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

Re: Fish Version 1.2, Phosphorus Version 1.3, and Chloride Version 1.2

Dear Mr. Mackenzie,

The Independent Environmental Monitoring Agency (Agency) has reviewed the following Dominion Diamond Ekati ULC (Dominion) response plans (RPs): Fish Version 1.2, Phosphorus Version 1.3, and Chloride Version 1.2 and provides the following comments for your consideration.

Phosphorus v 1.3 and Chloride v 1.2

Both the Phosphorous and Chloride plans mention and reference the operational water management model (OWMM), however the OWMM does not appear to be available to reviewers. The OWMM optimizes the management of water within Long Lake Containment Facility (LLCF) cells as well as optimizing discharge scenarios and seems to provide the inputs for the Koala Watershed water quality model predictions. The OWMM is a component of the Optimizing LLCF Discharge mitigation option to update the water quality predictive model when low action level is exceeded. Dominion expects that calibration of the 2017 OWMM would optimize the water quality model predictions in 2018 (Chloride Response Plan version 1.2: p 3-5).

Given the importance of the OWMM in determining water quality at Ekati, the model should be made available so reviewers can better understand how water quality predictions are developed and mitigations chosen.

Recommendation: Dominion make the OWMM available to reviewers.

Fish v 1.2

Section 2.3.2

EROD (Ethoxyresorufin-O-deethylase) activity is used as a biomarker for fish exposure to certain chemicals, including Polycyclic Aromatic Hydrocarbons (PAHs) and organochlorines. EROD activity was elevated in whitefish in some lakes near the Ekati mine in 2012, indicating exposure to contaminants (Rescan 2013. *EKATI Diamond Mine: 2012 Aquatic Effects Monitoring Program Part 1 - Evaluation of Effects*: Section 3.7.3.15). While it is true that Rescan determined that PAHs were a more likely contaminant than organochlorines in eliciting high EROD activity in whitefish from 2012 Aquatic Effects Monitoring Plan (AEMP) lakes, organochlorine contamination should not be totally disregarded in

consideration of EROD activity in the current Fish Response Plan (section 2.3.2). The 2012 AEMP results showed that dioxins and furans in three of 20 total round whitefish collected from five Koala lakes and two reference lakes were above detection limits and also the mid-point and upper bounds of the data for those three fish were above the CCME guideline (0.71 mg/kg wet wt.). Additionally, dioxins showed four homologue peaks in a Leslie Lake sample and one peak in a Nema Lake sample. Each isomer has its own peak and the total number of peaks represents the number of separate isomers which were detected in each sample (Rescan 2013: 3-306).

Overall, the 2012 AEMP stated that "*many of the detection limits for individual targets were above the CCME guideline, due to the small amounts of tissue available after other analyses were conducted, and as a result data interpretation is difficult*."(Rescan 2013: 3-306). With these considerations in mind, the Agency believes that the role of organochlorines in producing high EROD activity in whitefish cannot be discounted. Therefore, the Agency suggests the Fish Response Plan incorporate organochlorines into its action levels. The Agency is concerned with excluding organochlorines from consideration in the Fish RP because PAHs do not biomagnify, but organochlorines do. Thus, organochlorines such as dioxins and furans, found in high concentrations in the past in Kodiak Lake sediments, likely have greater food chain consequences than PAHs. Organochlorines in edible fish have human health implications as organochlorines such as PCBs and dioxins are known carcinogens.

Recommendation: Organochlorines should be incorporated into the Fish RP's consideration of EROD influence on fish health action levels.

Section 3.2.1

Section 3.2.1 (p. 3-6) states "*The proposed response to the low action level trigger* [a biological variable in fish that exceeds the level at which AEMP methods determine an adverse effect could occur] *for antimony, molybdenum, uranium, and EROD is...to defer setting medium and high action levels and to continue monitoring and evaluation through the Aquatic Effects Monitoring Plan and Aquatic Response Framework*.". If any of these four variables exceed low-action benchmarks in fish tissue but not in water, no medium and high action levels will be developed despite situations wherein sediment may be the source rather than water. The Agency is concerned that sediment is being ignored as a possible source of contamination. The USEPA's draft guidance document *Technical Support for Fish Tissue Monitoring for Implementation of EPA's 2016 Selenium Criterion* states "*Fish whole-body or muscle tissue supersedes water column element when both fish tissue and water concentrations are measured.*" (Table 1. footnote #3). Furthermore, the 2012 AEMP results for fish (p.3-328) found "*a highly significant relationship between fish tissue and sediment concentrations was found to exist. Because of the relatively tight fit between sediment and fish tissue concentrations, any observed increases in sediment concentrations in future monitoring years will likely result in increases in fish tissue concentrations*."

Recommendation: The Fish Response Plan should not defer determination of medium and high action level development when levels of antimony, molybdenum, uranium or EROD are high in fish tissue but not in water. It is possible that high sediment concentrations may serve as a significant source of high metal body burdens in bottom-feeding fish species such as sculpin and whitefish.

Section 3.2.4

Section 3.2.4 (p. 3-8) states "...*palatability is not directly related to the significance threshold for fish in the ARF [Aquatic Response Framework]. The significance threshold is focused on fish health and the safety of consumers of fish. There is a difference between palatability and safety for consumption as it relates to the concentration of chlorinated phenols in fish tissues. Palatability is subjective and cannot be quantified analytically*."

Ekati's 2012 AEMP (p. 3-298) can be used to infer a potential palatability threshold for this Fish Response Plan based on chlorophenol concentrations in fish tissue derived from taste thresholds that British Columbia uses in its Ambient Water Quality Guidelines for Chlorophenols. The Fish RP Section 3.2.4 goes on to say *"...the Fish Response Plan decision process, and any subsequent actions through the ARF for chlorinated phenols (a surrogate measure of fish palatability) in fish tissues have the objective of* ***maintaining healthy fish populations that are safe to eat***." (emphasis added). Note this objective omits a requirement for fish tissue to be palatable, which will be a concern for Aboriginal land users at closure.

Recommendation: The Fish Response Plan 1.2 should incorporate palatability as determined by the BC guidelines as mentioned in the Ekati AEMP, into developing action levels for fish tissue palatability.

Selenium Action Level

For selenium, the high action level for fish health (section 3.4.1) is set so that 100% of the fish of a sampled species in an impacted lake must have selenium concentrations above the benchmark for fish protection in the USEPA Water Quality guidelines. This means that an entire sample of a fish species must reach possibly chronically toxic burdens of selenium in their tissues (for up to 4 or 5 years, as harvestable species are only sampled every 6 years) before mitigation measures are implemented.

The Agency is concerned that the significance threshold seems to be set for an entire watershed, not single lakes within a watershed. For the Koala watershed, the benchmark would have to be reached for all fish sampled in Leslie Lake through Slipper Lake for the threshold to be reached. The effect of this is that the reproductive capacity of a fish species (i.e., chronic toxicity for selenium in fish) of an entire near-field lake like Leslie Lake could be negatively affected before corrective measures are taken. In addition, this approach of using 100% of all fish sampled does not appear to consider that fish species can migrate from one lake to another. It is possible for a fish from an adjacent lake with lower contaminant levels to enter the sampled lake. Using the suggested 100% fish samples approach would result in the higher action levels not being triggered and is not adequately conservative in protecting fish populations in impacted lakes.

Recommendation: The Fish Response Plan 1.2 for fish health high action levels for selenium should be adjusted to reflect a benchmark that is lake-specific for fish health rather than watershed-wide.

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
Tłı̨chǫ Government – Violet Camsell-Blondin
Yellowknives Dene First Nation – Johanne Black
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North Slave Metis Alliance – Jessica Hurtubise
Kitikmeot Inuit Association – Geoff Clark
Government of the Northwest Territories – Laurie McGregor
Crown-Indigenous Relations and Northern Affairs Canada – Dinah Elliott