



Box 32, Wekweètì, NT X0E 1W0
Tel: 867-713-2500 Fax: 867-713-2502

#1-4905 48th Street, Yellowknife, NT X1A 3S3
Tel: 867-765-4592 Fax: 867-765-4593
www.wlwb.ca

December 3, 2018

W2012L2-0001

Mr. Harry O'Keefe
Dominion Diamond Ekati ULC (Dominion)
900-604 4 Street SW
Calgary, AB T2P 1T1

Dear Mr. O'Keefe

Re: Ekati Sediment Sampling Equipment Change Request

The Wek'èezhii Land and Water Board met on November 19, 2018 to consider Dominion Diamond Ekati ULC's (Dominion's) request to change the sediment sampling equipment used in the Aquatic Effects Monitoring Program (AEMP) for Water Licence W2012L2-0001.¹

As described in the attached Reasons for Decision, the Board has not approved the requested change to sediment sampling for the Ekati and Sable AEMP sites at this time; and has decided that it will determine appropriate sediment sampling methods for the Jay AEMP sites during its consideration of the Jay AEMP Design.

The Reasons for Decision provide more information on these decisions.

Sincerely,

A handwritten signature in blue ink, appearing to read "Joe Mackenzie".

Joe Mackenzie
Chair, Wek'èezhii Land and Water Board

Copied: Ekati Distribution List

¹ See WLWB (www.wlwb.ca) Online Registry for [W2012L2-0001 - Ekati - AEMP - Sediment Sampling Equipment Change - Request - Jun 25 18](#)



Box 32, Wekweètì, NT X0E 1W0
Tel: 867-713-2500 Fax: 867-713-2502

#1-4905 48th Street, Yellowknife, NT X1A 3S3
Tel: 867-765-4592 Fax: 867-765-4593
www.wlwb.ca

Reasons for Decision

Reference/File Number:	W2012L2-0001 (Type "A" Water Licence)
Licensee:	Dominion Diamond Ekati ULC (Dominion)
Subject:	AEMP – Sediment Sampling Equipment Change Request

Decision from the Wek'èezhìi Land and Water Board Meeting of November 19, 2018

1.0 Decision

On November 19, 2018, the Wek'èezhìi Land and Water Board (WLWB or the Board) met to consider a request by Dominion Diamond Ekati ULC (Dominion)² to change the sediment sampling equipment used in the Aquatic Effects Monitoring Program (AEMP) for Water Licence W2012L2-0001 (The Licence).³

In consideration of the submission, reviewer comments, and proponent responses, the Board has decided to:

1. Determine appropriate sediment sampling methods for the Jay AEMP sites during its consideration of the Jay AEMP Design; and
2. Not approve a change to Ekman sampling for the Ekati and Sable AEMP sites at this time.

2.0 Background

On June 25, 2018, Dominion submitted a request (the Request) to the Board to change the sediment sampling equipment used in the AEMP for Licence W2012L2-0001. The Request comprises a letter from Dominion stating that it has gathered additional supporting information regarding the use of the Ekman and core samplers and includes reports from two technical consultants (ERM Consultants Canada Ltd.

² See WLWB (www.wlwb.ca) Online Registry for [W2012L2-0001 - Ekati - AEMP - Sediment Sampling Equipment Change - Request - Jun 25 18](#)

³ See WLWB Online Registry for [W2012L2-0001 - Ekati - Water Licence - Amendment - Misery UG - Aug 24 18](#)

[ERM] and Golder Associates [Golder]) responsible for conducting sample collection for the Ekati AEMP and Jay Project AEMP baseline data.

The AEMP is required by Part J, Condition 1 of the Licence. Dominion completes this monitoring program on an annual basis, analyzing water quality, sediment quality, and various biological indicators in accordance with the approved AEMP Design Plan (required by Part J, Condition 2 of the Licence). Dominion is currently conducting monitoring at Ekati in accordance with the approved 2017-2019 AEMP Design Plan and the approved Sable AEMP Design Plan Version 1.3.^{4,5} This monitoring includes sediment sampling in the Koala, King-Cujo, Pigeon-Fay and Upper Exeter, and Horseshoe Watersheds. The Jay AEMP Design is currently under review; the sediment sampling that has taken place to date in relation to the Jay AEMP has been for the purposes of establishing baseline conditions.

Since the monitoring program began, including baseline years, sediment sampling for the AEMP has been based on the use of Ekman samplers collecting a 2 cm sample. Following the 2009 AEMP Re-Evaluation Report, Dominion committed to conducting a side-by-side comparative review of sediment quality data collected using an Ekman sampler (to collect the top 2 cm of sediment) versus a sediment corer (to collect the top 1 cm of sediment).⁶ This commitment was a result of reviewer comments which stated that, based on the sedimentation rates, a 2 cm sediment slice may represent four to six years of accumulation; therefore, sampling every three years would present some overlap in the time horizons sampled. Alternatively, a 1 cm slice may represent two to three years of accumulation which would represent more recent accumulation.

Following a 2011 study carried out by Environment Canada which suggested that core sampling may provide a more accurate and temporally precise depiction of sediment quality than Ekman sampling,⁷ Dominion continued side by side comparisons of sediment data collected using core and Ekman samplers in 2011, and presented the results in the 2012 Aquatic Effects Re-evaluation Report.⁸ In March 2013, after review of the 2012 Aquatic Effects Re-Evaluation and revised AEMP Design Plan, the Board supported Dominion's recommendation to continue paired sampling and to re-evaluate the need for Ekman sampling in the 2015 Aquatic Effects Re-evaluation.⁹

In the 2015 Aquatic Effects Re-evaluation Report and revised AEMP Design Plan,¹⁰ Dominion requested to discontinue the use of the sediment corers for AEMP sediment sampling and continue to use only the

⁴ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2017-2019 Design Plan - Version 6.1 - May 23 18](#)

⁵ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sable AEMP Design Plan - Version 1.3 - Mar 5 18.pdf](#)

⁶ See WLWB Online Registry for [W2009L2-0001 - BHP - AEMP - 2009 3yr Re-Evaluation - Board Decision Package - May 4 10](#)

⁷ Wilson A, Fox D, Poole G, and Bujold R. 2011. Linking incineration to dioxins and furans in lakebed sediments (or, the case of the missing water license condition). *Integrated Environmental Assessment and Management*, 7: 302-304.

⁸ See WLWB Online Registry for [W2009L2-0001 - BHP - AEMP - 2012 3yr Re-Evaluation - Report and Appendices - Dec 17 12](#)

⁹ See WLWB Online Registry for [W2009L2-0001 - BHP - AEMP - 2012 Re-Evaluation and Revised Design - Reasons for Decision - Apr 23 13](#)

¹⁰ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2015 3yr Re-evaluation and Design Plan - Report and Appendices - Jun 30 16](#)

Ekman sampler. Dominion stated that historical data would be difficult to use if sampling methods were to change because all the historical data had been collected using Ekman samplers. Dominion explained that differences between absolute concentrations in samples using the two types of sampling methods made it difficult to discern whether there were any statistically significant trends resulting from mine effects or the change in sampling method. In its Reasons for Decision, the Board stated that it “[was] not convinced that the fact that different statistical results were found when using data from the different methods [was] justification alone for using a less accurate method” (i.e., the Ekman sampler).¹¹ The Board ultimately decided that Dominion use 1 cm core samples instead of 2 cm Ekman grabs for monitoring of metals and nutrients and continue to use the Ekman sampler, if necessary, for monitoring of particle size and associated nutrients.

The decision described above applied to the sediment sampling conducted in the Koala, King-Cujo, and Pigeon-Fay and Upper Exeter Watersheds, and was applied to the 2017 to 2019 AEMP Design Plan. In its decision on the Sable AEMP Version 1.1, the Board decided that the same use of the sediment coring method be applied to sediment sampling for sites included in the Sable AEMP (i.e., the Horseshoe Watershed).¹² In addition, in its decision on the Jay Development Water Licence Amendment, the Board stated that:

...any additional baseline data collection done to support aquatic effects monitoring of the Jay Development should use those field methods approved for the AEMP for the main site. This includes the collection of 1 cm core samples instead of, or in conjunction with 2 cm Ekman grabs for sediment monitoring, as deemed necessary.¹³

Dominion’s Request proposes changes to the sediment sampling procedure for all AEMP-related sediment sampling to exclusively use Ekman samplers and discontinue the use of sediment corers. The Request includes recommendations from two different technical consultants supporting the exclusive use of Ekman samplers and provides the following technical, operational, and logistical reasons for proposing this change:

- Sample integrity and sufficient quantity;
- Field sampling time;
- Health and safety concerns; and
- Maintaining consistency with the historical dataset

¹¹ See WLWB Online Registry for [W2012L2-0001 - Ekati - 2015 AEMP Re-evaluation and Proposed Design - Board Directive and RFD - Feb 27 17](#)

¹² See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sable AEMP Design Plan - Version 1.1 - Directive and Reasons for Decision - Apr 21 17.pdf](#)

¹³ See WLWB Online Registry for [W2012L2-0001 - Ekati - Water Licence - Amendment - Jay Development - RFD and Recommendation to Minister - May 29 17.pdf](#)

2.1 Public Review and Information Request

The Request was distributed for public review on July 30, 2018. Reviewer comments were due by August 30, 2018. Comments were received from Environment and Climate Change Canada (ECCC), the Government of the Northwest Territories–Environment and Natural Resources (GNWT-ENR), and the Independent Environmental Monitoring Agency (IEMA). Proponent responses were submitted by the deadline of September 7, 2018. Reviewer comments and recommendations, as well as the proponent’s responses, are available on the WLWB Online Registry.¹⁴

An Information Request was issued to Dominion on October 1, 2018.¹⁵ Dominion submitted a response to the Information Request on October 16, 2018.¹⁶ Following the receipt of the Information Request, Board staff followed-up with Dominion seeking additional clarification. Dominion provided a response on November 8, 2018.¹⁷

3.0 Reasons for Decision

The Board considered past decisions, new information provided by Dominion, reviewer comments and proponent responses in their determination. Sections 3.1 to 3.4 discuss the supporting reasons for the decisions; the overall decisions are provided in Section 3.5.

3.1 Sample Integrity and Sufficient Quantity

The Request outlines a number of technical issues associated with core sampling at Ekati, which influences sample integrity and the ability to collect sufficient sediment material for laboratory analyses. In general, the information provided by Dominion explains that the types of sediments encountered across the Ekati site cause the success rate of core samples to be much less than that of Ekman samples. It further explains that poor quality samples are frequently encountered when using the core sampler, requiring many more deployments of the sediment core sampler. In some cases, it was not possible to collect the required core samples during the field program.

An inability to collect the required number of sediment samples occurred during the 2017 field season for the Jay AEMP baseline program. Dominion contracted Golder to conduct the 2017 baseline and reference lake open-water field program for the Jay project using a sediment corer and Ekman sampler, with the objective of comparing sediment quality data between the sampling methods.¹⁸ Sampling was carried out at five near-field (NF) stations in Lac du Sauvage and five in Afridi Lake, which is a proposed

¹⁴ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Review Summary and Attachments - Nov 8 18.pdf](#)

¹⁵ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Information Request to Dominion - Oct 1 18](#)

¹⁶ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Dominion Response to IR - Oct 16 18](#)

¹⁷ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Review Summary and Attachments - Nov 8 18.pdf](#); pg. 13

¹⁸ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sediment Sampling Equipment Change - Request - Jun 25 18](#)

reference lake for the Jay AEMP. In its report,¹⁹ Golder described experiencing challenges with collecting core samples in Lac du Sauvage using the sediment corer, having success at one out of the five stations (NF-4) and partial success at a second (NF-2), in that “insufficient sediment was collected to complete all of the laboratory analyses.” Golder explained that the reason for the limited success was that, “as with other NF area stations, a solid clay layer was observed in the core collected at this station, which likely contributed to the difficulties encountered during coring.” Golder reported successful sampling at all five stations using an Ekman sampler.

In general, reviewers acknowledged that there may be legitimate challenges with using coring equipment. As noted by ECCC, “based on the letters provided by Golder, it is clear that sediment sampling attempts at the near-field stations in Lac du Sauvage encountered numerous technical difficulties, and a change in sampling methodology may be warranted” (ECCC comment 2). However, IEMA noted that there was success at NF-4, which is located on the southeast of the proposed dyke, near the site of the proposed operational diffuser (IEMA comment 2). ECCC recommended that “[Dominion] review the merit in retaining core sampling in areas where it has proven to be feasible and provides useful data.”

Dominion’s challenges with respect to not being able to successfully collect sediment samples with a sediment corer were described only at the NF stations in Lac du Sauvage for the Jay AEMP baseline sampling program. While Dominion discusses many of the technical challenges with sediment coring at other Ekati AEMP sites, these do not appear to have resulted in an inability to obtain sediment quality samples. Clarification was sought through an Information Request that was issued to Dominion on October 1, 2018.²⁰ One of the items requested from Dominion was to provide a list of other sampling sites that required a similar increased level of effort to obtain sediment samples using a sediment corer. Dominion submitted a response to the Information Request on October 16, 2018.²¹ Dominion’s response indicated that similar challenges were experienced with AEMP sampling for sampling sites at Snap Lake and Gahcho Kué Mines but did not provide an indication of technical challenges resulting in the inability to collect sediment samples at the current Ekati AEMP sites or at Sable AEMP sites. In follow-up correspondence, Dominion was asked to clarify whether any samples had not been successfully collected from Ekati or Sable AEMP sites as a result of using a coring device.²² Dominion explained that although samples were collected at all sites, some variables could not be analyzed for some of the Sable AEMP baseline core samples. These included the analysis of available phosphorus, total nitrogen, and total organic carbon. The Board notes, however, that the decision on the implementation of core sampling acknowledged potential challenges with the analysis of particle size and nutrients and included

¹⁹ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sediment Sampling Equipment Change - Request - Jun 25 18](#)

²⁰ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Information Request to Dominion - Oct 1 18](#)

²¹ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Dominion Response to IR - Oct 16 18](#)

²² See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Review Summary and Attachments - Nov 8 18.pdf](#); see Follow-up Correspondence with Dominion on pg. 13

the direction to “continue to use Ekman sampler, if necessary, for monitoring of particle size and associated nutrients.”^{23,24}

During the public review, the GNWT-ENR recommended that, “for locations in the Koala Watershed, and those not analyzed in the technical reports submitted by Dominion, that a sediment corer program be continued where reasonable and shown to be historically successful” (GNWT-ENR comment 2). Because Dominion has not demonstrated an inability to collect sediment samples at the other Ekati AEMP and Sable AEMP sites, it is not clear that there is a technical need to revert to the use of an Ekman sampler in order to ensure that the sediment sampling program can be completed. The technical challenges associated with the sediment core sample collection, however, have been demonstrated to increase field sampling time (see Section 3.2) with associated health and safety concerns (see Section 3.3).

3.2 Field Sampling Time

In the Request, Dominion explained that core sampling is time consuming because of the number of samples required to obtain sufficient material for analysis. The Request describes that core sampling yields a smaller volume of material; for every Ekman sample collected, five core sub-samples are required to collect a sufficient amount of material for laboratory analyses. This results in 15 core samples per site (i.e., three replicates of five sub-samples) versus three Ekman samples (three replicates). Dominion explained that collecting the 15 core samples takes “approximately 2 to 2.5 hours to collect, compared to less than 30 minutes collecting sediment samples with an Ekman.”²⁵ It is not clear that field time associated with coring represents one of the main challenges because Dominion has been collecting both sets of samples (Ekman samples and core samples) during the past few sediment sampling years. Thus, the use of sediment corers would not necessarily represent an increase in field time for many of the AEMP sites.

The technical challenges described by Dominion with respect to being able to successfully collect core samples versus Ekman samples do however, demonstrate that core sampling can in some cases require a much greater amount of effort in addition to field sampling time. For example, at sites where it is challenging to obtain good quality sediment core samples, the information provided by ERM estimates that in 2017, “up to 40 coring attempts (average of roughly 25) were required in order to obtain the required number of replicates. This is compared to an estimate of up to 8 attempts (average of 4 to 5) for Ekman samples.” These estimates suggest that collecting core samples represents, on average, five times more sampling time effort than collecting Ekman samples. The Request argues that this additional effort exacerbates health and safety concerns (see Section 3.3).

²³ See WLWB Online Registry for [W2012L2-0001 - Ekati - 2015 AEMP Re-evaluation and Proposed Design - Board Directive and RFD - Feb 27 17](#)

²⁴ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sable AEMP Design Plan - Version 1.1 - Directive and Reasons for Decision - Apr 21 17.pdf](#)

²⁵ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sediment Sampling Equipment Change - Request - Jun 25 18.pdf](#) ; pg. 2

3.3 Health and Safety

The Request identified concerns for the health and safety of the field personnel carrying out sampling. These concerns are generally related to the increased weight of the sediment corer as compared to the Ekman sampler, which is exacerbated by the frequency of deployment, particularly at sites where there are challenges with obtaining good quality core samples.

During the public review, ECCC noted that the “rationale provided as support for the currently proposed changes in sampling methodology points to technical difficulties associated with sediment coring as well as safety concerns”, which differs from the rationale that was originally provided for the discontinuation or coring in the 2015 AEMP Re-evaluation Report (ECCC comment 2). In its response, Dominion stated that concerns relating to health and safety while sampling were not brought up previously: “because Dominion felt confident that the Wek’èezhii Land and Water Board (the Board) and reviewers would be persuaded by the scientific evidence that has been presented that clearly shows that data collected using the Ekman sampler is as effective at detecting mine effects as data collected with the core sampler. The Board’s decision to require Dominion to collect core samples necessitates due consideration of the difficulties in collecting the samples and the risk to field crews over the long term by the Board.” In its decision on the 2015 Aquatic Effects Re-evaluation Report and Proposed Design, the Board did consider the scientific evidence that was presented and decided that a switch to coring was warranted (see Section 3.4).

The health and safety concerns being brought forth by Dominion is new information. Dominion’s Request states that although safety issues can be controlled effectively “when collecting core samples with the typical level of effort and success, they are likely to be exacerbated during programs involving repeated sampling over an extended period due to mostly unsuccessful attempts.” It was noted that the Request did not elaborate on the type of mitigations that could be carried out to control safety issues associated with core sampling; therefore, more information on mitigation of these safety concerns was requested through the Information Request issued to Dominion on October 1, 2018.²⁶ In its response,²⁷ Dominion provided mitigations that have been implemented as part of the Ekati AEMP to reduce risks associated with heavy lifting, repetitive strain, fatigue, and awkward positioning while core sampling. For example, replacing the stainless-steel core tube with a lighter weight core tube, as well as field leads and assistants taking turns lifting the coring device. Dominion also referenced mitigations that were suggested for the Jay Project AEMP. According to Dominion:

The mitigations listed in response to part three of the information request, specific to the Ekati AEMP, were implemented in 2017 and did lessen strain compared to historical years but there is still concern, especially for challenging sites. Furthermore, some of the mitigative strategies proposed in response to part three of the information request are

²⁶ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Information Request to Dominion - Oct 1 18](#)

²⁷ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Dominion Response to IR - Oct 16 18](#)

considered difficult to implement for a number of reasons, most notably because of feasibility.²⁸

Dominion reiterated that the safety concerns faced are exacerbated with increased effort despite carrying out the mitigations, stating “a crew that is sampling for eight or more hours [per] day over multiple field days will undoubtedly experience strain, particularly in their lower back and upper body.”

One additional mitigation discussed by Dominion in the response to the Information Request is increasing the number of crew members working so that crews can be rotated or the duration of field programs extended. However, Dominion states that the cost involved with these options would be significant and would still not solve the issue of sediment coring in unsuitable substrates.

3.4 Historical Data Continuity

In the Request, Dominion presents the argument that sediment samples have been collected using an Ekman sampler since the beginning of the AEMP and baseline monitoring years. The Board notes that Dominion presented the same argument in the 2015 AEMP Re-evaluation and Design Plan.²⁹ The Board’s previous decision regarding historical data continuity in sampling methods, and the decision to use core sampling for the AEMP program was carefully considered and based on the evidence and reviewer comments received at that time.

In the Request, the technical memorandum (memo) provided by ERM provides some new information with respect to the challenges of integrating only sediment core data into the AEMP analyses. The memo explains the general interpretation challenges that resulted from the analysis conducted as part of the 2017 AEMP. In its decision on the 2015 Aquatic Effects Re-evaluation Report regarding the switch to coring, it was acknowledged that there may be some initial challenges associated with the switch, “as more core data becomes available, it will likely be easier to determine if changes are related to mine effects rather than a change in methodology.”³⁰

The 2017 AEMP Annual Report was recently distributed for public review and no comments were received with respect to challenges with the interpretation of results based on the incorporation of core data into the evaluation of effects.³¹ Although Dominion has described the technical, operational, as well as health and safety concerns related to core sampling, the Board must also consider the potential benefits of retaining the use of coring that was implemented in 2017 versus returning to the use of Ekman samples only. While it is not possible to definitively state whether the switch to coring has

²⁸ See WLWB Online Registry for [W2012L2-0001 - Ekati - Sediment Sampling Equipment Change Request - Dominion Response to IR - Oct 16 18](#)

²⁹ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2015 3yr Re-evaluation and Design Plan - Report and Appendices - Jun 30 16](#)

³⁰ See WLWB Online Registry for [W2012L2-0001 - Ekati - 2015 AEMP Re-evaluation and Proposed Design - Board Directive and RFD - Feb 27 17](#)

³¹ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2017 Annual Report - Review Summary and Attachments - Oct 12 18.pdf](#)

significantly improved the program's ability to detect mine effects, the results of the AEMP to date indicate that coring was able to detect mine effects for selenium that were not detected by Ekman samples. This was shown in the 2015 Aquatic Effects Re-evaluation Report, where only the core analysis was able to identify a mine effect for selenium.³² At that time, Dominion had suggested that this result may be due to the change in methods rather than a mine effect; however, it is also possible that the mine effect was real but not detected by the Ekman samples.

Further, the detection of a significant change in selenium by the core analyses was also plausible given the fact that selenium had increased significantly in water samples taken from the lakes in question. The results of the 2017 AEMP monitoring cycle lend support for the early detection of a mine effect of selenium by the core samples; the increasing trend identified in the 2015 Aquatic Effects Re-evaluation from the core samples continues in the data collected for the 2017 AEMP Annual Report.³³ The Board notes that while the 2017 AEMP results provide convincing support for the earlier detection of a mine effects by the core samples, it is unknown whether the effects would have been detected by Ekman samples, had they been collected. It is also apparent from the data that the core samples indicated an increase in selenium as early as 2010 for Leslie Lake and 2011 for Moose Lake. This means that coring was able to detect the change at least six years earlier than Ekman sampling (assuming Ekman sampling would have detected the change in 2017). Overall, the Board believes that, if core sampling can be conducted successfully, coring provides an advantage over Ekman sampling because of its ability to more accurately capture a fine layer of recently deposited sediments.

The memo provided by ERM also discussed concerns with incorporating core sampling only into the Sable AEMP because of the limited years of baseline data collected using core samples. The memo notes that the Board's Reasons for Decision of Version 1.1 of the Sable AEMP Design had indicated the importance of collecting more baseline sampling because of statistical power issues,³⁴ however, the Board notes that the power analysis was based on the use of sediment samples collected using an Ekman sampler. The Reasons for Decision on Version 1.1 of the Sable AEMP Design had also acknowledged that there would only be one year of baseline data collected using core samples. The statistical value of baseline data needs to be weighed against the ability of the sampling methods to detect a change. While a single year of baseline core data may not be ideal, the Board does not believe that it should be the deciding factor for selecting Ekman sampling over core sampling because Ekman samples may fail to detect a change regardless of the number of baseline data years.

Overall, although Dominion's memo appears to indicate some challenges of integrating core only data into the analyses, it is not clear that these are completely new concerns that have not already been considered by the Board.

³² See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2015 3yr Re-evaluation and Design Plan - Report and Appendices - Jun 30 16](#)

³³ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - 2017 Annual Report - Part 1 Evaluation of Effects - Mar 31 18.pdf](#)

³⁴ See WLWB Online Registry for [W2012L2-0001 - Ekati - AEMP - Sable AEMP Design Plan - Version 1.1 - Directive and Reasons for Decision - Apr 21 17.pdf](#)

3.5 Other Considerations and Overall Decision

The Board notes that Dominion has identified both sample integrity and health and safety issues with respect to the current sediment sampling program. The evidence presented shows data collection issues for the Jay AEMP baseline sites, suggesting that the use of an Ekman sampler may be preferable for this program. The Jay AEMP is currently under review and the Board believes making a decision now on the sediment sampling methods for the whole Jay AEMP, prior to the location of sites and other program details being finalized would be premature. The Board believes it will be able to make a more informed decision on the sediment sampling aspect during its consideration of the Jay AEMP.

- ***Decision #1: The Board has decided that it will determine appropriate sediment sampling methods for the Jay AEMP sites during its consideration of the Jay AEMP Design.***

With respect to sediment sampling at the Ekati AEMP and Sable AEMP sites, the Board does not believe Dominion has presented sufficient information to suggest that the integrity issues experienced with the Jay AEMP apply to these other AEMP sites; however, the Board recognizes that health and safety issues should also be considered. The Board believes there is a benefit to maintaining the use of coring with respect to being able to detect mine-related effects in sediment. Reviewers have indicated the value of core sampling and preference for continuation of core sampling where reasonable and shown to be historically successful (ECCC comment 2; GNWT-ENR comment 1).

The Board notes that there are potential solutions that would allow continued use of coring and address Dominion's concerns. Three are described below:

1. Lighter-weight coring devices: There are several other well-designed and commonly used corers that are light-weight (and that can be weighted if necessary), which could reduce the physical effort involved and reduce the possibility of the corer sinking too far into the sediment. Two examples include the HTH gravity corer (Pylonex) and the "rubber ball" corer (Hoskin Scientific Ltd), which do not appear to have been considered. One advantage of the HTH gravity corer is that it can be ordered with a larger core diameter, which would reduce the sampling effort as fewer subsamples would be needed per replicate. Use of a lighter and larger diameter corer is a feasible solution that would significantly reduce sampling effort while maintaining integrity of the sampling program. A change in corer types should not affect the samples in any way (i.e., no difference is expected due to a change in corer).
2. Compositing replicates or reducing replication: The current AEMP collects three replicates per site, with each replicate taken at a different location. These replicates currently consist of five subsamples in order to obtain the volume of material required for analysis. If Dominion were to composite the triplicates into one sample for analysis, this would likely only require two sub-samples per replicate for a total of six deployments per lake and would substantially reduce effort. Another option could be to reduce replication from three to two replicates per lake. There are however, statistical disadvantages to compositing samples and/or reducing replication.

3. Another suggestion is to reduce the number of lakes sampled; however, this could compromise detection of a mine effect in a lake that was dropped from the program.

The Board believes that options 1 and 2 may provide some valuable solutions to the concerns raised by Dominion with respect to health and safety concerns, while allowing for the continued use of core sampling at sites where it has historically been shown to be successful. The Board recognizes, however, that neither Dominion, nor reviewers, have had a chance to consider these alternatives.

Given that sediment sampling only occurs once every three years, the Board is not prepared to approve the discontinuation of a more accurate sediment sampling method without full consideration of alternatives.

- ***Decision #2: The Board does not approve a change to Ekman sampling for the Ekati and Sable AEMP sites at this time.***

The Board recognizes that there are other options that Dominion could pursue to address the important health and safety concerns that they have raised, associated with increased sampling effort. For example, Dominion could incorporate the use of a lighter-weight corer and/or could seek Board approval for compositing samples and reducing replication. In addition, there may be other options not considered in these Reasons for Decision.

Signed the 3rd Day of December 2018, on behalf of the Wek'èezhìi Land and Water Board



Witness



Joe Mackenzie
Chair, Wek'èezhìi Land and Water Board