sample for every 125,000 tonnes.

The Sable Underground project will produce approximately 500,000 tonnes of waste rock and Burgundy proposes to collect 6 samples. The MEND Manual suggests an initial sample frequency of 8 samples for less than 100,000 tonnes, or 26 samples for less than 1 million tonnes. This indicates that Burgundy does not propose to meet the suggested frequency of sampling.

At the Technical Session, Burgundy stated that the cost of sample analysis is approximately \$315 per sample. Increasing sample frequency to four times per year for the entire 4.5-year predicted underground mining operation would provide 18 samples, with an additional sample analysis cost of approximately \$3,780 (12 additional samples). This would be more consistent with the MEND Manual suggested initial sample frequency.

Agency Recommendation 6:

The Water Licence should require Burgundy to continue sampling waste rock with analysis for acid-base-accounting and metal leaching throughout the duration of underground mining, with sample frequency increased to four times per year.

3. SUMMARY OF RECOMMENDATIONS

Agency Recommendation 1:

Burgundy should provide details (including siting and size) of a proposed new demolition landfill through a requirement for a Demolition Landfill Design Plan within Part K of the Water License.

Agency Recommendation 2:

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