



Independent Environmental Monitoring Agency

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Joseph Mackenzie
Chair, Wek'eezhii Land and Water Board
#1-4905 48th St, Yellowknife, NT
X1A 3S3

Re: Interim Closure and Reclamation Plan (ICRP) Version 3.0 - Review

Dear Mr. Mackenzie,

The Independent Environmental Monitoring Agency (Agency) has reviewed the Interim Closure and Reclamation Plan (ICRP) version 3.0 submitted by Dominion Diamond Mines ULC (Dominion) and submit the following comments for your consideration.

General Overview and Conclusion

ICRP's are living documents that change as they move through mine life. They change to reflect operational changes and they also should increase in level of detail as the mine moves towards closure. Each version of the ICRP should increase the level of certainty and understanding around how the mine will close. This is not the case with the current version of the ICRP. The previous ICRP was approved in 2011 and the Agency anticipated a substantial update that not only incorporates the new mine components but also broadens the level of detail regarding the ICRP. The current version of the ICRP has mainly been updated to include the new mine components. Unfortunately, very little additional closure detail has been included in this version of the ICRP. Due to the lack of detail the Agency does not support the approval of the ICRP 3.0 in its current form. The comments below support this conclusion.

Recommendation 1: Due to the lack of detail the Agency does not support the approval of the ICRP 3.0 in its current form.

General Comments

Timelines and Final Closure and Reclamation Plan (CRP)

The requirement for Dominion to submit the Final CRP no less than 24 months before the end of commercial operations is outlined in the *MVLWB Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (2013). If the mine closes earlier than expected, there may be no Final CRP in place and significant effort could be required to finalize closure plans before closure implementation can occur.

By adopting the "24 months before end of operations" model, Dominion acknowledges and accepts the risks associated with this timeline. These risks include the possibility that the proposed final closure plan is not approved by the Wek'eezhii Land and Water Board (WLWB) and the start of closure activities are delayed beyond the two-year period. This may also lead to additional costs for continued care-and-maintenance at the site while closure planning and permitting is completed. Experience from

abandoned mines in Canada indicates that duration and costs for both of these activities can be substantial, and that environmental effects associated with mining activities will continue and can sometimes worsen during this period.

These risks are inherent in mine closure planning because closure plans always evolve as mine plans change and mining progresses. Also, there is always uncertainty about the duration of operations at mines – whether from increased duration because of successful exploration, or decreased duration from unplanned early closure. There are some important measures that should be undertaken to minimize the risks to public government and the environment arising from mine closure when there is no approved Final CRP in place.

The level of detail in the closure plan should be advanced as early as possible in the mining process. At the Ekati mine there are many pits, waste rock dumps, roads and kimberlite storage facilities and some have been completed. There appears to be no impediment to completion of final designs for closure of these facilities. Even if there is some possibility of future use of specific facilities, advancement of design for current conditions is warranted while recognizing that refinements of designs may be required to address final configurations. For facilities that are still in use, closure designs should also be advanced based on the current understanding of planned conditions at the end of mining.

Recommendation 2: Until more detailed designs are in place, the security bond should account for both increased costs of design and permitting, and the uncertainty in cost estimates (more uncertainty on the high side than on the low side) associated with early stages of planning and design.

Recommendation 3: The security bond should account for costs associated with interim care-and-maintenance at the site during the time required for finalizing the closure plan and designs, and getting approvals in place. The duration of planned ongoing care-and-maintenance required can be reduced as the level of design increases, but should probably be no less than two years until the Final CRP is approved.

Numerical Closure Criteria

The Agency considers the absence of numerical closure criteria for water, hydrocarbon contaminated soil and Waste Rock Storage Area (WRSA) seepage, or the absence of a process to develop closure criteria, to be a major weakness of the document. Section 5.3.5.4 describes uncertainties for closure of pits. The biggest current uncertainty likely relates to the lack of defined closure criteria for water quality – but this uncertainty is not identified.

Sections 5.2.1 and 5.3.2 propose that numerical closure criteria for water quality can be defined as part of the Final CRP. Section 5.5.5.3.1 makes a similar proposal for criteria for seepage water quality. This postponement is not an effective approach for an objective-based closure planning process as endorsed by Dominion and required by the MVLWB. Neither Dominion nor affected parties can evaluate the adequacy of the proposed closure activities without well-defined criteria, which should include numerical criteria where they are appropriate – for water, sediment, air and soil for example.

The numerical closure criteria will define what conditions are considered acceptable at mine closure, and whether proposed closure activities will achieve acceptable outcomes. In some cases, the analyses in the ICRP rely on comparison with operational aquatic benchmarks as criteria, but there is no reason to assume that the same criteria will be applicable at closure. Mines create adverse conditions and risks during operations. However, what was an acceptable risk during the relatively short operational life of a mine may no longer be acceptable for the ensuing 100s or 1000s of years during which the enduring structures and contamination exist. Closure plans are intended as a key mitigation measure aimed at restoring conditions for the long-term. Thus, operational criteria may not be applicable for closure.

In an objectives-based closure planning approach, we can expect that the closure criteria will influence the design of closure measures. The closure designs and closure criteria can also influence decisions about operational designs – otherwise, operational decisions can foreclose upon closure options, criteria and objectives. Dominion highlights the importance of considering closure in mine design as a lesson learned from Panda Diversion Channel slope stabilization reclamation activities (Table 6.4.1).

Recommendation 4: To support effective closure planning at this stage, the current ICRP should be revised to include numerical closure criteria where they are appropriate – and to provide rationale for the selection of the proposed criteria.

Recommendation 5: Where numerical criteria are not currently available, a clear process and time frame should be provided in the next version of the ICRP (3.1) to ensure that Dominion is moving towards development of numerical criteria in a timely manner.

Closure Design as a Closure Criteria

In the ICRP there are several closure criteria that rely on adherence with closure designs. This is an indirect criterion that is difficult to interpret directly and leads to a poor understanding of expected post-closure outcomes. Good designs will have criteria that define acceptable achievement of a closure objective and these will indirectly define expected post-closure conditions. However, the current approach allows the design to lead the criteria rather than the other way around. The criteria should define what the designs have to achieve. These may often be refined iteratively between interested parties and design engineers, but an objectives-based closure planning process should ultimately have the criteria leading the design.

These same criteria seem to assume that simply constructing according to the design will ensure that objectives have been achieved. Achieving objectives requires several stages – designs must incorporate provisions to achieve objectives and criteria, construction must be in accordance with design, and monitoring should confirm that objectives have been achieved – not just that things are done in accordance with the design. Finally, the confirmation of performance in many cases must be evaluated over time, not just as a one-time consideration of whether construction was in accordance with design.

Recommendation 6: All criteria that entail construction in accordance with designs should be revised to include details about what the designs are intended to achieve, specifically in relation to the associated closure objective. For example, for objective WR-3, “WRSA side slopes are physically stable,” what criteria and parameters will define a stable slope? These would be the criteria and parameters that the design would be expected to achieve, and would form the basis for measuring acceptable performance.

Recommendation 7: The criteria for the closure design should include a temporal aspect to reflect the appropriate amount of time required to confirm that the structure is functioning as designed and meeting the closure criteria.

Reclamation Maintenance

Section 10.7 proposes a reclamation maintenance cost of \$150,000 per year. This seems very low for a remote site. Almost any maintenance activity would exceed this cost if it required any equipment work – even for the cost of getting equipment and staff to the site.

Recommendation 8: The reclamation maintenance cost should be re-evaluated and adjusted to provide a more realistic estimate. It may be beneficial to describe typical or example maintenance activities that would be required and develop cost estimates for these example activities. All estimates should include costs that address the remoteness of the site and the potential need to bring equipment and people to the closed site to conduct maintenance activities.

Use of Territorial Standards and Guidelines

Table 5.2-1 of ICRP 3.0 (p-94) references the CCME agricultural standards for hydrocarbon remediation and ‘air quality closure criteria’ as criteria to be met when achieving Site-wide Objectives SW-3 and SW-7, respectively. Territorial contaminated site remediation and ambient air quality standards have been adopted by the GNWT under the *Environmental Protection Act*. These have been designed in order that the acceptability of hydrocarbon-contaminated soils and air emissions from developments can be determined taking into account northern conditions and factors. National, provincial and federal standards and guidelines should be used only in the absence of applicable territorial standards and guidelines.

Recommendation 9: Dominion reference territorial-adopted standards and guidelines (where available) as the measurable criteria used to assess the performance of closure activities.

ICRP Goal and Framework

Section 2.2 states that when closure criteria have been met, the closure activity can be considered to have been successful in meeting closure objectives. If closure criteria are not met within the anticipated timeframe, corrective measures may be required. This may include a reassessment of the monitoring period, adaptive management of reclamation and closure works, or implementation of contingency activities. (p-34).

While the scenario described may be appropriate for some facilities and closure criteria, this approach is likely not applicable to all components and closure activities at the Ekati mine. The proposed closure will result in permanent facilities at the site that will have permanent risks and liabilities. These will result in permanent requirements for monitoring, and periodic or infrequent maintenance – and the uncertainty and costs that are associated with these.

Section 5.1 also describes a scenario that seems to assume that it will be possible to reach a conclusion that each closure criterion has been achieved: “When closure criteria have been met, the closure activity can be considered to have been successful in meeting closure objectives.” (p-91). For many closure criteria, conditions can change over time and it is not sufficient to demonstrate one-time achievement. Acceptable conditions must continue over time and may require active measures (e.g., maintenance or repair) to achieve ongoing conditions that meet the criteria and objectives.

For example, water quality conditions can change over time based on progression of oxidation of acid-generating materials, or due to deterioration of thermal covers or changes in pit stratification. As a result, there may be an initial “achievement” of water quality criteria, but there will always be some degree of uncertainty about continued achievement.

Recommendation 10: Closure criteria for which performance can change overtime, should include a temporal component. For example, water quality is met for X years. Until the temporal aspect is met neither the criteria nor the objective can be deemed completed.

SW-1 - Community land use expectations have been considered in closure planning

As stated in the ICRP, this objective is a closure planning objective, focusing on what is expected during closure planning – rather than a closure objective. This is a good objective for the closure planning process, but it is different from an actual closure objective that should define the expected outcome of the closure plan.

Recommendation 11: The objective be changed to “post-closure land-use capacity is consistent with community land use expectations.”

Water Quality – Supporting Information

The ICRP does not include any detailed information to support predictions of water quality conditions, physical characteristics of pit lakes (i.e., mixing or separation of water in pit lakes) or thermal conditions in WRSAs. These components are all critical to understanding the closure and post-closure performance of the proposed closure plan. Dominion should provide detailed reports as appendices to the ICRP that describe the modelling work and the results. Without this information, it is not possible to complete a technical evaluation of the proposed closure plan.

For example, for Pigeon Pit, the ICRP identifies potential exceedances of operational water quality benchmarks for some parameters both during filling and in the long-term. Dominion concludes that the catchment is small and associated flows are low, and therefore loading to the receiving environment will be small even if the concentrations are above benchmarks. In the absence of details about the water quality modelling, it is impossible to evaluate the implications of the potential loading on downstream environments – especially in the context of long-term discharge to lake environments where loading could accumulate. Similar issues arise for other pits.

The discussion about water quality effects for Pigeon Pit also highlights the importance of identifying post-closure water quality criteria now. The predictions indicate that effects are possible even when relying on the operational aquatic benchmarks – but we do not know whether these are more or less stringent than appropriate post-closure aquatic criteria, or closure criteria that may consider wildlife, birds or drinking water. Similar issues arise for other pits.

Recommendation 12: Dominion provide the detailed supporting information that informed the water quality predictions. They should be included as Appendices.

Consistency with WLWB Directives

It is critical for accuracy and consistency that ICRP 3.0 correctly reflects the decisions, directives and instructions of the WLWB and commitments previously made by Dominion. The following paragraphs provide examples where, in the opinion of the Agency, WLWB decisions, directives and instructions and Dominion’s commitments have not been included in ICRP 3.0.

In its Reasons for Decision dated February 11, 2019 the WLWB directed Dominion to revise the Wastewater and Processed Kimberlite Management Plan (WPKMP) to clarify that the 30 m freshwater cap depth for Panda and Koala pit lakes has not yet been approved. However, table 5.3-9 and section 5.3.5.1 of ICRP 3.0 refer to leaving a 30 m freshwater cap for Panda and Koala pits upon closure.

In response to the Agency’s comments on the proposed WPKMP 8.0:

- With respect to model inputs for runoff quality, Dominion stated that it will “*consider investigating the collection of site-specific verification (i.e. to Snap Lake) water quality samples within the modelled domain of the Panda/Koala Pit laydown and pad areas. This information would be incorporated into future updates of the closure water quality modelling completed as part of the Ekati mine’s Reclamation Research Program (RP 2 – Panda/Koala Closure Freshwater Cap Depth).*”;
- With respect to the Agency’s recommendation that Dominion improve its proposed monitoring of Panda/Koala pit water to capture seasonal differences, Dominion responded that seasonal variations may be useful for the future modeling exercise described in RP2; and
- With respect to the Agency’s recommendation on the model inputs for ammonia and nitrate concentrations in WRSA seepage, Dominion responded that it “*will continue to review the ammonia and nitrate concentrations on a yearly basis, and if these data indicate increasing*

concentration trends, the scope of reclamation research as part of RP 2 – Panda/Koala Closure Freshwater Cap Depth may be expanded to include evaluating the effects of ammonia and nitrate on pit lakes water quality.”

Because these concerns were raised after the ICRP submission, these commitments are not currently reflected in Research Plan 2 nor are details of the modelling provided. The absence of these details in ICRP 3.0. means that there is not an effective mechanism to raise and discuss these issues as part of the ICRP review.

Recommendation 13: Dominion ensure that the next version of ICRP accurately reflect WLWB decisions, directives and instructions of the WLWB, and commitments previously made by Dominion, so that the issues raised can be discussed.

Adaptive Management

Section 5.1.1 describes an adaptive management approach and states that “adaptive management will underpin the approach to reclamation and closure planning.” (p-91). Unfortunately, the ICRP only provides a general summary of the adaptive management concept, providing a listing and brief description of generic adaptive management steps. As a result, it is not possible to evaluate the applicability and effectiveness of the proposed adaptive management approach to a mine closure project.

In the context of mine closure, adaptive management should only be applied as a mechanism for addressing outstanding uncertainty about performance after implementation of closure measures that are expected to achieve the closure objectives and criteria. This is different than adaptive management as it is typically applied in natural resources management and science, in which adaptive management applies deliberate experiments in order to reduce uncertainty and identify the levels of activity needed to achieve certain outcomes. With mine closure we need initial measures that we expect will achieve the desired outcomes – but should also recognize that these sometimes have uncertainty about performance.

For mine closure, part of the planning process should entail identification of specific areas of uncertainty, and development of well-defined adaptive management plans to evaluate performance and implement contingency measures.

Closure adaptive management plans should include the following:

- Specific areas of uncertainty that should be addressed by adaptive management. What events or potential events should be addressed by adaptive management?
- Indicators that will be used to evaluate performance of closure measures.
- Thresholds for indicators – These will be used to trigger action in the adaptive management plan. These will likely include various levels that trigger different types of actions, and could be specific values, trends, or combinations. In all cases, actions to improve conditions must be triggered with sufficient time to change performance before conditions reach thresholds for acceptability.
- Monitoring requirements. Should detail what monitoring is needed to support the adaptive management plan. This could include both indicators and supporting parameters.
- Contingency measures. Explain what measures can be taken to improve conditions. There should be evidence that corrective measures will be effective, and that they are practical and feasible within the time frame that will be available before unacceptable conditions are reached. There should also be details about the contingency measures, or at least a detailed description

about the process for selecting, planning, designing and implementing the contingency measures. If the contingency measures remain conceptual, the thresholds in the adaptive management plan must be set to allow time for finalizing plans.

Recommendation 14: While it is not necessary to have a detailed adaptive management plan in place at this stage of closure planning, the ICRP needs to include a framework for adaptive management focused specifically on the Ekati mine. This framework should identify the specific areas of uncertainty that will be addressed in a closure adaptive management plan, and identify the types of indicators, thresholds and contingencies that will be refined as part of a detailed plan.

Post-closure Monitoring Plan

As mentioned in the General Overview and Conclusion section of these comments, ICRP 3.0 was expected to provide greater details on closure planning as compared to those provided by ICRP 2.4. Post-closure monitoring however, is a subject where fewer, rather than greater, details are provided.

To demonstrate this point, ICRP 2.4 contains Appendix 5.1-6. This Appendix outlines reclamation monitoring and performance of each monitoring program by providing indicators, methods, locations, evaluation and response thresholds. Closure monitoring frequency is then outlined by providing type, frequency and duration of monitoring for each program area. This contrasts with ICRP 3.0 where post-closure monitoring is only described using general statements. Several examples are provided:

The overall duration, scope and frequency of pit lake monitoring will be dependent upon the specific pit that is being monitored and will also be dependent on the observed monitoring trends and results. (p-149)

Water quality monitoring will be conducted to demonstrate that the closure water quality criteria have been met and the water quality closure objective has been achieved. The overall duration, scope and frequency of monitoring will be dependent on the observed monitoring trends and results. (p-214)

While Dominion has provided estimated monitoring timeframes through their February 14, 2019 response to Information Request #3, the additional details provided through Appendix 5.1-6 of ICRP 2.4 remain absent. Instead, Dominion states that *“Monitoring information (scope and durations) will be developed progressively through ICRP updates with a final monitoring plan to be submitted as part of the overall final closure plan submission.” (IR #3 response)*

The Agency is concerned this lack of monitoring program detail will result in additional complexities when evaluating requests for relinquishment of financial security and progressive reclamation programs proposed by Dominion during the duration of ICRP 3.0.

Recommendation 15: Dominion revise (as appropriate) and re-insert Appendix 5.1-6 of ICRP 2.4 in order to provide an updated conceptual closure/post-closure monitoring plan.

SW-6 - Surface drainage patterns are established to ensure runoff flows downstream through the watershed

The purpose of SW-6 should be clarified. Water will flow naturally downstream. The objective could be intended to focus on re-establishing pre-mining watershed boundaries, or minimizing storage/ponding in watersheds, etc. The intent of this objective is not clear.

Recommendation 16: Clarify objective SW-6 so that it is clearer.

SW-8 – Relinquishment documentation is provided

This is clearly not an objective as described in the Closure guidelines, rather, it is an administrative objective for Dominion. It certainly does not help support or define the closure goal.

Recommendation 17: SW-8 be deleted as an objective of the ICRP.

Dams and Water Conveyance Facilities

Water Conveyance Facilities

Dominion's closure objectives for water conveyance facilities propose post-closure channels that are "*stable to a degree that is consistent with natural channel stability.*" (p-123) This is not an acceptable objective for mine closure. The beds of natural channels are typically subject to movement under flood conditions, with the smaller channel material moving during low return-period (i.e., high frequency) flood events and overall channel migration occurring during high return-period (i.e., low frequency) flood events. This channel movement leads to erosion of underlying material, with large flood events sometimes causing significant erosion. This may be acceptable in natural surficial materials, but not for channels flowing through or adjacent to mine wastes.

Mine-related water conveyance channels in the post-closure environment must permanently convey water safely around or over mine facilities and mine wastes (e.g., pits, waste rock and processed kimberlite).

With some designs, movement of surficial channel armoring materials can be acceptable in post-closure water conveyance channels, but overall channel migration will be unacceptable in all cases. Post-closure conveyance channels should be designed to be stable in high return-period events that are appropriate for the risks associated with the specific channels. Characterization of risks and selection of return-periods should consider the materials that would be affected by channel failure (e.g., processed kimberlite, waste rock), water quality impacts, downstream values, and remediation costs.

Dominion proposes monitoring of water management infrastructure for limited periods of time, with costing for periods up to 10 years for some facilities. Water management infrastructure (e.g., Panda Diversion Channel, Panda Dam) will be permanent and will always be at risk of damage from natural events. Failure of some infrastructure could lead to release of mine wastes. Post-closure monitoring will need to continue for the foreseeable future.

Recommendation 18: The closure objective should be changed to address the need for permanently stable channels.

The current closure criteria for water conveyance channels – e.g., "*Channels are built in accordance with design, with no significant slumping, subsidence, or erosion occurring during the post-closure monitoring period*" (p-123) fail to recognize the permanent requirement for channel stability. These channels must be permanently stable, regardless of Dominion's proposed post-closure monitoring period. For individual types of facilities, the closure criteria should specify the flood return-periods that will be addressed in the designs (likely varying depending of risks of individual facilities), and requirements to confirm that the constructed channels are and remain capable of safely conveying these design flood events.

Recommendation 19: The closure criteria for conveyance channels be changed to specify the flood return-periods that will be addressed in the designs, and requirements to confirm that the constructed channels are and remain capable of safely conveying these design flood events.

Panda Dam – Design Criteria

Section 5.7.1.2.3 proposes that the Panda Dam will remain in place as part of the closure plan. This will ensure continued flow through the Panda Diversion Channel – and therefore continued access to fish habitat in this channel. No specific design criteria are proposed for the dam. Since it will be a permanent structure, site-specific design criteria should be included. Monitoring and maintenance will also be required.

Recommendation 20: The ICRP should be revised to address objectives and criteria for this type (Dam) of permanent structure.

Sediment Quality

Section 5.7.5.1 describes closure measures for water management infrastructure. This includes removal of sediments from ponds in some cases.

Recommendation 21: Closure objectives and criteria should be developed to support decision making and evaluation of performance related to sediment.

WM-1- Water quality is acceptable for entry to the Receiving Environment

Proposed monitoring for WM-1 (water quality) includes inspections of breaches to confirm they are constructed in accordance with designs. It is unclear how confirming that facilities are constructed in accordance with the design is related to water quality. Continued post-closure monitoring to confirm physical stability may be related to water quality because any failure would lead to sediment release.

Recommendation 22: Monitoring for closure criteria and objectives should be relevant to the specific criteria and objectives it is intended to evaluate.

WM-2 Reclamation is in accordance with Fisheries Act Authorizations, where applicable.

The objective and the associated criterion are about compliance with the Fisheries Act Authorization. This seems like an administrative objective rather than a closure objective that defines expected closure outcomes. The objective should focus on what fish habitat conditions are expected at closure.

Recommendation 23: The objective should be re-worded to define what the reclamation work is actually trying to achieve.

Open Pits

Littoral Zones – Topographic Conditions

Section 5.3.4.1 addresses littoral zones in pit lakes and states that reclamation of pit lakes includes consideration of the construction of littoral zones and that the topographic conditions in and around pits will affect the likely success of any littoral areas. There is no doubt that topography of the pit edges will be critical for success of any littoral areas. This should be a consideration not only for reclamation, but for pit design and construction. As noted in the lessons learned from the Panda Diversion Channel slope stabilization, the operational period will be the easiest time to create appropriate topography for littoral areas, and in-pit topography could be adjusted to improve conditions for littoral areas.

Dominion's analysis of potential success for littoral areas appears to rely on planned pit design, where the pits are designed for mining purposes without consideration of need for littoral areas. As with all mine components, the pit design should carefully consider reclamation requirements and post-closure conditions, and the designs should be refined to improve reclamation success and achievement of the closure goal and objectives.

Recommendation 24: Dominion should demonstrate that its pit designs have considered the benefits of littoral areas, rather than simply evaluating the potential for littoral area success based on pit designs that are optimized for mining purposes.

OP-3 – Littoral zones are provided in selected pit lakes

OP-3 as written is not a measurable objective. As currently stated, the objective relies entirely on Dominion’s decisions about which pits are “selected” for littoral zones. The objective should be re-stated to clearly describe the expected outcome of the closure plan in relation to littoral zones in open pits.

Recommendation 25: OP-3 should be re-stated to clearly describe the expected outcome of the closure plan in relation to littoral zones in open pits.

Littoral Zones – Establishment of Fish Habitat

In Section 5.3.5.3.2, with respect to establishment of fish habitat Dominion states “*Dominion is not responsible for monitoring or proving the establishment of a self-sustaining aquatic ecosystem (BHP Billiton 2011a).*” (p-146). Dominion’s lack of commitment to monitoring and demonstrating performance of closure measures seems incompatible with the ICRP closure goal that states a commitment to establishing post-closure self-sustaining ecosystems that are compatible with a healthy environment. It is recognized that a decision was previously made to allow the Ekati owners to be responsible solely for creation of littoral zones without having to demonstrate their effectiveness as fish habitat.

Recommendation 26: Dominion should clarify how the statement that ‘Dominion is not responsible for monitoring and proving establishment of self-sustaining aquatic system’ is compatible with the stated ICRP closure goal: “*return the Ekati mine site to viable, and wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment.*”

Contaminant Loading from Pit Walls

Some pit walls at the site could contain metasediment (e.g., Misery, Pigeon where metasediment is prevalent in the mined rock). This material has potential for oxidation and metal leaching. Waste rock management requires special measures to minimize risks associated with the metasediment. In pits, the primary mitigation for preventing contaminant loading will be water covers that will limit oxidation. Therefore, covering metasediment material in pits with water in a timely way should be a key objective of the closure plan.

Recommendation 27: The closure plan for pits should be revised to include closure objectives and criteria that define acceptable covering of metasediment in pit walls. These may address the duration that materials can remain without water cover after mining, and/or depths of water cover. The closure plan should be revised as needed to address the objectives and criteria.

Progressive Reclamation of Pigeon Pit

Table 5.3-3 describes there being a relatively high percentage of metasediments in the pit wall lithology of Pigeon Pit and for this reason, outlines Dominion’s plans to mitigate the resulting acid rock drainage and metal leaching (ARD/ML) risk by actively flooding the pit as part of progressive reclamation. Appendix F (Flooding Optimization Study) goes on to provide a schedule summarizing the start (2023) and end (2025) of the 2.5 year Pigeon pit back flooding schedule. Once back flooding has been completed and pit water quality meets final closure criteria, any resulting overflow would then be

diverted to the Pigeon Diversion Channel. In the Agency's opinion, the Pigeon progressive reclamation and back flooding schedule re-enforce the need to establish a timeframe and initiate work towards development of numerical water quality closure criteria (refer to Recommendations 4 and 5).

Recommendation 28: Dominion describe the process it intends to use to develop numerical water quality closure criteria for Pigeon pit and establish a timeframe for initiating the work. This process should be completed prior to the planned 2023 update of the ICRP as described in the integrated schedule of activities provided by Dominion in response to Information Request #5.

Safe Pit Egress

Section 5.3.5.3.4 describes measures intended to provide safe pit egress, but these are limited to leaving pit ramps in place, and relying on egress at inflow/outflow channels and littoral areas. Effectively, Dominion is not proposing any activities that are focused on providing safe egress from pit lakes, and the resulting conditions will provide safe egress in only a small portion of the pit lake perimeters. It seems likely that this approach will lead to conditions that could result in entrapment for animals that end up in pit lakes. The proposed approach may not achieve the closure objectives for wildlife safety.

Recommendation 29: Dominion describe or quantify in detail how much of pit lake perimeter will be available for safe pit lake access and egress and how/why this will achieve the closure objective. Also Refer to Wildlife section below.

RP-2 Sampling data requirements

The water quality monitoring proposed in research plan RP2 – Panda/Koala Closure Freshwater Cap Depth – seems to be little more than the data that is required as part of the SNP program. RP2 proposes that additional samples will be collected “as needed” but there is no clear description of what results or needs would trigger additional sampling. The stability and performance of freshwater caps is a critical component of the closure plan and an area of significant uncertainty.

Recommendation 30: Dominion include additional details about the data that will be collected and how these data will be analyzed/interpreted to reach conclusions about the performance of the freshwater cap. The details of current modelling should be provided to allow for scope and needs of research to be better understood.

Waste Rock Storage Areas

Surficial Materials

The descriptions of WRSAs in Section 5.5 include many references to stockpiling of surficial materials for potential future use in reclamation activities. Tables 5.5-2 and 5.5-3 identify a total of over 44 million tonnes of surficial materials. Despite this large volume of material, closure activities in the ICRP propose only limited use of surficial materials for reclamation purposes, with remaining material staying in permanent stockpiles.

In its February 14, 2019 response to information requests, Dominion clarified that to-date only approximately 2,836,000 m³ (approximately 4-5 million tonnes) of this material has actually been stored in locations where it could be recovered and used for reclamation – out of a possible approximately 35.5 million tonnes to-date. The actual storage of surficial material for future reclamation is not consistent with the intentions described in the ICRP, with only a small portion of material actually available. This operational decision that is not consistent with initial proposals or current descriptions has foreclosed on many reclamation options.

The proposed final surface for most WRSAs is bare waste rock which will generally not support achievement of the closure goal that entails “*return[ing] the Ekati mine site to viable, and wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment.*” Collectively the WRSAs are one of the largest disturbance footprints at the Ekati site and, if closed as proposed, they will likely remain as barren rock surfaces for the foreseeable future. The ICRP does not provide a strong rationale for why this long-term impact on overall land capability is necessary. Also, it does not appear to be consistent with input received from communities in some cases, for example:

“During engagement, Dene have suggested that, at closure, fine clays and soils should be used on waste rock piles to support vegetation growth, and that the lands reclaimed should be tilled to encourage progressive regrowth and even moisture distribution.” (p-54).

Given the current status of mining activities and the small quantity of available surficial material, with some facilities already complete while mining is still ongoing at other locations, reclamation should now be a focus for waste handling, especially for surficial materials. Where possible, surficial materials should be directly placed for reclamation purposes, or should be stored as close as possible to future locations where reclamation materials may be required.

For the Jay Pit, the ICRP proposes “selective stockpiling of till surficial soils” for future potential reclamation. Other surficial materials are to be placed in the WRSA in “specified locations.” It is not clear whether the material placed in the WRSA will be recoverable in the future for reclamation purposes. If not, the operational decisions about placement of surficial materials will continue to foreclose on future reclamation options. If Dominion proposes to make surficial materials inaccessible for future reclamation, final decisions must be made prior to operations about the need for reclamation materials – i.e., where they will be required and in what quantities. The ICRP should address this information requirement now, especially given the past practice of placing potential reclamation materials in inaccessible locations.

Recommendation 31: Dominion should provide a detailed plan for handling and management of surficial materials, addressing intended requirements for use in reclamation and demonstrating how mining plans will be implemented to provide material that is necessary to support closure.

Calibration of Humidity Cells

Table 5.5-7 states that on-site seepage flow rates and quality were used to calibrate humidity cell data for prediction of loading from WRSAs. No detailed reports are provided to support this analysis and interpretation. However, given the size and age of the WRSAs, and the climate conditions at the site, it is possible that the seepage data may be unreliable for calibration because WRSAs may not have fully wetted and reached a flow equilibrium. Also, for rock materials subject to oxidation (e.g., metasediments) water quality may also still be changing. Are there other methods that can be used for calibration? For example, many mines rely on field bin test programs to support water quality predictions and calibration. The Ekati mine had test bins at some point, it is not clear what their status is. Also, it would be beneficial to understand flows within the active layer around WRSAs.

Recommendation 32: Dominion should provide evidence to support the reliability of seepage data for calibrating models, for example water balance modelling for dumps to demonstrate a clear understanding that current seepage flows can provide appropriate calibration data. If this information is not available, Dominion should describe how it will collect information to support reliable model calibration.

Waste Rock Storage Areas - Water Balances

ICRP 3.0 currently provides no assurances that WRSA water balances and the interconnection between surface and subsurface seepage flow from rock piles will be investigated.

What happens to rainfall and snow melt once it has entered the WRSAs is not well understood. The only information currently being collected by Dominion to inform this water balance is the biannual surface seepage surveys. Results of these surveys indicate that only a small percentage of the water entering the piles is being released as surface seepage (based on on-site meteorological data and confirmed by statements in the Golder Associates report 'Water Quality Modeling of Seepage from Waste Rock Storage Areas', October 11, 2016 (page 9). Therefore, there are several possibilities, including: the water not accounted for is being held within the core of the pile until wet-up conditions are achieved; there are sub-surface pathways by which water is leaving the WRSAs; evapotranspiration; or a combination of the above possibilities is occurring. This unknown fate of water entering the WRSAs results in significant uncertainties when predicting risks from seepage leaving the piles, especially the Misery, Pigeon and Jay WRSAs where metasediment is a major component. It also means that the data are unreliable for calibration of models and development of model inputs and assumptions.

The description for RP4 – Pigeon WRSA Closure Cover – references seepage results and suggests that these indicate that ARD is not occurring. It is possible (and perhaps likely) that evidence of ARD would not yet be apparent from this seepage as the waste rock may not have fully wetted up and oxidation may not yet be apparent in water chemistry of seepage water. No details are provided about water quality, or analysis of parameters that may be early indicators of ARD.

Post construction monitoring for this research plan seems to rely primarily on monitoring that is required by regulatory instruments – with potential for additional monitoring at Dominion's discretion. Additional detail should be provided about what monitoring will be needed to support the research. For example, the research plan discusses various considerations for predictive modelling (e.g., progressive wetting, pore ice retention) but the monitoring program does not appear to address collection of data that would support modelling or calibration for all aspects.

Recommendation 33: Dominion provide assurance that waste rock storage area water balances and the interconnection between surface and sub-surface seepage flow from rock piles will be investigated and a work plan and schedule provided.

Waste Rock Storage Areas – Thermal Conditions and Seepage Quality

Table 5.5-6 of the ICRP indicates that the upper 20 m of the Jay WRSA may not remain frozen in the long-term in the face of global climate warming. The control of water quality by maintaining frozen conditions is identified as a contingency for the Jay WRSA. The modelling seems to suggest that the proposed contingency measure is unlikely to be effective in the time frame needed for the closure plan. Additional details about thermal and water quality modelling are needed in order to evaluate the adequacy of the proposed closure plan and potential implications of warming climate.

Recommendation 34: Dominion should provide additional details about the thermal and water quality modelling. If modelling predicts thawing of material that may leach metals, Dominion should evaluate the implications for future water quality.

WR-1 – Seepage water quality is safe for entry to the receiving environment.

If the locations will be accessible to wildlife, the objective should also address safety of water for wildlife and birds (and potentially humans if accessible to people). A similar issue arises for LLCF-1, WM-1 and

other water quality objectives. It also needs to be addressed in Sections 5.2.1 and 5.3.2 – and other relevant sections.

Recommendation 35: Rephrase the objective and update relevant sections to also address water quality is safe for wildlife, birds and humans, and develop criteria to address all components of the revised objective.

Proposed monitoring for WR-1 (Table 5.5-4) includes thermal monitoring. For WRSAs where thermal conditions are important, there should be a criterion that addresses expected thermal characteristics – otherwise there is nothing to compare monitoring results with. For any WRSA with potential water quality issues (i.e., acid-rock drainage or metal leaching) where containment of materials under the active layer is proposed (e.g., Misery, Pigeon, Jay, etc.), there should be clear, quantifiable thermal criteria.

Recommendation 36: For any waste rock storage area with potential water quality issues (i.e., acid-rock drainage or metal leaching) where containment of materials under the active layer is proposed (e.g., Misery, Pigeon, Jay, etc.), there should be clear, quantifiable thermal criteria. Also see comments on Thermal Conditions and Seepage Quality.

Pigeon Cover Design

Section 5.5.4.1 describes consideration of closure options for the Pigeon WRSA. Because the Pigeon waste rock includes a significant metasediment component, closure planning during design included a closure cover. The objective of the cover design was to thermally encapsulate metasediment by providing a cover that would leave all metasediment in a permanently frozen state below the active layer. In the ICRP, Dominion raises uncertainty about the geochemical characteristics of the Pigeon waste rock, and therefore the design or need for a cover. Dominion has proposed a reclamation research plan (RP-4) to determine the need for a cover and, if necessary, refine the cover design.

The WLWB also identified uncertainty about the cover design during the review of the Pigeon WRSA Design Report, part of the Waste Rock and Ore Management Plan Version 7.0. As noted in the ICRP, *“the WLWB did not approve the final cover design and indicated that the design should be determined through the overall closure planning process”* (Section 5.5.4.1). The WLWB’s uncertainty was not about whether a cover is required, but rather about construction feasibility and whether the proposed design would be effective for long-term encapsulation of metasediment waste rock. (Reasons for Decision, Pigeon WRSA Design Report and WROMP Version 7.0, September 28, 2017)

The ICRP does not make a clear statement about the currently proposed closure plan for the Pigeon WRSA. In the face of uncertainty, the closure plan should be precautionary, until results of reclamation research demonstrate that plans can be safely revised while still achieving closure goal, objectives and criteria.

Recommendation 37: The ICRP should clearly identify the currently proposed closure plan for the Pigeon WRSA. Until the results of reclamation research demonstrate that the cover proposal can be eliminated or refined, the closure plan should retain a robust cover proposal that is designed to maintain thermal encapsulation of metasediment waste rock, while recognizing that this proposal is still subject to WLWB approval. The security bond should include funds for completing this activity.

Waste Rock Storage Areas - Slope Stability

Section 5.5.5.2.5 addresses slope stability for WRSAs, and Section 5.5.5.3.4 lists some design parameters (e.g., slope angles). However, neither section provides clear design criteria, or identifies any specific design guidance that was used to establish the design parameters or will be used to support the future

design. For example, include the return-period earthquake events and factors of safety that were (or will be) used to define acceptable slope stability for closure.

Recommendation 38: Dominion provide clear design criteria or specific design guidance that will be used to establish the design parameters for slope stability of waste rock storage areas.

Waste Rock Storage Areas - Monitoring

Section 5.5.7 proposes monitoring of WRSAs until closure objectives are achieved. Monitoring (e.g., water quality and physical stability) will need to continue in the long-term to demonstrate continued performance. Achievement of closure objectives cannot be considered a one-time event for mine facilities that will remain permanent parts of the landscape.

Recommendation 39: Closure criteria for permanent structures need to include a temporal aspect to them to acknowledge that initially meeting objectives is not appropriate. Also, long term monitoring schedules should be required to confirm continued compliance well after closure.

WR-2 - Erodible waste material is physically stable

WR-2 addresses erosion of mine waste materials. Proposed monitoring is limited to inspection by a qualified professional but there are no specific criteria identified and the proposed criterion is not directly quantifiable. Erosion is a time sensitive measurable parameter and the criteria and monitoring should be defined to be measurable.

Recommendation 40: The criteria associated with WR-2 should be measurable and include a temporal component.

Long Lake Containment Facility

LLCF-5 - Vegetation on LLCF is safe for consumption by wildlife or humans

LLCF-5 addresses metal content in vegetation. The criterion relies on risks being acceptable for wildlife and humans. While risk assessment may be an acceptable basis for defining acceptable post-closure outcomes, the risk assessment must be completed now to develop the numerical criteria that define acceptable risks. Otherwise it is not possible to understand whether the proposed closure plan can achieve the proposed criteria.

Recommendation 41: A WLWB-approved risk assessment be conducted to develop the numerical criteria that define acceptable risks.

RP-9 Long Lake Containment Facility Water Quality - Predictions

RP9 – LLCF Water Quality is intended to develop a better understanding and prediction of water quality for the LLCF. This seems like an urgent need for the closure plan. If there are water quality issues in the LLCF these will present major challenges for the overall closure approach – and would likely result in either significant costs, or significant changes in the predicted effects of the project. This uncertainty needs to be resolved as quickly as possible.

Recommendation 42: Dominion update RP-9 that will ensure that this information is provided as early as possible.

Vegetation

Vegetation Objectives and Criteria

Section 5.2.5 describes the general approach to re-vegetation at the Ekati mine as follows:

“The design of the revegetation program at the Ekati mine allows for a natural progression of native vegetation species to develop on the reclaimed landscape over time. While ingress of native species into reclamation areas is expected to take place over time, active planting of native vegetation at selected sites is pursued to prevent erosion or dust generation and initiate the process of natural succession.” (p-101)

For the most part the ICRP appears to propose reliance on natural progression of vegetation to achieve closure objectives. The only site-wide objective for vegetation is related to non-native species. There are no site-wide objectives aimed at defining acceptable achievement of the closure goal for the site. The overall Closure Goal for the Ekati mine site is: *“to return the Ekati mine site to viable, and wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment.”* (p-33).

Section 5.2.1.1 discusses Community Land Use (SW-1) and explains that *“Dominion aims to provide for the emergence of biodiversity by maintaining or establishing self-sustaining ecosystems that lead to viable long-term traditional land uses.”* (p-95). However, the only site-wide objective for vegetation (SW-5) is unlikely to address the above statement or the expected land use outcomes described in the same section:

“End land uses envelop a multitude of values that may exist beyond ecological conditions and are driven by what regulators, Dominion, Indigenous communities, and other stakeholders want to see on the landscape once the Ekati mine is closed. ... Currently, the target end land use for the Ekati mine is wildlife and aquatic habitat that supports resident or transient species and the continuation of traditional land uses (which are centered on hunting, fishing, and transient/seasonal camp sites).” (p-96)

Section 3.5.1 describes the typical vegetation in the area of the Ekati mine, which should form the basis for defining post-closure conditions:

“Typically, vegetation is low in stature and dominated by willow and ericaceous (heath) shrubs, lichens, and mosses. The dominant ecosystem map unit at the Ekati claim block is Heath Tundra and this unit occurs on well to moderately drained upland sites. In low-lying wetter areas where soils are poorly to very poorly drained, Tussock/Hummock Sedge Meadows or Emergent Marshes have developed. Vegetation communities that develop on mesic and dry terrain are generally restricted to the tops of eskers, and the communities are dominated by herb species (Map 3.5-1).” (p-63)

Recommendation 43: Dominion should define objectives and criteria for vegetation at the site, addressing the expected closure outcomes for key parameters that quantify vegetation success, for example vegetation cover and contaminant concentrations.

Level of Effort for Revegetation

The proposed approach for re-vegetation is not likely to achieve the closure goal or land-use expectations (or objectives developed in accordance with Recommendation 42 above) within a reasonable time frame. More active measures will likely be required. Previous re-vegetation test programs and progressive reclamation seem to confirm this (e.g., Sections 6.3.5 through 6.3.8, and results discussed background information for RP-8). For example:

- A 2013-2014 study found that ground cover was much higher on sites with topsoil than on adjacent rock crush, and survival and size of planted seedlings were greater in topsoil.
- Long-term monitoring at the south airstrip esker indicates that the most successful revegetation technique was fertilizing and seeding with native grasses.
- At the Fox Portal, after 21 growing seasons, only the organic soil has appreciable cover by vascular plants.
- On the LLCF, organic amendment of PK resulted in sustained increase in growth from 2016 to 2017.

These programs indicate that the establishment of self-sustaining natural vegetation communities seems to be more successful where the re-vegetation programs begin with active re-vegetation and where fertilizer is applied initially. On mine waste materials like processed kimberlite, the experience indicates that addition of growth media or soil amendments can also bring significant benefit.

Recommendation 44: In order to achieve the closure goal and/or land use expectations in a reasonable time frame a more active approach to re-vegetation is required. Dominion should use active re-vegetation and initial soil amendments. If such measures will not be part of the re-vegetation plans, Dominion should demonstrate how the existing approach will achieve the land use targets and the Closure Goal.

Re-vegetation

The characterization of residual effects for WRSAs in Table 5.5-12 states that the growth and type of vegetation will be different than pre-mining conditions. With the proposed approach for WRSA reclamation, vegetation will be virtually non-existent for the foreseeable future. The characterization of residual effects seems to understate the magnitude of the change that we can expect.

Recommendation 45: The WLWB should confirm that the effects arising from the proposed reclamation approach, especially the barren waste rock surfaces, remain consistent with the effects that were predicted and accepted as part of project planning and assessment.

SW-5 - The introduction of non-native species to the site is limited through the reclamation work

SW-5 establishes an objective related to minimizing introduction of “non-native” species at the site. The criteria and monitoring are focused on what species are “used” for reclamation purposes, not on what the actual outcomes of reclamation work are. The criteria should be revised to address post-closure conditions rather than what species are planned or used. It may also be beneficial to reconsider and clarify the focus of the objective on non-native species versus invasive species or species that may propagate at the site. Previous test programs seem to indicate that non-native species (e.g., annual rye) will be an important component of reclamation activities, though these species may not be capable of propagating at the site. Note that this issue also needs to be addressed in Section 5.2.5.

Recommendation 46: The objective be re-worded to focus on the actual closure and post-closure conditions and not the design or reclamation work. For example, “The site has no self-sustaining populations of non-native species”. How this is achieved should be defined in the criteria such as a maximum percentage of non-native plant cover at a certain time post closure, or rates of decline of non-native plant populations.

Underground Mine

UG-1 and 2 – Underground Mine Workings

Table 5.4-3 establishes the objectives that hazards from potential access (UG-1) and the presence of hazardous materials in the underground (UG-2) are mitigated. Dominion proposes to measure the success of UG-1 by ensuring the construction of vent raise caps and portal seals meet the design specifications as set out in the as-built drawings. No periodic physical inspection of the caps and seals is proposed. Further, to mitigate the risks from hazardous materials (UG-2), Dominion proposes to inventory and remove the materials and send them to appropriate disposal facilities. No mention of the removal of mobile and non-mobile inert wastes is provided in the proposed actions.

Recommendation 47: Periodic routine monitoring of underground vent raise caps and portal seals be undertaken post-closure to confirm design specifications are being maintained.

Recommendation 48: Objective UG-2 be revised to include the management of underground mobile and non-mobile inert wastes at the end of mining activities.

Buildings and Infrastructure

BI-1 – Residual material from demolition does not negatively affect the environment or human health

This objective has a broad scope that seems to address all environmental components and human health. However, the criteria do not address the full scope of what the objective envisions. The scope of criteria should be revised.

Recommendation 49: The criteria and monitoring should be revised to clearly indicate how the full scope of the objective will be met.

BI-2- Roads left in place are suitable for wildlife movement

The only criterion for BI-2 is that “targeted roads are left in place.” This criterion does not address the main focus of the objective which is about suitability of reclaimed roads for wildlife movement. Also, the achievement of the criterion relies entirely on Dominion’s decisions about which roads to “target” for reclamation. For additional information on this topic please see Wildlife section below.

Recommendation 50: The criteria should describe how the roads will be closed in relation to wildlife movement. This should be tied to the reclamation research and include community input.

BI-4 – Natural vegetation establishment is promoted in disturbed areas

BI-4 does not seem consistent with the overall reclamation goal. A more active objective and more detailed measurable criteria are warranted.

Recommendation 51: The objective should be more clearly defined and the relationship to the reclamation goal should be described. The criteria need to be detailed and measurable so that they can be quantified to confirm that the objective has been met.

Wildlife

Reclamation of Roads - Wildlife

Dominion has proposed to use site-wide management to prioritize which roads should be reclaimed, with the potential that many roads will be left in place largely unaltered for wildlife movement. This

approach seems to be largely based on input received at the February 2018 workshop. Prioritization appears to be based on habitat distribution and observations over the past 2 decades of mining. There are a number of faults with this approach and logic:

- Caribou have been moving across the landscape for nearly 10,000 years (and hopefully will continue to do so for another 10,000 years) and do not require roads for travel;
- There is no definitive evidence provided that roads will provide effective habitat or travel routes for caribou or function as effective eskers, assuming they are aligned in directions that the caribou want to travel;
- There is no evidence that leaving long sections of the Misery and Sable roads will be a net long-term benefit to caribou;
- Recommendations for which roads are largely retained is based primarily on which areas are surrounded by “by good quality tundra and esker habitat”; however, caribou use over the past 2 decades has been documented through the lens of collapsing (and currently very low) caribou numbers and increasing mine activity and sensory disturbance, both of which have likely impacted caribou distribution, movements and habitat selection. Assuming the herds recover and sensory disturbance from the mine is eliminated post-closure, caribou use of the landscape could change over what we are seeing now and what Dominion has recorded as relative use;
- Current access by wildlife to cross some roads – the Sable Road is the prime example – is viewed as poor, with steep road-edge slopes for much of its length, limited number and restricted dimensions of caribou crossing structures, and dominance of coarse road-verge materials with gaps hazardous to passage of wildlife. The Sable Road runs perpendicular to the main esker in the area, and the long-term permeability of the road could be of greater concern than use of the road as a wildlife travel corridor (acknowledged as a residual effect: Section 5.8.8, p-253);
- No examples are provided where this approach has been successfully used.

The Agency is concerned with the uncertainty and subjectivity surrounding reclamation activities associated with roads. For example: “*For closure, some roads may be left in place as travel corridors, and if required, road berms will be knocked down to facilitate access and egress by wildlife*” (Section 5.8.1.2.3, p-239) and “*Knock down berms and construct additional wildlife crossings, if required by design*” (Section 5.8.5.1, Table 5.8-8, p-248) (emphasis added).

Dominion acknowledges uncertainties with their current plans to address roads: “*When and where will roads left in place be suitable to facilitate wildlife movement through the site*” (Section 5.8.6, Table 65.8-10, p-252), and that roads may result in residual effects: “*These corridors... are expected to provide new corridors that wildlife can safely access and egress, but may impede existing travel corridors.*” (Section 5.8.8, p-253).

Recommendation 52: The Agency recommends that all roads at Ekati be designed, operated and reclaimed to enhance permeability of the mine site to wildlife movement and rehabilitate areas to as much of a usable state by wildlife as possible. Reclamation of the roads still leaves a surface that even with scarification and re-contouring could be used for travel but would, however, require the knock down and flattening of road shoulders to provide easier, safer access onto and across roads.

Reclamation of Waste Rock Storage Areas - Wildlife

Dominion has proposed that following the principle of ‘site-wide caribou management’ some WRSAs will have access/egress ramps upon closure and others will not. WRSAs surrounded by poor habitat (e.g., boulder habitat) and in observed low use areas will not have ramps. One of the justifications is “*TK shared through community engagement and workshops suggests that even with the installation of access/egress ramps, caribou may not travel onto waste rock storage piles in the absence of a food*

source or mating opportunities” (Section 5.5.4.3, Table 5.5-5, p-184). Caribou would presumably want to access a WRSA primarily for insect relief and not food, since these structures will be the highest and windiest landforms around. Eskers are used primarily as travel corridors and for insect relief, and not as a food source. Also, the rut in a relatively short period (3-4 weeks) in the year, so it is unclear how mating opportunities would drive use or avoidance of WRSA.

The original Environmental Assessment for the Ekati mine stated: *“The existing terrain will be sloped to match the surrounding terrain and vegetation communities. ... An undulating terrain will enhance micro-site diversity, which will foster a mosaic of plant communities and wildlife use. For instance, knolls might function as relief sites for caribou from biting insects, while depressions could be vegetated using species suitable for such sites. ...In all cases, revegetation designs for the waste rock storage sites will be developed to enhance the mosaic of site types”* (BHP EA report Vol III, Section 9.3.1.3). It appears that ICRP 3.0 has drifted significantly from this original intent.

There appears to be no consensus among communities and Elders whether to encourage caribou onto and off of these piles using access and egress ramps. The Agency is not aware of any science that supports or refutes use of WRSAs by caribou or the efficacy of ramps. Regardless, a ramp would presumably encourage and facilitate egress if access occurred.

Dominion states: *“WRSA-specific decision-making regarding the need to facilitate wildlife access/egress and the number and location of access points will be advanced through reclamation research (see Section 5.5.9), ongoing engagement with communities and TK holders (see Section 2.4), and future updates to the ICRP”* (Section 5.5.4.3, p-182). Section 5.5.9 provides little information on reclamation research related to WRSA access/egress ramps for wildlife, so it is unclear how research will be used in the decision-making process.

Recommendation 53: All WRSAs should have at least one egress ramp to facilitate wildlife, particularly caribou, climbing down off of a pile if for whatever reason they access the top of WRSAs.

RP-1 Wildlife Safety

RP-1 correctly identifies that: *“There is uncertainty in determining the best approach to ensuring wildlife safety on and around individual WRSAs (e.g., providing ramps vs. discourage access) and road segments (e.g., smooth surface [esker-like] vs. scarified surface) in closure.”* (Appendix E p-4)

The Agency visited many of the Society member communities (Whati, Behchoko, Dettah, Kugluktuk and Lutsel’ke) from January to early February 2019. The main purpose of the visits was to increase awareness of the ICRP within the communities and to discuss some of the changes between ICRP versions. All communities expressed concern over Dominion’s proposed changes to the manner in which roads and WRSAs were to be closed. Dominion is proposing that some roads and WRSAs be closed differently depending on wildlife usage and habitat mapping generated while Ekati has been operating. The structures located in areas of the site that have seen higher wildlife usage will be closed differently than in areas of relatively low wildlife usage. Dominion has not been able to provide sufficient details yet on what these differences might be. The communities clearly wanted to be able to provide greater input on the issues of caribou movement and how WRSAs and roads should be closed.

During the Technical Workshop held in Yellowknife January 22 and 23, 2019, all the Indigenous organizations and governments (Tlicho Government, YK Dene, and North Slave Metis Alliance) representatives present expressed concern with the proposed changes to closure of roads and WRSAs in relation to wildlife and specifically caribou movement. During the Technical Workshop it became apparent that Dominion is looking for input into how the roads and WRSAs should be closed. At the workshop Indigenous Organizations specifically requested a series of meetings to determine the best

approach to closing the WRSAs and roads in relation to caribou movement. Considering that Dominion has not yet proposed how they plan to address this concern and their expressed intent to include Traditional Knowledge (TK) into the closure plan this uncertainty appears to be ideally suited to community and TK input.

Recommendation 54: Dominion engage with Indigenous Organizations and Governments to set up a dialogue and process to discuss the inclusion of community input on the closure of roads and WRSA's. This process should be driven by the communities not the proponent.

Security Estimate

The security estimate (Section 10.0) does not reflect the actual text of the closure plan. The reason given by Dominion was that decisions on some of the components of the closure plan (littoral zones, WRSA ramps and cover designs, roads, LLCF cover design, etc.) have not been finalized. Therefore, the security needed to have some estimates in it to ensure that some security was held for these possible eventualities.

The Agency believes that having security that clearly doesn't reflect the text of the closure plan is not acceptable for a mine that has been open for over 20 years. It can also lead to confusion when text does not match the reclaim estimate. Security held is based on the reclaim estimate and not the text of the closure plan. It is the only part of the plan that has enough detail to actually initiate closure activities. In the event of an early shut down presumably the security would be initiated based on the line items detailed in the reclaim estimate and not the general text of the ICRP. In order to avoid this scenario, the security should always reflect the final proposed plan and can be updated as understanding and research provides increased certainty.

Recommendation 55: Security estimate be updated to accurately reflect the final approved ICRP.

Should you have any questions concerning these comments, the Agency is pleased to discuss these at your convenience.

Sincerely,



Jaida Ohokannoak
Chairperson

Cc: Dominion Diamond– Lucas Novy
Tłıchq Government – Violet Camsell-Blondin
Yellowknives Dene First Nation – Johanne Black
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North Slave Metis Alliance – Jessica Hurtubise
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Indigenous and Northern Affairs Canada – Dinah Elliott