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July 2nd, 2024

File: W2020L8-0003

Mr. Ryan Fequet
Executive Director
Wek'èezhi Land and Water Board
#1-4905 48th St., Yellowknife, NT X1A 3S3

Dear Mr. Fequet,

**Re: Kwetpaà (Rayrock) Remediation Project (W2020L8-0003)
Aquatic Effects Monitoring Program (AEMP) Design Plan – Version 1.1 Reasons for Decision
Response Framework Revisions # 1 to #4**

Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Contaminants and Remediation Division (CARD) received from the Wek'èezhi Land and Water Board (WLWB) the Reason for Decision on the Aquatic Effects Monitoring Program (AEMP) Design Plan, Version 1.1 on May 23, 2024. In accordance with Decision #2, CIRNAC-CARD is respectfully submitting the updated Response Framework (Section 12), with Response Framework Revisions 1 through 4, for review and approval.

Enclosed with this cover letter you will find the updated Response Framework (Section 12) proposed for Rayrock AEMP Design Plan V1.2 and a concordance table summarizing of how Response Framework Revisions 1 through 4 have been addressed in the updated Response Framework. This submission is also accompanied by the updated Appendix B Baseline Summary Tables for the AEMP Design Plan, which contain the complete 2021-2023 Rayrock AEMP Pre-Remediation Baseline Summary Tables (submitted with the Annual Rayrock 2023 AEMP Report). The updated Critical Effects Sizes included in the revised Response Framework are reflected in these updated Appendix B Baseline Summary tables.

If you have any questions regarding the updated Response Framework for the Rayrock AEMP Design Plan or any of the enclosed documents, please do not hesitate to contact me.

Yours Truly,

Ron Breadmore
Project Manager, CIRNAC-CARD

Cc:
Andrew Richardson, Project Officer, CIRNAC-CARD

Encl:
Concordance Table - Rayrock AEMP Design Plan Version 1.1 Reasons for Decision Response Framework Revisions #1-4
Revised Response Framework (Section 12) for Rayrock AEMP Design Plan Version 1.2
Rayrock AEMP Design Plan Version 1.2 Appendix B – Baseline Summary Tables



Concordance Table

Rayrock AEMP Design Plan Version 1.1 – Reasons for Decision Response Framework Revisions #1 to #4

Requirement	Location in Rayrock AEMP Design Plan V 1.2	Response
Response Framework Revisions:		
1. CIRNAC-CARD is to define how much of an increase from baseline freshet levels would trigger a response for Low, Medium, and High Action Levels.	Section 12.2.2 Table 12-2	<p>The water level data collected from June to September 2022 for Sherman Lake, Lake A, New Control Lake, Gamma Lake, and Beta Lake provided a quality dataset for water level evaluations for each waterbody. Data collection was repeated in 2023, however, issues with wildlife damage/tampering caused incomplete data collection at most of the sites. The 2023 Sherman Lake station data provided water levels through June and July, that captured the freshet peak and the maximum water level recorded. Overall, the monthly and summer averages for each lake for 2022 and 2023 are very closely aligned and the Standard Error calculations for each location are low.</p> <p>A quantitative trigger or threshold for change in water level on Sherman Lake has been set using the elevation difference between the maximum spring freshet water level and the average summer water level measured during the pre-remediation baseline in 2023. At the Sherman Lake hydrologic monitoring station, the maximum water level was measured in June at 180.475 masl and the average water level in 2023 was 180.345. This elevation difference of 0.130 m (130mm) between the annual peak and the summer average will be used as a numeric value for evaluating the Low Action Level for Sherman Lake hydrology.</p> <p>The elevation level difference of 0.130m (130mm) will be used in the Response Framework to increase the frequency of water level data downloads to weekly. The weekly downloads will provide more timely evaluation of the water level trends at site and be used to identify when and if the water levels drop. If there is no regional trend or other natural factors linked to this rise in water level, and the water levels on Sherman Lake remain above this 0.130m (130mm) difference threshold for a duration of more than three weeks, then it will be considered a Moderate Action Level trigger value for water level. If it remains above the 0.130m threshold for more than six weeks, then it will be considered a High Action Level trigger value for water level.</p> <p>It is also worth noting that the discharge is only expected to have any possible influence on Sherman Lake and Lake A. Due to site access and operational limitations during the spring break up and thaw period, annual commissioning and start-up of the Mill Lake Water Treatment Facility and the Confined Disposal Facility are not anticipated to occur until after the annual freshet. Therefore, freshet levels measured on Sherman Lake and Lake A will not be influenced by discharge of treated water from the Rayrock site. This will be calibrated by evaluating the water level in June 2024 as well as by observing changes in the other lakes at the start of the 2024 freshet and open water season.</p> <p>The inclusion of water level data collection for Gamma, Beta, and New Control lakes would still be evaluated to understand and determine interannual variation in water levels at site and regionally, and to evaluate if other activity during the remediation changes water drainage patterns that influence those lakes.</p>

Requirement	Location in Rayrock AEMP Design Plan V 1.2	Response
2. CIRNAC-CARD is to clarify how the assessment of Action Levels relates to the proposed data download frequency from pressure transducers during the period of discharge.	Section 12.2.2 Table 12-2	<p>As included in the response to Response Framework Revision #1, the elevation level difference of 0.130m (130mm) on Sherman Lake during discharge will be used in the Response Framework to increase the frequency of water level data downloads to weekly.</p> <p>As described in response to requirement #1 above, if this increase in the summer water level on Sherman Lake is detected when treated water discharge is occurring then an initial investigation of precipitation rates and potential blockages (e.g., beaver dam or log jam) of drainage pathways will be undertaken along with the evaluation of water levels on Beta and Gamma lakes and New Control Lake to determine if a similar trend is occurring. The frequency of water level data retrieval would switch to weekly until either the water level falls to a measure below the 0.130m (130 mm) difference in elevation or it is determined that there is a natural cause for the measured increase.</p> <p>If water levels remain above this 0.130m (130mm) difference threshold for a duration of more than three weeks, then it will be considered a Moderate Action Level trigger value for water level. If it remains above the 0.130m threshold for more than six weeks, then it will be considered a High Action Level trigger value for water level. Again, in addition to the quantitative water level criteria, the qualitative evaluation of Sherman Lake shoreline habitat environmental change or stress from elevated water levels will remain as part of the combined Response Framework triggers for confirming the aquatic environment Action Levels.</p>
3. CIRNAC-CARD is to clarify the approach used to set Significance Thresholds (i.e., 95th percentile) and adjust the Low, Medium and High Water and Sediment Action Levels accordingly to reflect the Significance Thresholds.	Section 12.2 (no longer Significance Thresholds – V1.1 section removed) Table 12-1 (no longer Site-Specific Significance Thresholds – V1.1 table removed) Section 12.2.3 Section 12.2.5 Table 12-3 Table 12-4 Table 12-6 Table B-2 Table B-3 Table B-5 Table B-6	<p>The original intent for including a reference to the Sherman Lake Site Specific Significance Thresholds (SSSTs) that were developed by CanNorth (CanNorth 2023) was to provide information on what SSSTs could look like in comparison to the established EQCs for discharge to Sherman Lake under the Water Licence. The information on SSSTs was added for context about EQC setting but was never intended to inform any part of the AEMP Design Plan Response Framework Action Levels. The EQC levels included in the Water Licence and the baseline action levels proposed in the AEMP Response Framework for these water quality parameters in Sherman Lake are substantially more conservative than the SSSTs developed by CanNorth. Therefore, all reference to the CanNorth SSSTs for Sherman Lake has been removed from Section 12 and Appendix D to eliminate any further confusion or discussion related to the development of these thresholds for the purposes of the Rayrock AEMP Design Plan.</p> <p>Action Level triggers under the AEMP Design Plan have been set using measures of acceptable change in baseline water chemistry for each waterbody. Water quality, sediment quality, benthic invertebrate tissue concentrations, and large-bodied fish tissue concentrations will be screened against the baseline values (e.g., 95th percentile) developed for each AEMP sampling location using the data collected during the AEMP baseline sampling program (2021-2023).</p> <p>CIRNAC-CARD has proposed the use of the 95th percentile of the AEMP baseline data and an Action Level system based on gradual increases of 10% (Low), 20% (Medium) and 40% (High) from baseline levels. These thresholds have been determined based on the input and recommendations provided by the Tłıchǰ Government and GNWT-ECC.</p> <p>GNWT Comment # 7 on AEMP DP V 1.1 (Submitted April 2, 2024) recommended the use of 10% above the 95th percentile value for each lake location as an action level. GNWT indicated that, "Typically, a value of 20% is used to represent a significant departure from baseline conditions as this is considered the threshold for</p>

Requirement

Location in Rayrock AEMP Design Plan V 1.2

Response

analytical error for metals in water (Austin 2020) and a practical limit for assessing change from baseline condition for water quality (ENV 2021).

The BC Guidance for Derivation of Water Quality Objectives (ENV 2021) identifies levels of protection, including:

- Full protection maintains existing water quality with no degradation, substantial alteration, or impairment by human activities. Numerical WQOs should be within 20% of established baseline or background conditions. This would apply where the goal is to fully protect the existing water quality and values or if a parameter of concern has naturally elevated levels such that the WQG cannot be met. In each instance, a change of 20% in current conditions is considered acceptable recognizing the precision for measurement of low-level concentrations in replicate samples is not usually better than 20% in ideal laboratory conditions and natural variability is often greater than 20%. For example, if current conditions for a parameter is a 30-day average of 10 mg/L, a WQO of 12 mg/L would be established to protect the identified water uses and values.

TG Comment #5 on AEMP DP V1.1 (submitted April 2, 2024) indicted that if the low action level was to be set at X% above the maximum baseline concentration (or X% above the 95% UCL value), then moderate action level could be set at 2X% above baseline maximum (or 95% UCL), and the high action level set at 4X% above the maximum (or 95% UCL) baseline concentration.

With the recommendations and guidance provided on ranges of reasonable change from the established baseline condition, we have selected 10% above the 95th percentile value for the low action level where a change is measurable but still below an acceptable range, a 20% change for the moderate action level where conditions may indicate an increase beyond expected natural variability, and a 40% change for the high action level where the concentrations go beyond the intended water quality objectives (protection of baseline conditions).

References:

Austin, Joyce (editor). 2020. British Columbia Environmental Laboratory Manual. Analysis, Reporting and Knowledge Services, Knowledge Management Branch, B.C. Ministry of Environment and Climate Change Strategy, Victoria, B.C.

ENV (British Columbia Ministry of Environment and Climate Change Strategy). 2021. Guidance for Derivation of Water Quality Objectives in British Columbia, WQO-04. Prov. B.C., Victoria B.C.

4. CIRNAC-CARD is to update the critical effects sizes for the benthic invertebrate program to reflect additional baseline data.

Section 12.2.4
Table 12-5
Table B-4

The Low Action Level for benthic invertebrates is defined as significantly lower invertebrate density and richness in the receiving waterbodies (Sherman Lake waterbody, Beta Lake, Gamma Lake, Kwetsq̓tia) compared to the pre-remediation baseline conditions of a magnitude greater than 1 SD for benthic invertebrates (Table 12-5). A CES of 2 SD is used in EEM Technical Guidance (Environment Canada 2012). However, the variability of the pre-remediation baseline data in a few of the lakes is high enough that a decrease of 1 SD may approach or exceed densities of zero. This Action Level also requires reasonable evidence that changes to these endpoints is linked to activity at the Kwet̓q̓tia (Rayrock) Remediation Project,

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Requirement

**Location in Rayrock AEMP
Design Plan V 1.2**

Response

as indicated by water quality and sediment quality. The Low Action Level is focused primarily on change related to potential toxicity, as it is most directly relevant to preventing reductions in benthic communities.



12 RESPONSE FRAMEWORK

12.1 Overview

This section describes the Response Framework for the AEMP that has been developed in recognition that the Kwetı̄ᑦᑦᑦ (Rayrock) Remediation Project is a short-term remediation project and therefore may be different to those developed for new development projects. The Response Framework links monitoring results to actions with the objective of maintaining the valued aquatic ecosystem conditions or assessment endpoints described in Section 9.3 within the current or existing baseline range. The Response Framework provides an approach to responding to the results of the AEMP and was developed with guidance from the *Guidelines for Adaptive Management – A Response Framework for Aquatic Effects Monitoring* (WLWB 2010; MVLWB/GNWT 2019) and Racher et al. (2011).

The AEMP is designed to detect potential changes in Sherman Lake after discharge commences from the water treatment facility, as well as any changes to other receiving water bodies (i.e., Gamma and Beta Lakes) during remediation. Changes are not deemed “effects” until a link to the Kwetı̄ᑦᑦᑦ (Rayrock) Remediation Project has been established. Should an effect be detected, a corresponding “action” will occur. The type of action taken depends on the magnitude or severity of an effect relative to an assessment endpoint. This is termed the “Action Level.”

The goal of the Response Framework is to systematically respond to monitoring results to prevent significant adverse effects from occurring. This is accomplished by requiring proponents to take actions at defined Action Levels, which are triggered well before significant adverse effects could occur. A level of change that, if exceeded, would result in a significant adverse effect is termed a “significance threshold.”

The Kwetı̄ᑦᑦᑦ (Rayrock) Remediation Project is a federal contaminated site that will be undergoing remediation. The EQCs developed and approved in the Water Licence were established to meet the Canadian Water Quality Guidelines (CWQGs) for the protection of aquatic life (CCME 1999a) and existing pre-remediation baseline conditions in Sherman Lake so as not to change the water quality. As a result, there was no requirement to establish an effluent mixing zone. If treated effluent exceeds the EQCs set out in the Water Licence in any one grab sample, it will not be discharged to the receiving environment, therefore conditions in Sherman Lake are not anticipated to change during the AEMP.

However, if upset conditions were to occur during remediation or other changes to water quality parameters identified due to remediation activities, the AEMP has been designed to address two impact hypotheses: 1) changes to Sherman Lake are from effluent discharges or 2) changes to the receiving water bodies is due to physical remediation activities.

It is important to recognize the context in which the Response Framework for the Kwetı̄ᑦᑦᑦ (Rayrock) Remediation Project has been developed. Unlike other large-scale and long-term civil projects in the Northwest Territories, the duration of the water discharge will be short (during the open water season only) and there is little opportunity for a chronic build-up of COPCs. Large-scale and long-term civil projects, such as mines or power generation facilities, have operational phases that are years to decades long, allowing a chronic increase in COPCs in the surrounding environment. In total, the Mill Lake water treatment plant is expected to operate for less than 12 months over the three years of operation, with the majority of the water to be treated and discharged in the first year, and the remaining in the following two open water seasons. Mill Lake water discharge is anticipated to be completed by 2026 or 2027. The repairs



for the TCAs near Beta Lake and Gamma Lake will be completed within one construction season (i.e., months). Extensive investigation of the aquatic environment at Kwetı̄ᑭᑦᑲᑦ (Rayrock) has shown that, despite remnants of mining contaminants in localized settings, most area of the Kwetı̄ᑭᑦᑲᑦ (Rayrock) site (except those that will be remediated) are safe and functioning similarly to surrounding areas that were not impacted. Therefore, the AEMP is focused on acute increases in concentrations that have the possibility of a lasting effect on the aquatic environment.

12.2 Action Levels

The proposed Action Levels for the aquatic environment survey, water quality, sediment quality, benthic invertebrate community, benthic tissue, and fish tissue are presented in Tables 12-1 to 12-6. The spatial extent of the Action Level evaluation includes all receiving water bodies adjacent to the Kwetı̄ᑭᑦᑲᑦ (Rayrock) Remediation Project, which includes the Sherman Lake waterbody (Sherman Lake, Alpha Bay, Lake A), Gamma Lake, Beta Lake, and Kwetsōᑲᑦ.

Responses to occur if an Action Level is triggered are also presented in Tables 12-1 to 12-6, and follow recommendations provided on Version 1.0 and guidance in MVLWB and GNWT (2019).

12.2.1 Effluent Quality

The effluent quality Action Level is based on the EQCs established in the Water Licence W2020L8-0003 (Table 10-1). The EQCs apply to effluent coming directly out of the water treatment facility (SNP 1663-7), prior to discharge to the receiving environment of Sherman Lake. The Water Licence established these EQCs based on both the baseline water quality conditions in Sherman Lake and the CWQGs for the protection of aquatic life (CCME 1999a). The CWQGs are set to protect all forms of aquatic life and all aspects of aquatic life cycles, including the most sensitive life stage of the most sensitive species (i.e., alga species) over the long term from anthropogenic stressors such as chemical inputs or changes to physical components. They provide a science-based benchmark for a nationally consistent level of protection for aquatic life in Canada. The guidelines identify waterborne concentrations intended to protect all forms of aquatic life for indefinite exposure periods.

The effluent quality treatment goals, established in the Water Licence, for Mill Lake effluent include:

- Ammonia - 499 µg/L, total ammonia nitrogen
- Fluoride - 120 µg/L
- Nitrate - 13,000 µg/L
- Nitrite - 197 µg-NO₂/L
- Copper - 2.8 µg/L
- Iron - 300 µg/L
- .
- Nickel - 25 µg/L
- Uranium - 15 µg/L
- Zinc - 23 mg/L
- Total Petroleum Hydrocarbons - 5 mg/L
- Total Suspended Solids - 15 mg/L

Compliance

Compliance with the Water Licence requires that effluent discharge stop if the effluent quality exceeds the EQCs in any one grab sample or if the effluent is determined to be acutely toxic to fish (i.e., Rainbow Trout) and zooplankton (i.e., *Daphnia magna*). Effluent quality and toxicity are tested prior to commencing or resuming discharge. Daily tests of effluent for ecological parameters (i.e., temperature, conductivity, pH,



redox potential, TDS, turbidity, dissolved oxygen), and daily on-site analysis of copper and uranium is required. Effluent quality samples will be shipped weekly to a certified laboratory for all sampling parameters outlined for SNP 1663-7, including major ions, nutrients, solids, standard laboratory parameters, total metals, and total radionuclides, and monthly for acute toxicity testing (Table 9-3).

These effluent quality compliance levels have been established through the Water Licence and discharge must stop if the water treatment facility does not meet either the EQCs or toxicity requirements. The WLWB and the Inspector will be notified immediately, a spill report will be submitted, and corrective actions taken and reported on (Table 12-1).

12.2.2 Aquatic Environment

The target lakes included in the aquatic environment survey are the Sherman Lake waterbody, Beta Lake, Gamma Lake, and New Control Lake. The Action Levels for aquatic environment combine both water level (hydrology) and shoreline observation results that may change due to the Kwetiq̓aà (Rayrock) Remediation Project.

A physical change in water level and shoreline aquatic habitat is not expected due to the discharge of Mill Lake water into the Sherman Lake waterbody. Approximately 322,085 cubic meters (m³) of treated Mill Lake water will be discharged into Sherman Lake over the course of three open water seasons. In total, the water treatment plant is expected to operate for less than 12 months over the three years of operation, with the majority of the water to be treated and discharged in the first year (187,820 m³), and the remaining of the following two seasons (68,940 m³ and 65,325 m³, respectively) (Sanexen 2023).

The Sherman Lake waterbody is 178.5 ha in area and is quite deep in places, with depths of up to 9 m measured in the Lake. If an average water depth of 3 m is assumed, then the volume of Sherman Lake is 5,355,000 m³. The first year of discharge would add approximately 3.5% of the total volume of Sherman Lake, and approximately 1.2% of the total volume in the second and third treatment seasons. Without consideration of lake water retention or discharge rates, these annual volumes would contribute up to 0.11 m to the water level in year one, and up to 0.04 m in year two and three (if the water in Sherman Lake waterbody remained static).

The probability of an Action Level being triggered is extremely low due to volume of water to be discharged from Mill Lake relative to the size of the Sherman Lake waterbody, the daily discharge limits, and the short duration of time that discharge will occur in the open water season. Also, due to site access and operational limitations during the spring break up and thaw period, annual commissioning and start-up of the Mill Lake water treatment facility and the Confined Disposal Facility are not anticipated to occur until after the annual freshet. Therefore, freshet levels measured on Sherman Lake and Lake A will not be influenced by discharge of treated water from the Rayrock site.

The quantitative trigger or threshold for change in water level on Sherman Lake have been set using the elevation difference between the maximum spring freshet water level and the average summer water level measured during the pre-remediation baseline in 2023. At the Sherman Lake hydrologic monitoring station, the maximum water level was measured in June at 180.475 masl and the average water level from June to September 2023 was 180.345. This elevation difference of 0.130 m (130mm) between the annual peak and the summer average will be used as a numeric value for evaluating the Low Action Level for Sherman Lake hydrology.



Water level data will be downloaded each June, immediately prior to commencement of effluent discharge, and then on a monthly schedule during open water. The annual water level data collected before and during discharge periods on Sherman Lake and on the other lakes will be used to actively update our understanding of the expected hydrograph and seasonal ranges for the Sherman Lake waterbody.

Low Action Level

The Low Action Level is based on maintaining water elevations and shoreline aquatic habitats in the Sherman Lake waterbody at pre-remediation baseline conditions during the period of remediation when the Water Treatment Plant is in operation. The Low Action Level is triggered if during active effluent discharge water levels rise by 0.130m (130 mm) (based on the water level measured at the start of discharge), indications of environmental change or stress are observed at 25% of the observation locations, and the changes are due to the Kwetı̄ᑭàà (Rayrock) Remediation Project (Table 12-2). The Low Action Level is intended to be sensitive to changes in water level in the Sherman Lake waterbody that are outside of the normal or expected hydrograph. Seasonal and annual fluctuations in water level are anticipated, and regions in the north have been experiencing extreme variability in water levels in recent years (ECCC and GNWT 2021).

If this water level is reached and an increasing or irregular trend in the summer water level on Sherman Lake is detected when treated water discharge is occurring then an initial investigation of precipitation rates and potential blockages (e.g., beaver dam or log jam) of drainage pathways will be undertaken along with the evaluation of water levels on Beta and Gamma lakes and New Control Lake to determine if a similar trend is occurring. The frequency of water level data retrieval would switch to weekly until either the water level falls to a measure below the 0.130m (130 mm) difference in elevation or it is determined that there is a natural cause for the measured increase. The weekly downloads will provide more timely evaluation of the water level trends at site and be used to identify when and if the water levels drop. Results of shoreline surveys would be used to determine whether the change in water level has affected the stability and structure of habitat features. A review of remediation activity, including the discharge volumes from the water treatment facility and physical works adjacent to shoreline locations and site drainage features would be undertaken to determine if an Action Level criterion related to activity at the remediation site has been confirmed.

Moderate Action Level

The Moderate Action Level is based on water levels in Sherman Lake rising by 0.130m (130 mm) during active effluent discharge and persisting for more than three weeks. If there is no regional trend or other natural factors linked to this rise in water level, and the water levels on Sherman Lake remain above this 0.130m (130mm) difference threshold for a duration of more than three weeks, then it will be considered a Moderate Action Level value for water level. This duration of elevated water level, combined with evidence of environmental changes in shoreline aquatic habitat (e.g., altered shoreline features or stress to vegetation) observed at 50% of the observation locations would trigger the Moderate Action Level (Table 12-2). Evaluation and comparison to water levels in Beta, Gamma, and New Control lakes would be undertaken along with a review of remediation activity. If the Moderate Action Level criteria are confirmed, notification will be provided within 24 hours of confirmation of the Action Level exceedance, and a response plan will be prepared and submitted within 30 days, as required under the Water Licence.



High Action Level

The High Action Level is based on water levels in Sherman Lake rising by 0.130m (130 mm) during active effluent discharge and persisting for more than six weeks. If there is no regional trend or other natural factors linked to this rise in water level, and the water levels on Sherman Lake remain above this 0.130m (130mm) difference threshold for a duration of more than six weeks, then it will be considered a High Action Level value for water level. This duration of elevated water level combined with evidence of environmental changes in shoreline aquatic habitat (e.g., altered shoreline features or stress to vegetation) observed at 75% of the observation locations would trigger the High Action Level (Table 12-2). Evaluation and comparison to water levels in Beta, Gamma, and New Control lakes would be undertaken along with a review of remediation activity. If the High Action Level criteria are confirmed, notification will be provided within 24 hours of confirmation of the Action Level exceedance, and a response plan will be prepared and submitted within 30 days, as required under the Water Licence.

12.2.3 Water and Sediment Quality

Low, Moderate, and High Action Levels for water and sediment quality are intended to apply to parameters with concentrations that are increasing due to the Kwetı̄ḡaà (Rayrock) Remediation Project. Results from the AEMP locations in the Sherman Lake waterbody (Sherman Lake, Alpha Lake, and Lake A), Gamma Lake, Beta Lake, and Kwetsòḡia will be evaluated against the Action Levels for both water and sediment quality. The Action Levels have been established using the pre-remediation baseline conditions in these receiving waterbodies (Section 8.3 and Appendix B). The Low, Moderate, and High Action Levels are based on percent change from 95th percentile baseline concentration (Section 8.3 and Appendix B).

Water and sediment quality Action Levels are independent of Action Levels for benthic invertebrates and fish. Both water quality and sediment Action Levels were developed using the existing baseline conditions, with the understanding that some of these waterbodies have impacts from historical mining. Biological monitoring will determine if effects are occurring on aquatic organisms from changes in the environment from remediation activity and has its own Action Levels.

Low Action Level

The Low Action Level is triggered if the concentration from an AEMP location in a receiving waterbody during one sampling event is 10% greater than the 95th percentile concentration from the pre-remediation baseline period, an increasing trend is observed for that parameter, and the increase is linked to the Kwetı̄ḡaà (Rayrock) Remediation Project (Table 12-3 and 12-4). The Low Action Level is intended to be sensitive to changes in water and sediment quality.

Low Action Levels will apply to all AEMP locations within the Sherman Lake waterbody, as well as the other on-site lakes (i.e., Beta Lake, Gamma Lake, and Kwetsòḡia) that may receive surface runoff or drainage from the remediation site. Results from the Sherman Lake K, L, and B sampling locations will be compared to the 95th percentile of the pre-remediation baseline water quality values from their respective locations. The Alpha Lake, Lake A, Beta Lake, Gamma Lake, and Kwetsòḡia stations will be compared to the 95th percentile of the pre-remediation baseline water quality values established for each respective waterbody (Tables B-2).



For water quality the Low Action Level is considered to be very sensitive to changes in water quality, as baseline concentrations of parameters in Sherman Lake are low and the EQCs for discharge to Sherman Lake have been established to meet the CWQGs level of aquatic protection. Copper and fluoride are the only parameters with an EQC that may trigger a Low Action Level in the AEMP. The mean copper concentration of 2.1 µg/L (95th percentile of 4.25 µg/L) for Sherman Lake K (Table B-2) is only 25% lower than the current EQC of 2.8 µg/L in the Water Licence. The mean fluoride concentration of 170 µg/L (95th percentile of 188 µg/L) for Sherman Lake K (Table B-2) is higher than the current EQC of 120 µg/L in the Water Licence. All other mean values for parameters in Sherman Lake with associated EQCs are between 200-2,400% lower than the EQC values.

For sediment quality, the focus will be on the AEMP locations in waterbodies immediately adjacent to the Kwetı̄ᑭāà (Rayrock) Remediation Project that may receive surface runoff or drainage from the remediation site. A Sediment and Erosion Control Plan (SECP) has been approved for civil works close to the site waterbodies. The SECP includes more frequent monitoring of remedial activity for the potential movement of solids and the development of erosion issues that could lead to sedimentation events. It outlines methods that will be employed before, during, and after remediation to prevent erosion and mitigate movement of sediment through local runoff to receiving waterbodies. Sediment quality results from each of the receiving waterbodies (i.e., Sherman Lake, Alpha Lake, Lake A, Gamma Lake, Beta Lake, Kwetsōᑭā) will be compared to the 95th percentile of the pre-remediation baseline water quality values from each respective lake (Table B-3).

It is possible that concentrations in water and sediment may approach or exceed the 95th percentile plus 10% from the pre-remediation baseline period simply due to seasonal fluctuations or other factors (e.g., single high result due to a wind event, sample contamination, natural variability). Treated effluent concentrations, remediation activity, temporal trends (i.e., changes over time), and spatial trends (e.g., proximity to immediate discharge point or civil work) will be considered when determining if an Action Level trigger is due to activity from the Kwetı̄ᑭāà (Rayrock) site, and what actions are necessary to be taken. If no source from the Kwetı̄ᑭāà (Rayrock) Remediation Project is identified (i.e., the result is not linked to the remediation activity), there is no increasing trend (visual evaluation or statistical test), and/or the spatial pattern is unexpected (e.g., an increase occurred at a farther downstream station but not immediately downstream of the effluent discharge or adjacent to the site), the result may be due to analytical error, contamination of the sample, or other unidentified source. Individual anomalous or erroneous results would not immediately trigger a Low Action Level but would be further investigated as appropriate depending on the nature of the exceedance (e.g., parameter, magnitude, duration of the trend, and confirmation of link to remediation activity) prior to an Action Level response being confirmed.

Moderate Action Level

The Moderate Action Level is triggered if the concentration from an AEMP station in a receiving waterbody during one sampling event is 20% greater than the 95th percentile of the pre-remediation baseline period and the increase is linked to the Kwetı̄ᑭāà (Rayrock) Remediation Project (Table 12-3 and 12-4).

The Moderate Action Level for water and sediment quality is based on a magnitude of change from baseline conditions with the intent of preventing parameters from increasing in the receiving environment, and specifically water quality in Sherman Lake. Triggering of Moderate Action Levels are not expected as action will be taken to prevent water from being discharged that does not meet the EQCs and to bring water quality concentrations down if they are found to be increasing during treatment or in the receiving



environment. If no increases in water quality parameters are detected and the SECP is implemented correctly, then increases in sediment concentrations are not anticipated.

The EQCs for the water treatment have been set to mirror the CWQGs and baseline conditions in Sherman Lake at a level that is protective of the most sensitive aquatic species. Site investigations and risk assessments conducted to support the Kwetı̄ᑭāà (Rayrock) Remediation Project have indicated that some water and sediment quality parameters in receiving waterbodies adjacent to the Kwetı̄ᑭāà (Rayrock) site have exceedances of environmental quality screening guidelines; however, the measured levels have not been found to present a risk to the environment. The planned remediation activities for Mill Lake are designed to improve conditions for aquatic life. A single exceedance of an EQC or an AEMP result above the established pre-remediation baseline concentration is not expected to result in effects to the biological components; however, these would be unexpected occurrences requiring action (Table 12-3 and Table 12-4).

High Action Level

The High Action Levels for water and sediment quality are also based on a magnitude of change from baseline conditions, with the intent of preventing parameters from increasing in the receiving environment. The High Action Level is triggered if the concentration from an AEMP location in a receiving waterbody during one sampling event is 40% greater than the 95th percentile of the pre-remediation baseline concentration and the increase is linked to the Kwetı̄ᑭāà (Rayrock) Remediation Project (Table 12-3 and 12-4).

A concentration above the 95th percentile of the pre-remediation baseline concentration could occur due to one high outlying value (e.g., one high concentration and three results below) or could be a result of a persistent increase in concentrations over the course of a month (e.g., four values that are above or close to Action Levels). A short-term spike in water quality levels at concentrations set in the EQCs are not expected to cause acute effects and the short-term duration of the effluent discharge is unlikely to cause sublethal (chronic) effects to aquatic life in Sherman Lake. However, if concentrations in water or sediment quality continue to increase up to or exceeding the Moderate and High Action Levels, additional investigations, mitigation, and an immediate response will occur (Table 12-3 and 12-4).

12.2.4 Benthic Invertebrates

Biological monitoring of benthic invertebrates is used to detect effects on the benthic community. Action Levels have been set for two benthic invertebrate indicators: invertebrate density (i.e., how many) and richness (i.e., how many different types of invertebrates). Invertebrate density and richness were chosen as they are expected to respond predictably to increased toxicity or nutrient enriched conditions, according to identifiable response patterns (Environment Canada 2012). A decrease in density and richness greater than the CES indicates reductions in both the number and type of invertebrates, which provides the most reliable and interpretable evidence of community change in a negative direction. Community indices (e.g., dominance, Simpson's diversity index, Simpson's evenness index) provide additional useful information for inclusion in the overall community assessment but were not included in the Action Levels. Indirect responses in the benthic community assemblages are of interest for evaluating long-term trends and for investigating potential linkages to environmental causes (e.g., habitat, substrate, sediment quality, and water quality); however, they are less useful for establishing Action Levels, particularly when the alterations are not easily categorized as harmful to ecological function.



As outlined in Section 10.4, benthic invertebrates are to be collected directly from the sediment at each AEMP location. The spatial extent of the Action Level evaluation is focused on the sample locations immediately adjacent to the Kwetı̄ᑦᐱà (Rayrock) Remediation Project but applies to all sampling sites in the receiving waterbodies in order to understand and evaluate potential changes in the aquatic environment. As part of the benthic invertebrate assessment, the water and sediment quality monitoring will be used to indicate the potential cause of any unacceptable effects and inform potential management responses. Sediment quality and habitat data are also important to support the biological evaluation and to establish if there is a linkage to the Kwetı̄ᑦᐱà (Rayrock) Remediation Project (primarily effluent discharge) or if the observed effects to the community are due to other factors (e.g., habitat differences, historical sediment contamination, changes in climate).

Low Action Level

The Low Action Level for benthic invertebrates is defined as significantly lower invertebrate density and richness in the receiving waterbodies (Sherman Lake waterbody, Beta Lake, Gamma Lake, Kwetsòᑦᐱà) compared to the pre-remediation baseline conditions of a magnitude greater than 1 SD for benthic invertebrates (Table 12-5). A CES of 2 SD is used in EEM Technical Guidance (Environment Canada 2012). However, the variability of the pre-remediation baseline data in a few of the lakes is high enough that a decrease of 1 SD may approach or exceed densities of zero. This Action Level also requires reasonable evidence that changes to these endpoints is linked to activity at the Kwetı̄ᑦᐱà (Rayrock) Remediation Project, as indicated by water quality and sediment quality. The Low Action Level is focused primarily on change related to potential toxicity, as it is most directly relevant to preventing reductions in benthic communities.

Moderate Action Level

The Moderate Action Level for benthic invertebrates requires several conditions to be met, as outlined in Table 12-5. The Moderate Action Level looks beyond a change in the benthic community and provides an early warning of potential alteration of the invertebrate food supply for sentinel fish species in the receiving waterbodies. This is because the Moderate Action Level requires a magnitude of change that represents more than a 50% reduction in mean densities of three key invertebrate taxa compared to current conditions (i.e., chironomids, bivalves, oligochaetes). These taxonomic groups are represented in benthic invertebrate communities found in the receiving waterbodies, and they also tend to be more sensitive to contaminant exposure and disturbance compared to other benthic species.

High Action Level

The conditions required for the High Action Level to be triggered for benthic invertebrates are defined in Table 12-5. This Action Level provides a more definite warning of potential alteration of the invertebrate community in the receiving waterbodies. The High Action Level requires a magnitude of change that represents more than an 80% reduction in mean densities of four key prey taxa compared to reference (i.e., chironomids, bivalves, oligochaetes, and mayflies). At the High Action Level, a reduction in mean mayfly densities is required as well as a reduction in the other key taxonomic groups specified for the Moderate Action Level. Collectively, these four taxonomic groups represent a large proportion of the dietary food items available fish species Sherman Lake. Mean densities of these taxa can be variable, but a reduction of this magnitude in multiple invertebrates would signal a definite change that should be addressed consistent with a High Action Level. The High Action Level may also be triggered by an exceedance of the Moderate



Action Level over two successive sampling programs that confirms a pattern and may represent a more substantial outcome than a single event which is more likely to be due to chance or a confounding factor.

12.2.5 Fish and Benthic Tissue

Conditions required for Action Levels related to changes in the concentration of metals in fish and benthic tissues are outlined in Table 12-6. For fish and benthic tissue, the effects indicators were identified as an increase in tissue concentrations compared to the pre-remediation baseline levels. Muscle, liver, and bone tissue will be analyzed on large-bodied fish (i.e., Northern Pike) and a composite sample of whole benthic organisms to monitor the potential movement of contaminants into the food chain. The typical effect indicators for sentinel fish species used in EEM programs (i.e., length, weight, condition, relative liver size, and relative gonad size) will be recorded for the large-body fish collected but are not included in the Action Level evaluation for the Response Framework. Change in tissue concentrations is not indicative of an impairment to fish or benthic health but will inform on going assessment and risk evaluation of the Kwetı̄ᑭaā (Rayrock) Remediation Project.

Low Action Level

The Low Action Level for fish and benthic tissue is triggered if an increase in any metal or radionuclide concentration is measured in the tissue that is greater than 10% above the 95th percentile of the pre-remediation baseline concentration for that waterbody (Table 12-6). Reasonable evidence that the change is linked to inputs from the Kwetı̄ᑭaā (Rayrock) Remediation Project is also required, as indicated by water and sediment quality data.

Moderate Action Level

The Moderate Action Level for fish and benthic tissue is triggered if an increase in any metal or radionuclide concentration is measured in the tissue that is greater than 20% above the 95th percentile of the pre-remediation baseline concentration for that waterbody (Table 12-6). Reasonable evidence that the change is linked to inputs from the Kwetı̄ᑭaā (Rayrock) Remediation Project is also required, as indicated by water and sediment quality data.

High Action Level

The High Action Level for fish and benthic tissue is triggered if an increase in any metal or radionuclide concentration is measured in the tissue that is greater than 40% above the 95th percentile of the pre-remediation baseline concentration for that waterbody (Table 12-6). Reasonable evidence that the change is linked to inputs from the Kwetı̄ᑭaā (Rayrock) Remediation Project is also required, as indicated by water and sediment quality data.

12.3 Action Level Responses and Notifications

The AEMP Action Levels and Response Framework are outlined in Tables 12-1 to 12-6.

12.3.1 Responses to Action Levels

Part F Conditions 6 and 7 of the Type A Water Licence (W2020L8-0003) include responses to Low, Moderate, and High Action Levels. Responses that will occur following an exceedance of an AEMP Action



Level are provided in Table 12-1 to 12-6 and include guidance provided in MVLWB and GNWT (2019). The AEMP responses apply to the aquatic environment (water level and shoreline habitat), water quality, sediment quality, benthic invertebrates, and fish and benthic tissue quality. If an Action Level is exceeded the initial steps are to follow AEMP best practices and to confirm and verify the data used to determine the Action Level exceedance.

If a Low Action Level trigger is confirmed, additional steps include evaluating temporal trends and examining linkages between the remediation activity and the change in the aquatic component being monitored. If the concentrations continue to increase, an evaluation to predict when a Moderate Action Level would be exceeded (if the trend continues) may be undertaken. Follow-up desktop and field studies may be recommended to address data gaps, linkages, or areas of uncertainty, and the need to increase the extent or frequency of monitoring.

If a Moderate Action Level is triggered, the responses for the Low Action Level apply, but other possible immediate responses will be to collect additional water samples to look at dissolved metals or other factors affecting bioavailability, toxicity samples for acute and chronic testing, and to develop an AEMP Response Plan, and implement mitigation, if applicable. The Moderate and High Action Levels may be reviewed and adjusted, if warranted and scientifically defensible, based on new data collected as part of the response. Proposed changes would be submitted to the WLWB for review and approval.

If a High Action Level is triggered, the responses for the Low and Moderate Action Levels apply, and efforts will focus on understanding the trend, mitigating, or reversing where possible, and preventing further adverse environmental changes from occurring. Typically, special studies are required to evaluate the long-term trends, potential ecological implications, and the recovery of the aquatic ecosystem.

12.3.2 Notification and Response Plan Timeline

As outlined in the Water Licence (Part H, Condition 9), an AEMP Response Plan is not required for a Low Action Level exceedance for water quality, sediment quality, benthic invertebrates, or fish. If responses, mitigations, or follow-up studies are initiated the year following the Low Action Level exceedance, then these results will be reported in the following annual AEMP report.

For all Moderate and High Action Level triggers, the WLWB and Inspector will be notified within 24 hours of the confirmation of the data triggering the Action Level. Notification and submission of an AEMP Response Plan to the Board for approval will be completed within 30 days of the confirmation of the data triggering the moderate or high Action Level.



Table 12-1 Effluent Discharge Action Levels and Responses for the Kwetiq̓aà (Rayrock) Aquatic Effects Monitoring Program

Location	SNP 1663-7	
Action Level Type	Effluent Discharge Quality	Action Level Response
Compliance	If one of the following are met: 1. Effluent quality exceeds the Effluent Quality Criteria (EQCs) established in the Water Licence in any one grab sample (daily tests for in situ ecological, copper and zinc done onsite and weekly submissions to lab). 2. Effluent quality is determined to be acutely toxic (tested prior to initial discharge and monthly during discharge).	Action to be undertaken in accordance with Part E, Condition 21 of the Water Licence: - Cease discharge - Notify Inspector and WLWB immediately - Report the spill immediately - Submit report of incident with summary of corrective actions

a) All water quality results must be confirmed, meaning that the final analytical result or field measurement has been checked and validated (i.e., no probe calibration or transcription errors).

b) Acute toxicity analysis (multi-concentration) – Rainbow Trout and Daphnia magna; as described in Reference Method EPS 1/RM/13 – Biological Test Method: Reference method for Determining Acute Lethality of Effluents to Rainbow Trout and EPS 1/RM/14 – Biological Test Method: Reference for Determining Acute Lethality of Effluents to Daphnia magna.(as specified in Annex A, Part A of the Water Licence)

EQC = effluent quality criteria; WLWB = Wek’èezhii Land and Water Board



Table 12-2 Aquatic Environment Action Levels and Responses for the Kwetıꞑaà (Rayrock) Aquatic Effects Monitoring Program Response Framework

Location	Sherman Lake and Lake A	
Action Level Type	Aquatic Environment	Possible Responses to Action Levels
Low	<p>If the following are met:</p> <ol style="list-style-type: none"> 1. Water levels rise in Sherman Lake by 130 mm from the water level measured at the start of effluent discharge. <p>AND</p> <ol style="list-style-type: none"> 2. Signs of stressed vegetation or other clear indications of environmental change are present along the shoreline at any 25% of the shoreline observation locations <p>AND</p> <ol style="list-style-type: none"> 3. Linked to the Kwetıꞑaà (Rayrock) Remediation Project activity (i.e., during effluent discharge,) 	<p>Increase water level logger download frequency to weekly.</p> <p>Compare water levels to New Control Lake and other study lakes – if similar trends are observed, then no further action.</p> <p>Review precipitation records and check the drainage pathways for potential blockage – if blocked, develop a plan for clearing the pathway.</p> <p>Compare shoreline location with previously documented conditions from 2021,2022, and 2023.</p> <p>Evaluate links to Kwetıꞑaà (Rayrock) Remediation Project activity upstream or adjacent to the shoreline location (e.g., comparing to regional background lakes, inspecting site for potential blockages, reviewing recent remediation activities, comparing to baseline shoreline conditions).</p> <p>Identify potential mitigation measures.</p>
Moderate	<ol style="list-style-type: none"> 1. Water levels rise by 130 mm from the water level measured at the start of effluent discharge and continue for >3 weeks. <p>AND</p> <ol style="list-style-type: none"> 2. Signs of stressed vegetation or other clear indications of environmental change are present along the shoreline at any 50% of the shoreline observation locations. <p>AND</p> <ol style="list-style-type: none"> 3. Linked to the Kwetıꞑaà (Rayrock) Remediation Project activity (i.e., during effluent discharge) 	<p>Increase water level logger download frequency to weekly.</p> <p>Compare water levels to New Control Lake and other study lakes – if similar trends are observed, then no further action.</p> <p>Review precipitation records and check the drainage pathways for potential blockage – if blocked, develop a plan for clearing the pathway.</p> <p>Compare shoreline location with previously documented conditions from 2021,2022, and 2023.</p>



Location	Sherman Lake and Lake A	
Action Level Type	Aquatic Environment	Possible Responses to Action Levels
		<p>Evaluate links to Kwetı̄ḡàà (Rayrock) Remediation Project activity upstream or adjacent to the shoreline location (e.g., comparing to regional background lakes, inspecting site for potential blockages, reviewing recent remediation activities, comparing to baseline shoreline conditions).</p> <p>Identify potential mitigation measures.</p> <p>The WLWB and Inspectors will be notified within 24 hours of confirmation of the Action Level.</p> <p>An AEMP Response Plan will be prepared by a qualified hydrologist within 30 days of the Action Level being identified, with detailed actions to correct the issue.</p>
High	<p>1. Water levels rise by 130 mm from the water level measured at the start of effluent discharge and continues for >6 weeks. AND 2. Signs of stressed vegetation or other clear indications of environmental change are present along the shoreline at any 75% of the shoreline observation locations AND 3. Linked to the Kwetı̄ḡàà (Rayrock) Remediation Project activity (i.e., during effluent discharge, tailings cap repair)</p>	<p>Increase download frequency of water levels to weekly.</p> <p>Compare trends to New Control Lake and other study lakes – if changes observed are similar, then no further action is required.</p> <p>Review precipitation records and check the drainage pathways for potential blockage – if blocked, develop a plan for clearing the pathway.</p> <p>Compare shoreline location with previously documented conditions, including pre-remediation baseline records from 2021,2022, and 2023.</p> <p>Evaluate links to Kwetı̄ḡàà (Rayrock) Remediation Project activity upstream or adjacent to the shoreline location (e.g., comparing to regional background lakes, inspecting site for potential blockages, reviewing recent remediation activities, comparing to baseline shoreline conditions).</p> <p>Identify potential mitigation measures.</p>



Location	Sherman Lake and Lake A	
Action Level Type	Aquatic Environment	Possible Responses to Action Levels
		<p>The WLWB and Inspectors will be notified within 24 hours of confirmation of the Action Level.</p> <p>An AEMP Response Plan will be prepared by a qualified hydrologist within 30 days of the Action Level being identified, with detailed actions to correct the issue.</p>

a) Temporal trends to be evaluated visually.

AEMP = Aquatic effects monitoring program; WLWB = Wek'èezhii Land and Water Board



Table 12-3 Water Quality Action Levels and Responses for the Kwetiq̓aà (Rayrock) Aquatic Effects Monitoring Program

Locations	All AEMP stations located in receiving water bodies adjacent to the Rayrock Remediation Project (Sherman Lake, Alpha Bay, Lake A, Gamma Lake, Beta Lake, Kwetsôtia)	
Action Level Type	Water Quality	Possible Responses to Action Levels
Low	<p>All of the following are met:</p> <ol style="list-style-type: none"> 1. An increase in concentration greater than 10% above the 95th percentile of the pre-remediation baseline monitoring period. <p>AND</p> <ol style="list-style-type: none"> 2. Supported by an increasing temporal trend <p>AND</p> <ol style="list-style-type: none"> 3. Linked to the Kwetiq̓aà (Rayrock) Remediation Project 	<p>Follow AEMP best practices:</p> <ul style="list-style-type: none"> - confirm Low Action Level was triggered (e.g., confirm reliability of chemistry data) - review processes, procedures, and data to further evaluate cause/linkage to Site (e.g., water treatment plant effluent), as appropriate - evaluate temporal trends in water quality parameters at monitoring stations - examine potential linkage between increased concentration and results for other aquatic monitoring parameters. <p>Report in Annual AEMP Report.</p> <p>Increase monitoring frequency at the station to weekly, increase sample numbers, include monitoring at depth, and expand the monitoring area around that location for water quality to confirm findings.</p> <p>Identify potential mitigation options (e.g., investigate changes in source water [mine water] chemistry and treatment practices).</p> <p>Implement mitigation/further controls, as appropriate (e.g., install extra sediment control measures in construction areas).</p> <p>Initiate follow-up desktop/field studies if required – examine linkages between concentration, toxicity, and biological responses.</p> <p>Predict water quality trends and predict time to reach a potential next action level, where appropriate.</p> <p>Review appropriateness of the Moderate Action Level and refine if warranted and scientifically defensible.</p>
Moderate	<p>Both of the following are met:</p> <ol style="list-style-type: none"> 1. An increase in concentration greater than 20% above the 95th percentile of the pre- 	<p>Follow AEMP best practices as outlined for Low Action Level.</p> <p>Confirm Moderate Action Level (e.g., confirm reliability of chemistry data).</p>



	<p>remediation baseline monitoring period. AND 2. Linked to the Kwetıꞑaà (Rayrock) Remediation Project</p>	<p>Collect additional water samples for evaluation of dissolved metals if Action Level triggered by metals.</p> <p>Collect additional water samples for evaluation of orthophosphate if Action Level triggered by total phosphorus.</p> <p>Collect water sample for chronic and acute toxicity analysis, including phytoplankton and zooplankton species following ECCC standard test methods.</p> <p>Develop Response Plan.</p> <p>If Moderate Action Level confirmed, implement mitigation(s) to stop or slow trend as recommended in the approved Response Plan (e.g., review effluent quality criteria for treated effluent).</p> <p>Conduct desktop or field special study to examine ecological significance, causation, and/or linkage Kwetıꞑaà (Rayrock) Remediation Project as described for the Low Action Level. This may include additional toxicity tests and/or benthic invertebrate surveys.</p> <p>Increase or continue to increase monitoring frequency or spatial extent of monitoring for water quality, toxicity, benthic invertebrates.</p> <p>Refine Moderate and High Action Levels if warranted and scientifically defensible.</p>
<p>High</p>	<p>Both of the following are met: 1. An increase in concentration greater than 40% above the 95th percentile of the pre-remediation baseline monitoring period. AND 2. Linked to the Kwetıꞑaà (Rayrock) Remediation Project</p>	<p>Follow AEMP best practices as outlined for Low Action Level.</p> <p>Confirm High Action Level. (e.g., confirm reliability of chemistry data).</p> <p>Notify Inspector and WLWB within 24 hours.</p> <p>Collect water sample for chronic and acute toxicity analysis (including more sensitive phytoplankton and zooplankton species) following ECCC standard test methods.</p> <p>Develop Response Plan.</p>



		<p>If High Action Level confirmed, implement appropriate mitigations on a priority basis to reverse trend, with focus on eliminating the source and preventing adverse impacts to biological receptors in Sherman Lake.</p> <p>Conduct special study to examine effectiveness of mitigation, long-term monitoring of mitigation effectiveness ecological significance and reversibility, causation, and/or linkage to Site.</p>
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- c) All water quality results must be confirmed, meaning that the final analytical result or field measurement has been checked and validated (i.e., no probe calibration or transcription errors).
- d) Temporal trends to be evaluated visually.

AEMP = Aquatic effects monitoring program; ECCC = Environment and Climate Change Canada



Table 12-4 Sediment Quality Action Levels and Responses for the Kwetı̄ᑭàà (Rayrock) Aquatic Effects Monitoring Program

Locations	All AEMP stations located in receiving water bodies adjacent to the Rayrock Remediation Project (Sherman Lake, Alpha Lake, Lake A, Gamma Lake, Beta Lake, Kwetsòtia)	
Action Level Type	Sediment Quality	Possible Responses to Action Levels
Low	<p>All of the following are met:</p> <ol style="list-style-type: none"> 1. An increase in concentration greater than 10% above the 95th percentile of the pre-remediation baseline monitoring period. <p>AND</p> <ol style="list-style-type: none"> 2. Supported by an increasing temporal trend <p>AND</p> <ol style="list-style-type: none"> 3. Linked to the Kwetı̄ᑭàà (Rayrock) Remediation Project 	<p>Follow AEMP best practices:</p> <ul style="list-style-type: none"> - confirm Low Action Level was triggered (e.g., confirm reliability of chemistry data) - review processes, procedures, and data to further evaluate cause/linkage to Site (e.g., sediment and erosion control plan implementation and results), as appropriate - evaluate temporal trends in sediment quality parameters at monitoring stations - examine the potential linkage between the increased concentration and results for other aquatic monitoring parameters. <p>Report in Annual AEMP Report.</p> <p>Increase monitoring frequency at the station and expand the monitoring area around that location for sediment quality to confirm findings.</p> <p>Identify potential mitigation options (e.g., investigate changes in water chemistry and erosion and sediment control practices).</p> <p>Implement mitigation/further controls, as appropriate (e.g., install extra sediment control measures in construction areas).</p> <p>Initiate follow-up desktop/field studies if required – examine linkages between concentration, toxicity reference values, and biological responses.</p> <p>Predict sediment quality trends and predict time to reach a potential next action level, where appropriate.</p> <p>Review appropriateness of the Moderate Action Level and refine if warranted and scientifically defensible.</p>
Moderate	<p>Both of the following are met:</p> <ol style="list-style-type: none"> 1. An increase in concentration greater than 20% above the 95th percentile of the pre-remediation baseline monitoring period. 	<p>Follow AEMP best practices as outlined for Low Action Level.</p> <p>Confirm Moderate Action Level (e.g., confirm reliability of chemistry data).</p>



	<p>AND 2. Linked to the Kwetıřaà (Rayrock) Remediation Project</p>	<p>Collect samples for chronic and acute toxicity analysis following ECCC standard test methods.</p> <p>Develop Response Plan.</p> <p>If Moderate Action Level confirmed, implement mitigation(s) to stop or slow trend as recommended in the approved Response Plan.</p> <p>Conduct desktop or field special study to examine ecological significance, causation, and/or linkage to Kwetıřaà (Rayrock) Remediation Project as described for the Low Action Level. This may include additional toxicity tests and/or benthic invertebrate surveys.</p> <p>Increase or continue to increase monitoring frequency or spatial extent of monitoring for water quality, sediment quality, toxicity, benthic invertebrates.</p> <p>Refine Moderate and High Action Levels if warranted and scientifically defensible.</p>
<p>High</p>	<p>Both of the following are met: 1. An increase in concentration greater than 40% above the 95th percentile of the pre-remediation baseline monitoring period.</p> <p>AND 2. Linked to the Kwetıřaà (Rayrock) Remediation Project</p>	<p>Follow AEMP best practices as outlined for Low Action Level.</p> <p>Confirm High Action Level. (e.g., confirm reliability of chemistry data).</p> <p>Notify Inspector and WLWB within 24 hours.</p> <p>Collect samples for chronic and acute toxicity analysis following ECCC standard test methods.</p> <p>Develop Response Plan.</p> <p>If High Action Level confirmed, implement appropriate mitigations on a priority basis to reverse trend, with focus on eliminating source and preventing adverse impacts to biological receptors in Sherman Lake.</p> <p>Conduct special study to examine effectiveness of mitigation, long-term monitoring of mitigation effectiveness, ecological significance and reversibility, causation, and/or linkage to Site.</p>



- a) All sediment quality results must be confirmed, meaning that the final analytical result or field measurement has been checked and validated (i.e., no transcription errors).
- b) Temporal trends to be evaluated visually.

AEMP = Aquatic effects monitoring program; ECCC = Environment and Climate Change Canada



Table 12-5 Benthic Invertebrate Action Levels and Responses for Kwetı̄ʔaà (Rayrock) Aquatic Effects Monitoring Program

Locations	All AEMP stations located in receiving water bodies adjacent to the Rayrock Remediation Project (Sherman Lake, Alpha Lake, Lake A, Gamma Lake, Beta Lake, Kwetsòtia)	
Action Level Type	Benthic Invertebrates ^(a)	Possible Responses to Action Levels
Low	Both of the following are met: 1. Density and richness ^(b) in the receiving water bodies are significantly lower compared to baseline conditions, with an effect size equal to or above the CES (i.e., 1 SD) AND 2. Linked to the Kwetı̄ʔaà (Rayrock) Remediation Project	Follow AEMP best practices: <ul style="list-style-type: none"> - confirm Low Action Level was triggered (e.g., confirm reliability of sample and lab data) - review processes, procedures, and data to further evaluate cause/linkage to Site (e.g., WTP effluent, Sediment and Erosion Control Plan implementation and results), as appropriate - evaluate temporal trends in water and sediment quality parameters at monitoring stations - examine the potential linkage between increased concentration and results for other aquatic monitoring parameters. Report in Annual AEMP Report. Increase monitoring frequency and expand the monitoring area to confirm findings. Identify potential mitigation options (e.g., investigate changes in water chemistry and erosion and sediment control practices). Initiate follow-up desktop/field studies if required – examine linkages between concentration, toxicity, and biological responses. Review appropriateness of the Moderate Action Level and refine if warranted and scientifically defensible.
Moderate	All of the following are met: 1. Density and richness ^(b) in the receiving water bodies are significantly lower compared to baseline conditions, with an effect size equal to or above the CES (i.e., 1 SD) AND 2.. Significantly lower mean densities (50% or more)	Follow AEMP best practices as outlined for Low Action Level. Confirm Moderate Action Level (e.g., confirm reliability of data). Develop Response Plan.



	<p>difference) of chironomids, bivalves, oligochaetes compared to baseline conditions AND 3. Linked to the Kwetı̄ᑭᑦᑲᑦ (Rayrock) Remediation Project</p>	<p>If Moderate Action Level confirmed, implement mitigation(s) to stop or slow trend as recommended in the approved Response Plan.</p> <p>Conduct desktop or field special study to examine ecological significance, causation, and/or linkage Kwetı̄ᑭᑦᑲᑦ (Rayrock) Remediation Project as described for the Low Action Level. This may include additional toxicity tests and/or benthic invertebrate surveys.</p> <p>Increase or continue to increase monitoring frequency or spatial extent of monitoring for water quality, sediment quality, toxicity, benthic invertebrates.</p> <p>Refine Moderate and High Action Levels if warranted and scientifically defensible.</p>
<p>High</p>	<p>1. Moderate Action Level exceedances over two successive sampling programs that confirm a pattern^(c) OR All of the following are met: 1. Density and richness^(b) in the receiving water bodies are significantly lower compared to baseline conditions, with an effect size equal to or above the CES (i.e., 1 SD) AND 2. Significantly lower mean densities (80% or more difference) of chironomids, bivalves, oligochaetes, and mayflies, compared to baseline conditions AND 3. Linked to the Kwetı̄ᑭᑦᑲᑦ (Rayrock) Remediation Project</p>	<p>Follow AEMP best practices as outlined for Low Action Level.</p> <p>Confirm High Action Level. (e.g., confirm reliability of chemistry data).</p> <p>Notify Inspector and WLWB within 24 hours.</p> <p>Collect samples for chronic and acute toxicity analysis following ECCC standard test methods.</p> <p>Develop Response Plan.</p> <p>If High Action Level confirmed, implement appropriate mitigations on a priority basis to reverse trend, with focus on eliminating source and preventing adverse impacts to biological receptors in Sherman Lake.</p> <p>Conduct special study to examine effectiveness of mitigation, long-term monitoring of mitigation effectiveness, ecological significance and reversibility, causation, and/or linkage to Site.</p>

- a) For this biological component of the AEMP Design Plan it is more appropriate to be consistent with monitoring under the EEM Framework and evaluate data against critical effects sizes as opposed to normal ranges.
- b) Density and richness have been identified by EC (2012) as being primarily responsible for response patterns in benthic invertebrate communities.
- c) Represents a more consequential outcome than a single event which is more likely to be due to chance or a confounding factor.



AEMP = Aquatic effects monitoring program; ECCC = Environment and Climate Change Canada; CES = critical effect size; SD = standard deviations



Table 12-6 Benthic and Fish Tissue Action Levels and Responses for the Kwetı̄ᓂàà (Rayrock) Aquatic Effects Monitoring Program

Location	All receiving water bodies adjacent to the Rayrock Remediation Project (Sherman Lake, Alpha Lake, Lake A, Gamma Lake, Beta Lake, Kwetsòtia)	
Action Level Type	Tissue Burden	Action Level Response
Low	<p>1. An increase in any metal or radionuclide concentration in the benthic or fish tissue of greater than 10% above the 95th percentile of the pre-remediation baseline monitoring period for that water body. AND 2. Linked to the Kwetı̄ᓂàà (Rayrock) Remediation Project</p>	<p>Follow AEMP best practices:</p> <ul style="list-style-type: none"> - confirm Low Action Level was triggered (e.g., confirm reliability of sample and lab data) - review processes, procedures, and data to further evaluate cause/linkage to Site (e.g., WTP effluent, Sediment and Erosion Control Plan implementation and results), as appropriate - evaluate temporal trends in water and sediment quality parameters at monitoring locations <p>Report in Annual AEMP Report.</p> <p>Initiate follow-up desktop/field studies if required – examine linkages between concentration, toxicity, and biological responses.</p> <p>Increase monitoring frequency and expand the monitoring area to confirm findings.</p> <p>Increase sample numbers and tissue volumes for analysis.</p> <p>If the average concentrations remain 25% greater than baseline in the second sampling, an investigation into the cause of the change will be completed by a biologist.</p> <p>Additional action may be required based on the recommendations of the biologist.</p> <p>Refine Moderate and High Action Levels if warranted and scientifically defensible.</p>
Moderate	<p>1. An increase in any metal or radionuclide concentration in the benthic or fish tissue of greater than 20% above the 95th percentile of the pre-remediation baseline monitoring period.for that water body.</p>	<p>Follow AEMP best practices as outlined for Low Action Level</p> <p>Confirm Moderate Action Level (e.g., confirm reliability of data).</p>



	<p>AND 2. Linked to the Kwetı̄ᑭàà (Rayrock) Remediation Project</p>	<p>Develop Response Plan</p> <p>If Moderate Action Level confirmed, implement mitigation(s) to stop or slow trend as recommended in the approved Response Plan.</p> <p>Refine Moderate and High Action Levels if warranted and scientifically defensible.</p>
<p>High</p>	<p>1. An increase in any metal or radionuclide concentration in the benthic or fish tissue of greater than 40% above the 95th percentile of the pre-remediation baseline monitoring period for that water body. AND 2. Linked to the Kwetı̄ᑭàà (Rayrock) Remediation Project</p>	<p>Follow AEMP best practices as outlined for Low Action Level</p> <p>Confirm High Action Level. (e.g., confirm reliability of chemistry data).</p> <p>Notify Inspector and WLWB within 24 hours.</p> <p>Develop Response Plan</p> <p>Conduct special study to examine ecological or human health significance, causation, and/or linkage to Site.</p>

- a) All tissue quality results must be confirmed, meaning that the final analytical result or field measurement has been checked and validated (i.e., no transcription errors).
- b) Temporal trends to be evaluated visually.

AEMP = Aquatic effects monitoring program; WLWB = Wek'èezhii Land and Water Board

Table B-1: Rayrock Baseline Monitoring Location Details
 Rayrock AEMP Design Plan V 1.2
 Kwetjjaá (Rayrock) Remediation Project
 Public Services and Procurement Canada

Drainage Pathway/Component	Location/Station ID*	Northing	Easting	Site Description	SNP Station (Y/N)	Shoreline Survey		Water Level		Water Chemistry		Sediment Chemistry		Benthic Community		Benthic Tissue		Fish Community		Fish Tissue [†]	
							# of Sampling Events		# of Sampling Events		# of Sampling Events		# of Sampling Events		# of Sampling Events		# of Sampling Events		# of Sampling Events		# of Sampling Events
Sherman Lake	Sherman Lake B	7035596 N	522837 E	Potentially Impacted	Y	X	3	X	2	X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X		X	(1) 2022				
	Sherman Lake L	7035950 N	523320 E	Potentially Impacted	Y	X	3			X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022			X	(2) 2021, 2023	X	(2) 2021, 2023
	Sherman Lake K	7036101 N	523217 E	Potentially Impacted	Y	X	3			X	(3) 2017, 2021, 2022, 2023	X	(3) 2017, 2021, 2022, 2023	X		X	(2) 2021, 2022				
Surrounding Lakes	Alpha Lake	7035524 N	522561 E	Potentially Impacted	Y	X	3			X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(1) 2022				
	Beta Lake	7035430 N	522440 E	Potentially Impacted	Y	X	3	X	2	X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(1) 2022				
	Gamma Lake	7034745 N	522195 E	Potentially Impacted	Y	X	3	X	2	X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(1) 2022				
	Lake A	7034281 N	523544 E	Potentially Impacted	Y	X	3	X	2	X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(1) 2022				
	Lake B (Non SNP)	7032399 N	523038 E	Background Conditions	N					X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(2) 2021, 2022	X	(1) 2022				
	Kwetsq̄ta (Non SNP)	7036019 N	523044 E	Potentially Impacted	N					X	(3) 2021, 2022, 2023		(2) 2021, 2022	X	(2) 2021, 2022	X	(2) 2021, 2022				
Regional Background	New Control Lake	7038516 N	519063 E	Background Conditions	Y	X	3	X	2	X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(2) 2021, 2022	X			
	Alternate Reference Lake (Non SNP)	7036794 N	526373 E	Background Conditions	N					X	(3) 2021, 2022, 2023	X	(3) 2021, 2022, 2023	X	(2) 2021, 2022	X	(1) 2022	X	(2) 2021, 2023	X	(2) 2021, 2023
	Dlah Lake (Non SNP)	7033716 N	522362 E	Background Conditions	N					X	(2) 2022, 2023	X	(1) 2022	X	(1) 2022	X	(1) 2022				

Notes:

*All lake water sampling from Zone 11; Datum NAD 83

Baseline AEMP was conducted in 2021 and 2022 and 2023.

Table B-2: Water Quality Baseline Results and Action Levels (2021-2023; Metals - mg/L; Radionuclides - Bq/L)
Rayrock AEMP Design Plan V 1.2
Kwet'ijaà (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Mill Lake WTF EQC	Sherman Lake B (1663-1)							Sherman Lake L (1663-8)							Sherman Lake K (1663-10)						
			n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)
Routine Parameters																							
Hardness (CaCO3)	mg/L		10	0	50	45.50	55.00	60.00	70.00	10	0	53.65	46.70	59.02	64.38	75.11	10	0	49	45.27	53.90	58.80	68.60
Nitrate (N)	mg/L	13	10	8	0.0434	0.065	0.048	0.052	0.061	10	7	0.0365	0.0229	0.04015	0.04380	0.05110	10	9	0.011	0.012	0.012	0.013	0.015
Nitrate (NO3)	mg/L	13	10	8	0.192	0.29	0.211	0.230	0.269	10	7	0.158	0.0996	0.17380	0.18960	0.22120	10	9	0.049	0.054	0.054	0.059	0.069
Nitrite (NO2)	mg/L	0.197	10	10	-	0.033	0.036	0.040	0.046	10	10	-	0.033	0.036	0.040	0.046	10	10	-	0.03	0.04	0.04	0.05
Calculated Total Dissolved Solids	mg/L		10	0	59.55	55.0	65.51	71.46	83.37	10	0	65.3	56.6	71.83	78.36	91.42	10	0	64.5	55.91	70.95	77.40	90.30
Conductivity	µS/cm		10	0	110.0	107.0	121.0	132.0	154.0	10	0	110.0	108.0	121.0	132.0	154.0	10	0	110.0	108.2	121.0	132.0	154.0
pH	pH		10	0	7.55	6.90	8.30	9.06	10.57	10	0	7.285	6.85	8.01	8.74	10.20	10	0	7.855	6.96	8.64	9.43	11.00
						6.79	6.04	6.04	4.53					6.56	5.83	4.37				7.07	6.28	4.71	
Anions																							
Alkalinity (Total as CaCO3)	mg/L		10	0	63.95	52.40	70.35	76.74	89.53	10	0	68	53.10	74.80	81.60	95.20	10	0	67	53.82	73.70	80.40	93.80
Chloride (Cl)	mg/L		10	2	2.155	1.715	2.37	2.59	3.02	10	0	2.355	1.82	2.59	2.83	3.30	10	0	1.9	1.50	2.09	2.28	2.66
Sulphate (SO4)	mg/L		10	2	2.585	2.046	2.84	3.10	3.62	10	1	2.62	2.057	2.88200	3.14400	3.67	10	1	3.1	2.245	3.410	3.720	4.340
Dissolved Fluoride (F)	mg/L	0.12	6	0	0.18	0.17	0.20	0.22	0.25	6	0	0.218	0.18	0.24	0.26	0.31	6	0	0.188	0.17	0.21	0.23	0.26
Nutrients																							
Nitrite (N)	mg/L	0.197	10	10	-	0.010	0.011	0.012	0.014	10	10	-	0.010	0.011	0.012	0.014	10	10	-	0.010	0.011	0.012	0.014
Nitrate plus Nitrite (N)	mg/L		10	8	0.0434	0.065	0.048	0.052	0.061	10	7	0.0365	0.0229	0.04015	0.04380	0.05110	10	9	0.011	0.012	0.012	0.013	0.015
Total Ammonia (N)	mg/L	0.499	10	8	0.0346	0.049	0.038	0.042	0.048	10	8	0.030	0.03	0.03256	0.03552	0.04	10	9	0.022	0.027	0.024	0.026	0.031
Total Phosphorus	mg/L		10	1	0.0312	0.0203	0.034	0.037	0.044	10	0	0.0126	0.00913	0.014	0.015	0.018	10	0	0.0142	0.009	0.016	0.017	0.020
Misc. Inorganics																							
Dissolved Organic Carbon	mg/L		10	0	12.85	11.48	14.14	15.42	17.99	10	0	11.85	10.18	13.04	14.22	16.59	10	0	12.7	10.90	13.97	15.24	17.78
Total Organic Carbon	mg/L		10	0	10.55	9.33	11.61	12.66	14.77	10	0	9.855	9.00	10.84	11.83	13.80	10	0	11	9.55	12.10	13.20	15.40
Total Dissolved Solids	mg/L		10	0	98.3	71.0	108.13	117.96	137.62	10	0	84	68.80	92.40	100.80	117.60	10	0	99	76.55	108.90	118.80	138.60
Total Suspended Solids	mg/L	15	10	2	5.7	3.735	6.27	6.84	7.98	10	2	3.06	2.01	3.36	3.67	4.28	10	3	2.9	2.196	3.190	3.480	4.060
Dissolved Elements																							
Dissolved Calcium	mg/L		10	0	10.55	9.58	11.61	12.66	14.77	10	0	11.55	9.94	12.71	13.86	16.17	10	0	10.5	9.62	11.55	12.60	14.70
Dissolved Magnesium	mg/L		10	0	5.4	5.21	5.94	6.48	7.56	10	0	6.13	5.33	6.74	7.36	8.58	10	0	6.13	5.18	6.74	7.36	8.58
Dissolved Potassium	mg/L		10	0	1.655	1.50	1.82	1.99	2.32	10	0	1.9	1.62	2.09	2.28	2.66	10	0	1.7	1.54	1.87	2.04	2.38
Dissolved Sodium	mg/L		10	0	4.355	4.10	4.79	5.23	6.10	10	0	4.555	4.17	5.01	5.47	6.38	10	0	4.2	4.06	4.62	5.04	5.88
Total Metals																							
Total Aluminum	mg/L		10	0	0.279	0.08	0.31	0.33	0.39	10	0	0.112	0.04	0.12	0.13	0.16	10	0	0.165	0.07	0.18	0.20	0.23
Total Arsenic	mg/L		10	0	0.00066	0.0006	0.00073	0.00079	0.00093	10	0	0.0006055	0.0005	0.00067	0.00073	0.00085	10	0	0.000635	0.0006	0.00070	0.00076	0.00089
Total Barium	mg/L		10	7	0.0171	0.0124	0.019	0.021	0.024	10	8	0.012	0.012	0.013	0.014	0.017	10	0	0.012	0.01	0.013	0.014	0.017
Total Boron	mg/L		10	9	0.022	0.024	0.024	0.026	0.031	10	8	0.0287	0.029	0.032	0.034	0.040	10	10	0.03	0.03	0.04	0.04	0.04
Total Cadmium	µg/L		10	9	0.022	0.025	0.024	0.027	0.031	10	10	-	0.02	0.022	0.024	0.028	10	10	-	0.020	0.022	0.024	0.028
Total Calcium (Ca)	mg/L		10	0	11.55	10.12	12.71	13.86	16.17	10	0	11	9.93	12.10	13.20	15.40	10	0	10.5	9.93	11.55	12.60	14.70
Total Chromium	mg/L		10	6	0.00152	0.00125	0.0017	0.0018	0.0021	10	9	0.0013	0.0013	0.00143	0.00156	0.00182	10	9	0.00115	0.0013	0.0013	0.0014	0.0016
Total Cobalt	mg/L		10	10	-	0.00030	0.00033	0.00036	0.00042	10	10	-	0.00030	0.00033	0.00036	0.00042	10	10	-	0.00030	0.0003	0.0004	0.0004
Total Copper	mg/L	0.0028	10	0	0.0032	0.0025	0.0035	0.0039	0.0045	10	0	0.00234	0.0017	0.0026	0.0028	0.0033	10	0	0.00425	0.0021	0.0047	0.0051	0.0060
Total Iron	mg/L	0.3	10	0	0.40	0.15	0.43	0.47	0.55	10	5	0.2	0.12	0.22	0.24	0.28	10	5	0.21	0.138	0.231	0.252	0.294
Total Lead	mg/L		10	9	0.0010	0.0017	0.0011	0.0012	0.0014	10	10	-	0.00020	0.00022	0.00024	0.00028	10	10	0.00042	0.00064	0.00046	0.00050	0.00059
Total Magnesium	mg/L		10	0	6.13	5.45	6.74	7.36	8.58	10	0	5.965	5.40	6.56	7.16	8.35	10	0	5.9	5.40	6.49	7.08	8.26
Total Manganese	mg/L		10	0	0.044	0.02	0.049	0.053	0.062	10	0	0.0475	0.02	0.05	0.06	0.07	10	0	0.034	0.017	0.037	0.041	0.048
Total Mercury	µg/L		10	10	-	0.0019	0.0021	0.0023	0.0027	10	10	-	0.0019	0.0021	0.0023	0.0027	10	10	-	0.0019	0.0021	0.0023	0.0027
Total Molybdenum	mg/L		10	2	0.00034	0.00028	0.00038	0.00041	0.00048	10	4	6.35E-04	0.00038	0.00070	0.00076	0.00089	10	3	2.65E-04	0.00024	0.0003	0.0003	0.0004
Total Nickel	mg/L	0.025	10	2	0.0033	0.005	0.0037	0.0040	0.0047	10	4	1.25E-03	0.0009	0.0014	0.0015	0.0018	10	2	1.20E-03	0.00089	0.0013	0.0014	0.0017
Total Potassium	mg/L		10	0	1.855	1.59	2.04	2.23	2.60	10		1.8	1.59	1.98	2.16	2.52	10	0	1.7	1.61	1.87	2.04	2.38
Total Selenium	mg/L		10	9	0.00021	0.00021	0.00023	0.00025	0.00029	10	10	-	0.00020	0.00022	0.00024	0.00028	10	9	0.00021	0.00022	0.00023	0.00025	0.00029
Total Silver	mg/L		10	10	-	0.00010	0.00011	0.00012	0.00014	10	9	0.00011	0.00011	0.00012	0.00013	0.00015	10	10	-	0.00010	0.00011	0.00012	0.00014
Total Sodium	mg/L		10	0	4.6	4.18	5.06	5.52	6.44	10	0	4.5	4.13	4.95	5.40	6.30	10	0	4.4	4.15	4.84	5.28	6.16
Total Sulphur	mg/L		10	0	0.96	0.89	1.06	1.15	1.34	10	0	0.907	0.82	1.00	1.09	1.27	10	0	0.96	0.85	1.06	1.15	1.34
Total Thallium	mg/L		10	10	-	0.00020	0.00022	0.00024	0.00028	10	10	-	0.000200	0.00022	0.00024	0.00028	10	10	-	0.00020	0.0002	0.0002	0.0003
Total Uranium	mg/L	0.015	10	0	0.00093	0.0006	0.00102	0.00111	0.00130	10	0	0.0006175	0.00051	0.00068	0.00074	0.00086	10	10	0.000715	0.0005	0.0006	0.0007	0.0008
Total Vanadium	mg/L		10	9	0.00122	0.0014	0.00134	0.00146	0.00171	10	10	-	0.00100	0.00110	0.00120	0.00140	10	10	-	0.0010	0.0011	0.0012	0.0014
Total Zinc	mg/L	0.023	10	8	0.0037	0.0038	0.00404	0.00440	0.00514	10	9	0.017	0.017	0.0187	0.0204	0.0238	10	10	0.004	0.005	0.004	0.005	0.006
Radionuclides																							
Radium 226	Bq/l																						

Table B-2: Water Quality Baseline Results and Action Levels (2021-2023; Metals - mg/L; Radionuclides - Bq/L)

Rayrock AEMP Design Plan V 1.2
 Kwetijaa (Rayrock) Remediation Project
 Public Services and Procurement Canada

Parameter	Units	Mill Lake WTF EQC	Alpha Lake (1663-4)							Beta Lake (1663-3)							Gamma Lake (1663-2)						
			n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)
Routine Parameters																							
Hardness (CaCO3)	mg/L		12	0	71.15	52.58	78.27	85.38	99.61	12	0	76.5	63.8	84.1	91.7	107.0	11	0	42.0	39.8	46.2	50.4	58.8
Nitrate (N)	mg/L	13	12	10	0.018	0.018	0.020	0.022	0.025	12	12	-	0.010	0.011	0.012	0.014	11	8	0.037	0.023	0.04	0.04	0.05
Nitrate (NO3)	mg/L	13	12	10	0.079	0.08	0.087	0.095	0.110	12	12	-	0.044	0.048	0.053	0.062	11	8	0.16	0.100	0.18	0.19	0.22
Nitrite (NO2)	mg/L	0.197	12	12	-	0.033	0.04	0.04	0.05	12	12	-	0.033	0.036	0.040	0.046	11	11	-	0.03	0.03630	0.03960	0.04620
Calculated Total Dissolved Solids	mg/L		12	0	81.8	62.50	89.98	98.16	114.52	12	0	83.8	68.6	92.2	100.6	117.3	11	0	68.5	53.5	75.4	82.2	95.9
Conductivity	uS/cm		12	0	140	116.7	154.0	168.0	196.0	12	0	150.0	127.6	165.0	180.0	210.0	11	0	99.5	93.1	109.5	119.4	139.3
pH	pH		12	0	7.632	6.91	8.40	9.16	10.68	12	0	7.235	6.93	7.96	8.68	10.13	11	0	7.05	6.77	7.75	8.45	9.86
Anions																							
Alkalinity (Total as CaCO3)	mg/L		12	0	75.8	58.42	83.38	90.96	106.12	12	0	75.6	58.7	83.2	90.7	105.8	11	0	47.0	40.4	51.7	56.4	65.8
Chloride (Cl)	mg/L		12	1	2.37	1.961	2.61	2.84	3.32	12	5	2.0	1.6	2.2	2.4	2.8	11	0	8.4	3.8	9.2	10.0	11.7
Sulphate (SO4)	mg/L		12	2	5.515	3.625	6.07	6.62	7.72	12	2	8.0	6.6	8.8	9.6	11.2	11	5	19.5	9.7	21.5	23.4	27.3
Dissolved Fluoride (F)	mg/L	0.12	7	0	0.217	0.19	0.24	0.26	0.30	6	0	0.20	0.16	0.22	0.24	0.28	7	0	0.17	0.15	0.19	0.20	0.24
Nutrients																							
Nitrite (N)	mg/L	0.197	12	12	-	0.010	0.011	0.012	0.014	12	12	-	0.010	0.011	0.012	0.014	11	11	-	0.010	0.01100	0.01200	0.01400
Nitrate plus Nitrite (N)	mg/L		12	10	0.018	0.018	0.020	0.022	0.025	12	12	-	0.010	0.011	0.012	0.014	11	8	0.037	0.0227	0.040	0.044	0.051
Total Ammonia (N)	mg/L	0.499	12	9	0.125	0.06	0.14	0.15	0.18	12	5	0.053	0.033	0.06	0.06	0.07	11	8	0.12	0.0692	0.14	0.15	0.17
Total Phosphorus	mg/L		12	0	0.022	0.013	0.024	0.026	0.031	12	0	0.089	0.044	0.10	0.11	0.12	11	0	0.041	0.029	0.045	0.049	0.058
Misc. Inorganics																							
Dissolved Organic Carbon	mg/L		12	0	11.8	10.60	12.98	14.16	16.52	12	0	34.2	26.8	37.6	41.0	47.9	11	0	30.6	23.2	33.7	36.7	42.8
Total Organic Carbon	mg/L		12	0	13	10.39	14.30	15.60	18.20	12	0	32.0	23.3	35.2	38.4	44.8	11	0	27.0	19.0	29.7	32.4	37.8
Total Dissolved Solids	mg/L		12	1	93.8	83.42	103.18	112.56	131.32	12	0	269.0	139.7	295.9	322.8	376.6	11	0	116.0	80.7	127.6	139.2	162.4
Total Suspended Solids	mg/L	15	12	3	4.02	3.10	4.42	4.82	5.63	12	0	22.9	7.4	25.2	27.5	32.1	11	1	3.6	2.6	3.9	4.3	5.0
Dissolved Elements																							
Dissolved Calcium	mg/L		12	0	17.45	11.62	19.20	20.94	24.43	12	0	16.9	14.1	18.6	20.3	23.7	11	0	8.1	7.7	8.9	9.7	11.3
Dissolved Magnesium	mg/L		12	0	6.505	5.60	7.16	7.81	9.11	12	0	8.3	6.9	9.2	10.0	11.7	11	0	5.4	5.0	5.9	6.4	7.5
Dissolved Potassium	mg/L		12	1	1.78	1.51	1.96	2.14	2.49	12	0	1.6	1.19	1.7	1.9	2.2	11	0	2.0	1.7	2.2	2.4	2.8
Dissolved Sodium	mg/L		12	0	5.045	4.39	5.55	6.05	7.06	12	0	5.6	4.5	6.2	6.7	7.9	11	0	5.5	4.7	6.0	6.5	7.6
Total Metals																							
Total Aluminum	mg/L		12	0	0.39	0.12	0.43	0.47	0.54	12	0	11.3	2.7	12.4	13.6	15.8	11	0	0.51	0.18	0.56	0.61	0.71
Total Arsenic	mg/L		12	0	0.00071	0.00063	0.00078	0.00086	0.00100	12	0	0.00227	0.0015	0.0025	0.0027	0.0032	11	0	0.00125	0.0010	0.0014	0.0015	0.0018
Total Barium	mg/L		12	5	0.018	0.0144	0.020	0.021	0.025	12	0	0.15	0.05	0.17	0.18	0.21	11	0	0.022	0.018	0.024	0.026	0.031
Total Boron	mg/L		12	11	0.024	0.029	0.027	0.029	0.034	12	12	-	0.02	0.022	0.024	0.028	11	11	-	0.020	0.022	0.024	0.028
Total Cadmium	ug/L		12	0	0.0236	0.028	0.026	0.028	0.033	12	8	0.046	0.033	0.050	0.055	0.064	11	10	0.029	0.037	0.03	0.03	0.04
Total Calcium (Ca)	mg/L		12	0	16	11.75	17.60	19.20	22.40	12	0	17.45	14.67	19.20	20.94	24.43	11	0	8.65	7.76	9.52	10.38	12.11
Total Chromium	mg/L		12	9	0.0017	0.0013	0.0019	0.0020	0.0024	12	1	0.021	0.009	0.023	0.026	0.030	11	6	0.0016	0.00131	0.0017	0.0019	0.0022
Total Cobalt	mg/L		12	12	-	0.00030	0.00033	0.00036	0.00042	12	0	0.004	0.0015	0.0048	0.0052	0.0061	11	11	-	0.00030	0.00033	0.00036	0.00042
Total Copper	mg/L	0.0028	12	0	0.0088	0.0068	0.0097	0.0105	0.0123	12	0	0.071	0.0221	0.078	0.085	0.099	11	0	0.028	0.019	0.031	0.034	0.039
Total Iron	mg/L	0.3	12	0	0.563	0.2783	0.62	0.68	0.79	12	0	10	3.0433	11.00	12.00	14.00	11	0	3.2	2.4	3.5	3.8	4.5
Total Lead	mg/L		12	5	0.00051	0.00038	0.00056	0.00061	0.00071	12	0	0.0054	0.0015	0.0059	0.0064	0.0075	11	0	0.0026	0.0015	0.0028	0.0031	0.0036
Total Magnesium	mg/L		12	0	6.65	5.8000	7.31	7.97	9.30	12	0	9.57	8.03	10.53	11.48	13.40	11	0	5.45	5.03	6.00	6.54	7.63
Total Manganese	mg/L		12	1	0.027	0.0156	0.0297	0.0324	0.0378	12	0	0.12	0.05	0.13	0.14	0.17	11	0	0.043	0.0306	0.047	0.052	0.060
Total Mercury	ug/L		12	11	0.0019	0.0019	0.0021	0.0023	0.0027	12	7	0.010	0.006	0.0112	0.0122	0.0143	11	7	0.0045	0.0032	0.0050	0.0054	0.0063
Total Molybdenum	mg/L		12	0	0.00063	0.0004	0.00070	0.00076	0.00089	12	0	0.00094	0.0007	0.0010	0.0011	0.0013	11	2	0.00043	0.00035	0.00047	0.00052	0.00060
Total Nickel	mg/L	0.025	12	1	0.00238	0.00139	0.0026	0.0029	0.0033	12	0	0.0144	0.0045	0.016	0.017	0.020	11	1	0.0017	0.00131	0.0019	0.0020	0.0024
Total Potassium	mg/L		12	0	1.85	1.50	2.03	2.21	2.58	12	0	5.605	2.23	6.17	6.73	7.85	11	0	2.05	1.71	2.26	2.46	2.87
Total Selenium	mg/L		12	1	0.00045	0.00035	0.00049	0.00053	0.00062	12	0	0.0036	0.0019	0.0039	0.0043	0.0050	11	0	0.00070	0.00058	0.0008	0.0008	0.0010
Total Silver	mg/L		12	11	0.0001	0.00010	0.00011	0.00012	0.00014	12	12	-	0.00010	0.00011	0.00012	0.00014	11	11	-	0.0001	0.00011	0.00012	0.00014
Total Sodium	mg/L		12	0	5.0	4.4	5.5	6.0	7.0	12	0	6.395	5.17	7.03	7.67	8.95	11	0	5.2	4.7	5.7	6.2	7.3
Total Sulphur	mg/L		12	0	1.8	1.27	1.98	2.16	2.52	12	0	4.015	3.03	4.42	4.82	5.62	11	0	2.2	1.4	2.4	2.6	3.0
Total Thallium	mg/L		12	12	-	0.00020	0.00022	0.00024	0.00028	12	12	-	0.00020	0.00022	0.00024	0.00028	11	11	-	0.00020	0.00022	0.00024	0.00028
Total Uranium	mg/L	0.015	12	0	0.0042	0.0023	0.0046	0.0050	0.0058	12	0	0.0185	0.008	0.0204	0.0222	0.0259	11	0	0.0041	0.0035	0.0045	0.0049	0.0057
Total Vanadium	mg/L		12	11	0.0014	0.0013	0.0015	0.0017	0.0020	12	2	0.0178	0.00801	0.020	0.021	0.025	11	10	0.00115	0.0013	0.0013	0.0014	0.0016
Total Zinc	mg/L	0.023	12	10	0.0044	0.0059	0.0048	0.0052	0.0061	12	7	0.071	0.0256	0.0781	0.0852	0.0994	11	11	-	0.0030	0.00330	0.00360	0.00420
Radionuclides																							
Radium 226	Bq/l	-	12	0	0.14	0.09	0.15	0.17	0.20	12	1	0.354	0.236	0.39	0.42	0.50	11	0	0.835	0.60	0.92	1.00	1.17
Lead-210	Bq/l	-	12	12	-	0.10	0.11	0.12	0.14	12	5	0.208	0.166	0.23	0.25	0.29	11						

Table B-2: Water Quality Baseline Results and Action Levels (2021-2023; Metals - mg/L; Radionuclides - Bq/L)

Rayrock AEMP Design Plan V 1.2
 Kwetijaà (Rayrock) Remediation Project
 Public Services and Procurement Canada

Parameter	Units	Mill Lake WTF EQC	Lake A (1663-6)							Lake B (Non SNP)							Kwetsotia (Non SNP)							
			n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	
Routine Parameters																								
Hardness (CaCO3)	mg/L		14	0	54.0	46.5	59.4	64.8	75.6	7	0	47.4	43.3	52.1	56.9	66.4	10	0	47.8	42.4	52.5	57.3	66.9	
Nitrate (N)	mg/L	13	14	11	0.06	0.03	0.07	0.08	0.09	7	7	-	0.010	0.0110	0.0120	0.0140	10	10	-	0.010	0.0110	0.0120	0.0140	
Nitrate (NO3)	mg/L	13	14	11	0.28	0.14	0.30	0.33	0.39	7	7	-	0.044	0.0484	0.0528	0.0616	10	10	-	0.044	0.0484	0.0528	0.0616	
Nitrite (NO2)	mg/L	0.197	14	14	-	0.033	0.036	0.040	0.046	7	5	0.25	0.33	0.27	0.30	0.34	10	10	-	0.033	0.0363	0.0396	0.0462	
Calculated Total Dissolved Solids	mg/L		14	0	61.4	54.2	67.5	73.6	85.9	7	0	54.1	50.0	59.5	64.9	75.7	10	0	51.1	46.4	56.2	61.3	71.5	
Conductivity	uS/cm		14	0	110.0	104.2	121.0	132.0	154.0	7	0	107.0	100.1	117.7	128.4	149.8	10	0	95.6	89.2	105.1	114.7	133.8	
pH	pH		14	0	7.218	6.87	7.94	8.66	10.11	7	0	7.61	7.03	8.38	9.14	10.66	10	0	6.97	6.69	7.66	8.36	9.76	
Anions																								
Alkalinity (Total as CaCO3)	mg/L		14	0	60.1	51.4	66.1	72.1	84.1	7	0	50.9	45.6	56.0	61.1	71.3	10	0	50.1	40.5	55.1	60.1	70.1	
Chloride	mg/L		14	2	2.2	1.8	2.4	2.6	3.1	7	0	3.1	2.2	3.4	3.7	4.4	10	7	1.6	1.4	1.8	1.9	2.3	
Sulphate	mg/L		14	7	1.8	1.4	2.0	2.2	2.5	7	7	-	1.00	1.10	1.20	1.40	10	4	10.5	6.1	11.5	12.6	14.7	
Dissolved Fluoride	mg/L	0.12	7	0	0.19	0.17	0.21	0.22	0.26	3	0	0.19	0.17	0.21	0.22	0.26	6	0	0.14	0.12	0.15	0.17	0.20	
Nutrients																								
Nitrite (N)	mg/L	0.197	14	14	-	0.010	0.0110	0.0120	0.0140	7	5	0.075	0.10	0.082	0.089	0.104	10	10	-	0.0100	0.0110	0.0120	0.0140	
Nitrate plus Nitrite (N)	mg/L		14	11	0.063	0.032	0.070	0.076	0.088	7	5	0.08	0.11	0.089	0.097	0.113	10	10	-	0.0100	0.0110	0.0120	0.0140	
Total Ammonia (N)	mg/L	0.499	14	13	0.048	0.110	0.053	0.058	0.068	7	7	-	0.015	0.0165	0.0180	0.0210	10	4	0.040	0.029	0.044	0.048	0.056	
Total Phosphorus	mg/L		14	0	0.033	0.021	0.037	0.040	0.047	7	0	0.041	0.028	0.045	0.050	0.058	10	2	0.040	0.029	0.044	0.048	0.056	
Misc. Inorganics																								
Dissolved Organic Carbon	mg/L		14	0	12.0	10.8	13.2	14.4	16.8	1	0	14.7	14.0	16.2	17.6	20.6	10	0	30.6	24.0	33.6	36.7	42.8	
Total Organic Carbon	mg/L		14	0	12.0	10.8	13.2	14.4	16.8	7	0	14.0	12.6	15.4	16.8	19.6	10	0	26.8	20.6	29.4	32.1	37.5	
Total Dissolved Solids	mg/L		14	0	88.0	70.9	96.8	105.6	123.2	7	0	84.0	72.6	92.4	100.8	117.6	10	0	84.0	71.6	92.4	100.8	117.6	
Total Suspended Solids	mg/L	15	14	0	7.3	4.2	8.0	8.7	10.2	7	0	4.7	4.0	5.2	5.6	6.6	10	2	13.2	7.6	14.5	15.8	18.4	
Dissolved Elements																								
Dissolved Calcium	mg/L		14	0	10.7	9.6	11.8	12.8	15.0	7	0	9.55	8.39	10.505	11.460	13.370	10	0	11.6	10.2	12.7	13.9	16.2	
Dissolved Magnesium	mg/L		14	0	6.4	5.5	7.0	7.6	8.9	7	0	5.67	5.43	6.237	6.804	7.938	10	0	4.7	4.1	5.2	5.7	6.6	
Dissolved Potassium	mg/L		14	0	1.9	1.7	2.1	2.3	2.7	7	0	1.74	1.43	1.914	2.088	2.436	10	0	1.0	0.8	1.1	1.2	1.4	
Dissolved Sodium	mg/L		14	0	5.1	4.3	5.6	6.1	7.2	7	0	5.59	4.99	6.149	6.708	7.826	10	0	3.6	2.8	3.9	4.3	5.0	
Total Metals																								
Total Aluminum	mg/L		14	0	0.16	0.07	0.17	0.19	0.22	7	0	0.65	0.21	0.715	0.780	0.910	10	0	1.54	0.44	1.70	1.85	2.16	
Total Arsenic	mg/L		14	0	0.00071	0.00058	0.00078	0.00086	0.00100	7	0	0.00101	0.0007	0.0011	0.0012	0.0014	10	0	0.0007	0.0005	0.00077	0.00084	0.00098	
Total Barium	mg/L		14	0	0.017	0.013	0.019	0.020	0.024	7	0	0.0211	0.02	0.023	0.025	0.030	10	1	0.037	0.025	0.041	0.045	0.052	
Total Boron	mg/L		14	0	0.023	0.023	0.025	0.028	0.032	7	7	-	0.020	0.0220	0.0240	0.0280	10	8	0.060	0.084	0.066	0.072	0.084	
Total Cadmium	ug/L		14	14	-	0.020	0.0220	0.0240	0.0280	7	7	-	0.020	0.0220	0.0240	0.0280	10	10	-	0.020	0.022	0.024	0.028	
Total Calcium (Ca)	mg/L		14	0	10.0	9.6	11.0	12.0	14.0	7	0	9.33	8.40	10.263	11.196	13.062	10	0	11.55	10.40	12.71	13.86	16.17	
Total Chromium	mg/L		14	12	0.0012	0.0013	0.0013	0.0014	0.0016	7	6	0.00135	0.0015	0.0015	0.0016	0.0019	10	4	0.0035	0.0023	0.0038	0.0042	0.0049	
Total Cobalt	mg/L		14	14	-	0.00030	0.00033	0.00036	0.00042	7	6	0.000307	0.00031	0.0003	0.0004	0.0004	10	6	0.0007	0.00053	0.00081	0.00088	0.00103	
Total Copper	mg/L	0.0028	14	0	0.0030	0.0020	0.0033	0.0036	0.0042	7	2	0.002	0.002	0.0021	0.0023	0.0027	10	2	0.0059	0.0033	0.0065	0.0071	0.0083	
Total Iron	mg/L	0.3	14	0	0.30	0.19	0.33	0.36	0.42	7	0	0.75	0.37	0.825	0.900	1.050	10	0	2.16	0.96	2.37	2.59	3.02	
Total Lead	mg/L		14	14	-	0.00020	0.00022	0.00024	0.00028	7	6	0.000242	0.00026	0.0003	0.0003	0.0003	10	7	0.0006	0.00038	0.00062	0.00067	0.00078	
Total Magnesium	mg/L		14	0	5.84	5.51	6.42	7.01	8.18	7	0	5.97	5.66	6.567	7.164	8.358	10	0	4.91	4.35	5.40	5.89	6.87	
Total Manganese	mg/L		14	0	0.036	0.02	0.039	0.043	0.050	7	0	0.0347	0.03	0.0382	0.0416	0.0486	10	0	0.081	0.04	0.09	0.10	0.11	
Total Mercury	ug/L		14	13	0.0019	0.0020	0.0021	0.0023	0.0027	7	5	0.0023	0.0024	0.0025	0.0028	0.0032	10	1	0.0067	0.0045	0.0074	0.0081	0.0094	
Total Molybdenum	mg/L		14	2	0.0004	0.0003	0.0004	0.0004	0.0005	7	4	0.00025	0.00023	0.00027	0.00030	0.00035	10	7	0.0012	0.0007	0.0013	0.0014	0.0016	
Total Nickel	mg/L	0.025	14	3	0.0012	0.0009	0.0013	0.0015	0.0017	7	1	0.00172	0.00136	0.0019	0.0021	0.0024	10	2	0.00352	0.00205	0.0039	0.0042	0.0049	
Total Potassium	mg/L		14	0	1.9	1.74	2.09	2.28	2.66	7	0	1.94	1.50	2.134	2.328	2.716	10	0	1.1	0.9	1.2	1.3	1.5	
Total Selenium	mg/L		14	14	-	0.00020	0.00022	0.00024	0.00028	7	5	0.000227	0.00023	0.00025	0.00027	0.00032	10	10	-	0.0002	0.0002	0.0002	0.0003	
Total Silver	mg/L		14	14	-	0.00010	0.00011	0.00012	0.00014	7	7	-	0.000100	0.00011	0.00012	0.00014	10	10	-	0.00010	0.00011	0.00012	0.00014	
Total Sodium	mg/L		14	0	4.9	4.4	5.4	5.9	6.9	7	0	5.31	4.86	5.841	6.372	7.434	10	0	3.2	2.8	3.5	3.8	4.5	
Total Sulphur	mg/L		14	0	0.9	0.8	1.0	1.1	1.3	7	0	0.775	0.71	0.853	0.930	1.085	10	0	3.5	2.0	3.9	4.2	4.9	
Total Thallium	mg/L		14	14	-	0.00020	0.00022	0.00024	0.00028	7	7	-	0.000200	0.00022	0.00024	0.00028	10	10	-	0.0002	0.00022	0.00024	0.00028	
Total Uranium	mg/L	0.015	14	0	0.00040	0.00034	0.00044	0.00048	0.00056	7	2	0.00020	0.00017	0.00022	0.00024	0.00028	10	0	0.010	0.004	0.011	0.012	0.014	
Total Vanadium	mg/L		14	14	-	0.0010	0.0011	0.0012	0.0014	7	5	0.0014	0.0014	0.0015	0.0017	0.0020	10	5	0.0028	0.0020	0.0031	0.0034	0.0040	
Total Zinc	mg/L	0.023	14	14	-	0.0030	0.0033	0.0036	0.0042	7	6	0.00741	0.0093	0.0082	0.0089	0.0104	10	4	0.0226	0.013	0.025	0.027	0.032	
Radionuclides																								
Radium 226	Bq/l	-	14	13	0.010	0.010	0.011	0.012	0.014	7	7	-	0.01	0.011	0.012	0.014	10	9	0.011	0.011	0.012	0.013	0.015	
Lead-210	Bq/l	-	14	14	-	0.10	0.11	0.12	0.14	7	7	-	0.10	0.11	0.12	0.14	10	10	-	0.10	0.11	0.12	0.14	
Uranium-238																								

Table B-2: Water Quality Baseline Results and Action Levels (2021-2023; Metals - mg/L; Radionuclides - Bq/L)
 Rayrock AEMP Design Plan V 1.2
 Kwetijaa (Rayrock) Remediation Project
 Public Services and Procurement Canada

Parameter	Units	Mill Lake WTF EQC	Alternative Reference Lake (Non SNP)							New Control Lake (1663-9)							Diah Lake (Non SNP)						
			n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	95th Percentile	Average	Low (+10%)	Medium (+20%)	High (+40%)
Routine Parameters																							
Hardness (CaCO3)	mg/L		9	0	32.6	30.4	35.9	39.1	45.6	9	0	62.6	59.7	68.9	75.1	87.6	3	0	38.8	36.7	42.7	46.6	54.3
Nitrate (N)	mg/L	13	9	8	0.012	0.014	0.01	0.01	0.02	9	9	-	0.010	0.011	0.012	0.014	3	3	-	0.010	0.011	0.012	0.014
Nitrate (NO3)	mg/L	13	9	8	0.054	0.061	0.06	0.07	0.08	9	9	-	0.044	0.048	0.053	0.062	3	3	-	0.0440	0.0484	0.0528	0.0616
Nitrite (NO2)	mg/L	0.197	9	9	-	0.0330	0.036	0.040	0.046	9	9	-	0.033	0.036	0.040	0.046	3	2	0.04	0.040	0.043	0.047	0.055
Calculated Total Dissolved Solids	mg/L		9	0	39.8	35.4	43.8	47.8	55.7	9	0	77.8	69.8	85.6	93.4	108.9	3	0	48.5	45.3	53.4	58.2	67.9
Conductivity	uS/cm		9	0	73.6	69.7	81.0	88.3	103.0	9	0	136.0	126.7	149.6	163.2	190.4	3	0	87.8	86.3	96.6	105.4	122.9
pH	pH		9	0	7.42	6.77	8.16	8.90	10.39	9	0	7.452	7.07	8.20	8.94	10.43	3	0	7.095	6.88	7.80	8.51	9.93
							6.68	5.94	4.45					6.71	5.96	4.47				6.39	5.68	4.26	
Anions																							
Alkalinity (Total as CaCO3)	mg/L		9	0	39.6	34.4	43.6	47.5	55.4	9	0	75.8	66.2	83.4	91.0	106.1	3	0	47.6	45.0	52.4	57.1	66.6
Chloride	mg/L		9	7	1.6	1.6	1.7	1.9	2.2	9	2	9.3	5.5	10.2	11.1	13.0	3	3	-	1.0	1.1	1.2	1.4
Sulphate	mg/L		9	8	1.6	2.0	1.8	1.9	2.2	9	5	2.1	1.7	2.3	2.5	2.9	3	3	-	1.0	1.1	1.2	1.4
Dissolved Fluoride	mg/L	0.12	5	0	0.0884	0.08	0.10	0.11	0.12	5	0	0.11	0.09	0.12	0.13	0.15	2	0	0.13	0.13	0.14	0.16	0.18
Nutrients																							
Nitrite (N)	mg/L	0.197	9	9	-	0.0100	0.011	0.012	0.014	9	9	-	0.010	0.0110	0.0120	0.0140	3	2	0.012	0.012	0.013	0.014	0.017
Nitrate plus Nitrite (N)	mg/L		9	8	0.012	0.014	0.014	0.015	0.017	9	9	-	0.010	0.0110	0.0120	0.0140	3	2	0.019	0.020	0.021	0.023	0.027
Total Ammonia (N)	mg/L	0.499	9	8	0.120	0.190	0.132	0.144	0.168	9	6	0.027	0.021	0.030	0.032	0.038	3	2	0.016	0.016	0.017	0.019	0.022
Total Phosphorus	mg/L		9	0	0.014	0.009	0.016	0.017	0.020	9	0	0.028	0.015	0.031	0.033	0.039	3	0	0.015	0.011	0.017	0.018	0.021
Misc Organics																							
Dissolved Organic Carbon	mg/L		9	0	11.8	10.4	13.0	14.1	16.5	9	0	14.8	13.0	16.3	17.8	20.7	0	0	-	-	-	-	-
Total Organic Carbon	mg/L		9	0	10.6	9.5	11.7	12.7	14.8	9	0	665.2	132.3	731.7	798.2	931.3	3	0	16.8	15.3	18.5	20.2	23.5
Total Dissolved Solids	mg/L		9	0	80.8	53.3	88.9	97.0	113.1	9	0	106.0	90.0	116.6	127.2	148.4	3	0	78.8	62.7	86.7	94.6	110.3
Total Suspended Solids	mg/L	15	9	2	3.4	2.4	3.8	4.1	4.8	9	3	8.9	5.4	9.7	10.6	12.4	3	1	2.5	2.6	2.7	3.0	3.5
Dissolved Elements																							
Dissolved Calcium	mg/L		9	0	6.8	6.3	7.4	8.1	9.5	9	0	18.6	17.4	20.5	22.3	26.0	3	0	7.3	6.4	8.0	8.7	10.2
Dissolved Magnesium	mg/L		9	0	3.9	3.6	4.3	4.7	5.4	9	0	4.2	3.9	4.6	5.0	5.8	3	0	5.1	5.0	5.6	6.1	7.1
Dissolved Potassium	mg/L		9	0	1.7	1.6	1.9	2.0	2.4	9	0	1.2	1.0	1.3	1.5	1.7	3	0	2.3	2.0	2.5	2.7	3.2
Dissolved Sodium	mg/L		9	0	2.8	2.6	3.1	3.4	3.9	9	0	4.2	3.9	4.6	5.0	5.9	3	0	4.8	4.5	5.3	5.7	6.7
Total Metals																							
Total Aluminum	mg/L		9	0	0.071	0.03	0.078	0.085	0.099	9	0	0.1	0.04	0.11	0.12	0.14	3	0	0.16	0.10	0.18	0.19	0.22
Total Arsenic	mg/L		9	0	0.00057	0.0005	0.0006	0.0007	0.0008	9	0	0.0015	0.0013	0.0017	0.0018	0.0021	3	0	0.00071	0.00061	0.00078	0.00085	0.00099
Total Barium	mg/L		9	0	0.011	0.01	0.012	0.013	0.015	9	2	0.013	0.012	0.014	0.015	0.018	3	0	0.012	0.012	0.013	0.014	0.017
Total Boron	mg/L		9	0	-	0.020	0.022	0.024	0.028	9	0	0.073	0.061	0.081	0.088	0.102	3	3	-	0.02	0.0220	0.0240	0.0280
Total Cadmium	ug/L		9	0	-	0.020	0.022	0.024	0.028	9	9	-	0.02000	0.0220	0.0240	0.0280	3	0	0.021	0.02	0.023	0.025	0.029
Total Calcium (Ca)	mg/L		9	0	6.7	6.3	7.4	8.0	9.4	9	0	18.6	17.44	20.46	22.32	26.04	3		6.86	6.47	7.55	8.23	9.60
Total Chromium	mg/L		9	0	-	0.0010	0.0011	0.0012	0.0014	9	9	-	0.00100	0.0011	0.0012	0.0014	3	3	-	0.001	0.0011	0.0012	0.0014
Total Cobalt	mg/L		9	0	-	0.0003	0.00033	0.00036	0.00042	9	9	-	0.00030	0.00033	0.00036	0.00042	3	3	-	0.00030	0.0003	0.0004	0.0004
Total Copper	mg/L	0.0028	9	6	0.0013	0.0015	0.0014	0.0016	0.0018	9	3	0.0016	0.0013	0.0017	0.0019	0.0022	3	3	-	0.001	0.0011	0.0012	0.0014
Total Iron	mg/L	0.3	9	1	0.19	0.15	0.21	0.23	0.27	9	0	0.22	0.14	0.24	0.26	0.30	3	0	0.32	0.27	0.36	0.39	0.45
Total Lead	mg/L		9	0	-	0.0002	0.00022	0.00024	0.00028	9	9	-	0.0002	0.0002	0.0002	0.0003	3	3	-	0.0002	0.0002	0.0002	0.0003
Total Magnesium	mg/L		9	0	3.76	3.51	4.14	4.51	5.26	9	0	4.36	3.99	4.80	5.23	6.10	3	0	5.59	5.47	6.15	6.71	7.83
Total Manganese	mg/L		9	0	0.053	0.038	0.059	0.064	0.074	9	0	0.028	0.018	0.0310	0.0338	0.0395	3	0	0.012	0.010	0.0132	0.0144	0.0168
Total Mercury	ug/L		9	0	-	0.0019	0.0021	0.0023	0.0027	9	5	0.0028	0.0024	0.0031	0.0034	0.0040	3	0	0.0025	0.0025	0.0028	0.0030	0.0035
Total Molybdenum	mg/L		9	7	0.0009	0.0013	0.00095	0.00103	0.00120	9	2	0.00044	0.00035	0.00048	0.00052	0.00061	3	3	-	0.0002	0.00022	0.00024	0.00028
Total Nickel	mg/L	0.025	9	6	0.0007	0.0006	0.00074	0.00081	0.00095	9	7	0.00054	0.00052	0.00059	0.00064	0.00075	3	0	0.0017	0.0012	0.0019	0.0021	0.0024
Total Potassium	mg/L		9	0	1.6	1.5	1.8	1.9	2.2	9	0	1.2	1.0	1.3	1.4	1.6	3	0	2.3	2.1	2.5	2.7	3.2
Total Selenium	mg/L		9	0	-	0.00020	0.00022	0.00024	0.00028	9	9	-	0.00020	0.00022	0.00024	0.00028	3	3	-	0.00020	0.00022	0.00024	0.00028
Total Silver	mg/L		9	0	-	0.00010	0.00011	0.00012	0.00014	9	9	-	0.00010	0.00011	0.00012	0.00014	3	3	-	0.00010	0.00011	0.00012	0.00014
Total Sodium	mg/L		9	0	2.7	2.5	3.0	3.2	3.8	9	0	4.3	3.9	4.8	5.2	6.0	3	0	4.6	4.3	5.0	5.5	6.4
Total Sulphur	mg/L		9	0	0.33	0.27	0.36	0.39	0.46	9	0	1.2	1.0	1.3	1.4	1.6	3	3	-	0.20	0.2200	0.2400	0.2800
Total Thallium	mg/L		9	0	-	0.00020	0.00022	0.00024	0.00028	9	9	-	0.00020	0.00022	0.00024	0.00028	3	3	-	0.00020	0.0002	0.0002	0.0003
Total Uranium	mg/L	0.015	9	0	-	0.00010	0.00011	0.00012	0.00014	9	0	0.00050	0.00041	0.00055	0.00060	0.00070	3	2	0.00011	0.00011	0.00012	0.00013	0.00015
Total Vanadium	mg/L		9	0	-	0.0010	0.0011	0.0012	0.0014	9	8	0.0011	0.0011	0.001	0.001	0.001	3	3	-	0.0010	0.0011	0.0012	0.0014
Total Zinc	mg/L	0.023	9	7	0.0050	0.0062	0.0055	0.0060	0.0071	9	7	0.051	0.034	0.056	0.061	0.071	3	2	0.014	0.0150	0.015	0.017	0.019
Radionuclides																							
Radium 226	Bq/l	-	9	0	-	0.010	0.011	0.012	0.014	9	9	-	0.010	0.011	0.012	0.014	3	3	-	0.010	0.011	0.012	0.014
Lead-210	Bq/l	-	9	0	-	0.10	0.11	0.12	0.14	9	9	-	0.10	0.11	0.12	0.14	3	3	-	0.10	0.11	0.12	0.14
Uranium-238	Bq/l	-	9	0	0.035	0.035	0.039	0.042	0.049	9	7	0.020	0.016	0.022	0.024	0.027	3	1	0.				

Table B-3: Sediment Quality Baseline Results and Action Levels (2021 - 2023; Metals - mg/kg; Radionuclides - Bq/g)
Rayrock AEMP Design Plan V 1.2
Kwetiq̄aà (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Sherman Lake B							Sherman Lake L							Sherman Lake K						
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Antimony	mg/kg	7	7	0.50	N/A	0.55	0.60	0.70	7	7	0.50	N/A	0.55	0.60	0.70	7	7	0.50	N/A	0.55	0.60	0.70
Arsenic	mg/kg	7	0	6.34	7.95	8.75	9.54	11.13	7	0	7.46	9.49	10.44	11.39	13.29	7	0	5.36	5.84	6.42	7.01	8.18
Barium	mg/kg	7	0	211.4	237.0	260.7	284.4	331.8	7	0	242.9	267.0	293.7	320.4	373.8	7	0	200.0	234.0	257.4	280.8	327.6
Beryllium	mg/kg	7	0	1.02	1.20	1.32	1.44	1.68	7	0	0.99	1.1	1.210	1.320	1.540	7	1	0.88	0.93	1.02	1.11	1.30
Cadmium	mg/kg	7	0	0.16	0.18	0.20	0.22	0.25	7	0	0.19	0.24	0.259	0.282	0.329	7	1	0.214	0.241	0.27	0.29	0.34
Chromium	mg/kg	7	0	68.29	76.70	84.4	92.0	107.4	7	0	71.86	79.4	87.34	95.28	111.16	7	0	63.29	76.50	84.15	91.80	107.10
Cobalt	mg/kg	7	0	16.7	19.80	21.78	23.76	27.72	7	0	16.29	18.7	20.57	22.44	26.18	7	0	14.0	15.0	16.5	18.0	21.0
Copper	mg/kg	7	0	177.7	250.0	275.0	300.0	350.0	7	0	103.57	178.0	195.80	213.60	249.20	7	0	82.86	183.20	201.52	219.84	256.48
Lead	mg/kg	7	0	15.69	18.70	20.57	22.44	26.18	7	0	10.77	12.70	13.97	15.24	17.78	7	0	10.80	13.00	14.30	15.60	18.20
Mercury	mg/kg	7	7	0.05	N/A	0.055	0.060	0.070	7	7	0.05	N/A	0.055	0.060	0.070	7	7	0.05	N/A	0.06	0.06	0.07
Molybdenum	mg/kg	7	0	0.78	1.17	1.28	1.40	1.64	7	0	1.23	1.51	1.66	1.81	2.11	7	1	1.131	1.176	1.29	1.41	1.65
Nickel	mg/kg	7	0	43.29	46.70	51.37	56.04	65.38	7	0	50.0	56.0	61.6	67.2	78.4	7	0	40.00	47.70	52.47	57.24	66.78
Selenium	mg/kg	7	4	1.841	2.563	2.8	3.1	3.6	7	4	3.238	4.47	4.92	5.36	6.26	7	4	1.851	2.56	2.82	3.07	3.58
Silver	mg/kg	7	7	0.20	N/A	0.22	0.24	0.28	7	7	0.20	N/A	0.22	0.24	0.28	7	6	0.25	0.25	0.28	0.30	0.35
Thallium	mg/kg	7	0	0.357	0.42	0.5	0.5	0.6	7	0	0.364	0.398	0.44	0.48	0.56	7	1	0.33	0.464	0.51	0.56	0.65
Tin	mg/kg	7	1	1.333	1.47	1.6	1.8	2.1	7	1	1.267	1.375	1.51	1.65	1.93	7	1	1.13	3.86	4.25	4.63	5.40
Uranium	mg/kg	7	0	15.87	20.40	22.4	24.5	28.6	7	0	12.81	19.70	21.670	23.640	27.580	7	0	15.57	23.70	26.07	28.44	33.18
Vanadium	mg/kg	7	0	60.71	64.70	71.2	77.6	90.6	7	0	58.29	65.10	71.610	78.120	91.140	7	0	54.43	63.10	69.41	75.72	88.34
Zinc	mg/kg	7	0	141.3	299.0	328.9	358.8	418.6	7	0	109.3	120.0	132.0	144.0	168.0	7	0	202.9	600.0	660.0	720.0	840.0
Radium-226	Bq/g	7	0	0.66	1.01	1.11	1.21	1.41	7	0	0.29	0.62	0.68	0.74	0.86	7	0	0.18	0.26	0.29	0.32	0.37
Lead-210	Bq/g	7	0	0.67	0.99	1.09	1.19	1.38	7	3	0.503	0.723	0.80	0.87	1.01	7	0	0.19	0.25	0.27	0.30	0.35
Uranium-238	Bq/g	7	0	0.29	0.38	0.41	0.45	0.53	7	0	0.16	0.26	0.287	0.313	0.365	7	0	0.21	0.27	0.30	0.32	0.38
Polonium-210	Bq/g	4	0	0.77	1.26	1.39	1.51	1.77	7	0	0.31	0.62	0.681	0.743	0.867	7	0	0.20	0.25	0.28	0.30	0.35
Thorium-230	Bq/g	7	0	1.65	2.47	2.72	2.96	3.46	7	0	0.35	0.88	0.97	1.05	1.23	7	0	0.15	0.26	0.28	0.31	0.36

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

All data was less than the laboratory method detection limit. Baseline average is based on highest detection limit represented in the dataset.
 At least one lab was result was less than the method detection limit. Baseline averages for datasets with three or more detected concentrations were derived using ProUCL 5.2 - UCL Statistics for Data Sets with Non-Detects. ProUCL 5.2 provides Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs.

Table B-3: Sediment Quality Baseline Results and Action Levels (2021 - 2023; Metals - mg/kg; Radionuclides - Bq/g)
Rayrock AEMP Design Plan V 1.2
Kwetiqaa (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Alpha Lake							Beta Lake					Gamma Lake								
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Antimony	mg/kg	10	3	0.67	0.81	0.89	0.97	1.13	10	10	0.50	N/A	0.55	0.60	0.70	7	0	1.27	1.70	1.87	2.04	2.38
Arsenic	mg/kg	10	0	5.89	7.02	7.72	8.42	9.83	10	0	4.68	6.66	7.32	7.99	9.32	7	0	30.29	41.10	45.21	49.32	57.54
Barium	mg/kg	10	0	123.8	195.5	215.1	234.6	273.7	10	0	228.0	256.5	282.2	307.8	359.1	7	0	174.3	225.0	247.5	270.0	315.0
Beryllium	mg/kg	10	0	1.39	1.60	1.76	1.92	2.24	10	0	0.89	0.97	1.06	1.16	1.35	7	0	1.51	1.64	1.80	1.97	2.30
Cadmium	mg/kg	10	0	0.17	0.23	0.25	0.27	0.32	10	0	0.12	0.15	0.16	0.18	0.20	7	0	0.21	0.26	0.29	0.31	0.37
Chromium	mg/kg	10	0	44.9	60.8	66.8	72.9	85.1	10	0	67.7	78.6	86.4	94.3	110.0	7	0	87.9	94.0	103.4	112.8	131.6
Cobalt	mg/kg	10	0	9.9	13.6	14.9	16.3	19.0	10	0	14.1	17.6	19.3	21.1	24.6	7	0	11.9	14.7	16.2	17.6	20.6
Copper	mg/kg	10	0	817.0	1200.0	1320.0	1440.0	1680.0	10	0	60.3	92.5	101.7	110.9	129.4	7	0	3500.0	4340.0	4774.0	5208.0	6076.0
Lead	mg/kg	10	0	143.1	215.5	237.1	258.6	301.7	10	0	12.6	16.8	18.4	20.1	23.5	7	0	358.6	563.0	619.3	675.6	788.2
Mercury	mg/kg	10	9	0.06	0.05	0.06	0.06	0.08	10	10	0.25	N/A	0.28	0.30	0.35	7	1	0.0643	0.0644	0.07	0.08	0.09
Molybdenum	mg/kg	10	0	1.80	2.71	2.98	3.25	3.79	10	0	0.87	1.26	1.38	1.51	1.76	7	0	4.61	5.10	5.61	6.12	7.14
Nickel	mg/kg	10	0	26.4	37.7	41.4	45.2	52.7	10	0	42.3	49.6	54.5	59.5	69.4	7	0	37.1	46.2	50.8	55.4	64.7
Selenium	mg/kg	10	0	23.5	33.0	36.3	39.6	46.2	10	6	0.87	1.199	1.32	1.44	1.68	7	0	19.39	28.40	31.24	34.08	39.76
Silver	mg/kg	10	0	0.71	1.06	1.16	1.27	1.48	10	10	0.20	N/A	0.22	0.24	0.28	7	0	0.61	0.99	1.09	1.18	1.38
Thallium	mg/kg	10	0	0.31	0.39	0.43	0.47	0.55	10	0	0.386	0.456	0.50	0.55	0.64	7	0	0.86	1.40	1.54	1.68	1.96
Tin	mg/kg	10	2	1.39	1.46	1.60	1.75	2.04	10	0	1.311	1.56	1.72	1.87	2.18	7	0	1.66	2.07	2.28	2.48	2.90
Uranium	mg/kg	10	0	58.00	77.20	84.92	92.64	108.08	10	0	15.23	20.75	22.83	24.90	29.05	7	0	198.14	251.00	276.10	301.20	351.40
Vanadium	mg/kg	10	0	39.20	55.65	61.22	66.78	77.91	10	0	60.6	75.0	82.5	90.0	105.0	7	0	72.14	87.10	95.81	104.52	121.94
Zinc	mg/kg	10	0	134.00	155.50	171.05	186.60	217.70	10	0	80.2	87.0	95.7	104.4	121.8	7	0	101.14	110.00	121.00	132.00	154.00
Radium-226	Bq/g	10	0	23.33	33.26	36.59	39.91	46.56	10	0	0.92	1.95	2.15	2.34	2.73	7	0	43.14	59.70	65.67	71.64	83.58
Lead-210	Bq/g	10	0	23.15	33.76	37.14	40.51	47.26	10	0	0.69	1.57	1.72	1.88	2.19	7	0	45.34	69.50	76.45	83.40	97.30
Uranium-238	Bq/g	10	0	0.98	1.26	1.38	1.51	1.76	10	0	0.24	0.34	0.37	0.40	0.47	7	0	3.24	4.71	5.18	5.65	6.59
Polonium-210	Bq/g	4	0	18.95	21.00	23.10	25.20	29.40	8	0	0.69	1.85	2.03	2.22	2.58	4	0	29.75	41.20	45.32	49.44	57.68
Thorium-230	Bq/g	7	0	12.06	15.80	17.38	18.96	22.12	10	0	1.33	3.45	3.79	4.13	4.82	7	0	170.14	290.10	319.11	348.12	406.14

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

All data was less than the laboratory method detection limit. Baseline average is based on highest detection limit represented in the dataset.
 At least one lab was result was less than the method detection limit. Baseline averages for datasets with three or more detected concentrations were derived using ProUCL 5.2 - UCL Statistics for Data Sets with Non-Detects. ProUCL 5.2 provides Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs.

Table B-3: Sediment Quality Baseline Results and Action Levels (2021 - 2023; Metals - mg/kg; Radionuclides - Bq/g)
Rayrock AEMP Design Plan V 1.2
Kwetiq̓aà (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Lake A							Lake B							Kwetsotia						
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Antimony	mg/kg	7	6	0.67	0.67	0.74	0.80	0.94	4	4	1	N/A	1.10	1.20	1.40	4	4	1	N/A	1.10	1.20	1.40
Arsenic	mg/kg	7	0	5.89	9.92	10.91	11.90	13.89	4	0	8.975	16.32	17.952	19.584	22.848	4	0	4.3	4.5	4.9335	5.382	6.279
Barium	mg/kg	7	0	200.0	277.0	304.7	332.4	387.8	4	0	245.0	373.0	410.3	447.6	522.2	4	0	162.5	178.5	196.35	214.2	249.9
Beryllium	mg/kg	7	0	0.85	1.14	1.25	1.37	1.60	4	2	1.005	1.31	1.44	1.57	1.83	4	4	0.8	N/A	0.88	0.96	1.12
Cadmium	mg/kg	7	0	0.24	0.43	0.47	0.51	0.60	4	0	0.21	0.32	0.35	0.39	0.45	4	0	0.17	0.204	0.224	0.245	0.286
Chromium	mg/kg	7	0	57.43	73.10	80.41	87.72	102.34	4	0	63.0	91.6	100.7	109.9	128.2	4	0	39.5	43.6	47.91	52.26	60.97
Cobalt	mg/kg	7	0	13.53	19.40	21.34	23.28	27.16	4	0	17.5	27.6	30.4	33.1	38.6	4	0	9.7	10.0	11	12	14
Copper	mg/kg	7	0	120.57	230.00	253.00	276.00	322.00	4	0	69.5	126.8	139.5	152.2	177.5	4	0	46.3	56.9	62.59	68.28	79.66
Lead	mg/kg	7	0	10.11	15.80	17.38	18.96	22.12	4	0	10.1	14.9	16.3	17.8	20.8	4	0	6.0	6.6	7.271	7.932	9.254
Mercury	mg/kg	7	6	0.081	0.072	0.08	0.09	0.10	4	4	0.05	N/A	0.06	0.06	0.07	4	4	0.10	N/A	0.11	0.12	0.14
Molybdenum	mg/kg	7	0	1.53	2.48	2.73	2.98	3.47	4	0	1.35	1.98	2.18	2.38	2.77	4	0	1.7	2.0	2.244	2.448	2.856
Nickel	mg/kg	7	0	44.71	60.70	66.77	72.84	84.98	4	0	51.25	82.1	90.31	98.52	114.94	4	0	33.0	35.7	39.27	42.84	49.98
Selenium	mg/kg	7	6	1.10	0.92	1.01	1.10	1.29	4	4	1.00	N/A	1.10	1.20	1.40	4	3	1.2	1.2	1.287	1.404	1.638
Silver	mg/kg	7	7	0.20	N/A	0.22	0.24	0.28	4	4	0.40	N/A	0.44	0.48	0.56	4	4	0.40	N/A	0.44	0.48	0.56
Thallium	mg/kg	7	0	0.32	0.48	0.53	0.58	0.67	4	0	0.35	0.52	0.57	0.62	0.72	4	2	0.22	0.23	0.2497	0.2724	0.3178
Tin	mg/kg	7	4	1.17	1.31	1.44	1.57	1.83	4	3	7.00	6.25	6.88	7.50	8.75	4	4	2.0	N/A	2.20	2.40	2.80
Uranium	mg/kg	7	0	15.16	21.40	23.54	25.68	29.96	4	0	11	17.4	19.14	20.88	24.36	4	0	162.5	187.0	205.7	224.4	261.8
Vanadium	mg/kg	7	0	47.43	69.60	76.56	83.52	97.44	4	0	57.75	84.7	93.17	101.64	118.58	4	0	34.8	36.9	40.535	44.22	51.59
Zinc	mg/kg	7	0	87.71	119.20	131.12	143.04	166.88	4	0	107.25	147	161.7	176.4	205.8	4	0	61.5	67.0	73.645	80.34	93.73
Radium-226	Bq/g	7	0	0.21	0.33	0.36	0.39	0.46	4	0	0.09	0.09	0.10	0.11	0.13	4	0	0.70	1.91	2.10	2.29	2.68
Lead-210	Bq/g	7	3	0.405	0.481	0.53	0.58	0.67	4	0	0.22	0.25	0.27	0.30	0.35	4	0	1.13	2.98	3.28	3.58	4.17
Uranium-238	Bq/g	7	0	0.21	0.28	0.30	0.33	0.39	4	0	0.09	0.11	0.12	0.13	0.15	4	0	1.95	2.19	2.40	2.62	3.06
Polonium-210	Bq/g	7	0	0.31	0.47	0.51	0.56	0.65	4	0	0.16	0.19	0.20	0.22	0.26	4	0	0.95	2.59	2.85	3.11	3.63
Thorium-230	Bq/g	7	0	0.38	0.91	1.00	1.09	1.28	4	0	0.16	0.22	0.24	0.26	0.31	4	0	0.67	2.06	2.26	2.47	2.88

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

All data was less than the laboratory method detection limit. Baseline average is based on highest detection limit represented in the dataset.
 At least one lab was result was less than the method detection limit. Baseline averages for datasets with three or more detected concentrations were derived using ProUCL 5.2 - UCL Statistics for Data Sets with Non-Detects. ProUCL 5.2 provides Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs.

Table B-3: Sediment Quality Baseline Results and Action Levels (2021 - 2023; Metals - mg/kg; Radionuclides - Bq/g)
Rayrock AEMP Design Plan V 1.2
Kwetiq̄aà (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Alternative Reference Lake							New Control Lake							Dlah Lake						
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Antimony	mg/kg	7	7	1.00	N/A	1.10	1.20	1.40	7	7	1.00	N/A	1.10	1.20	1.40	3	3	1.00	N/A	1.10	1.20	1.40
Arsenic	mg/kg	7	0	6.44	8.36	9.20	10.03	11.70	7	0	10.34	11.70	12.87	14.04	16.38	3	0	11.23	12.00	13.20	14.40	16.80
Barium	mg/kg	7	0	182.86	207.00	227.70	248.40	289.80	7	0	115.71	127.00	139.70	152.40	177.80	3	0	210.00	228.00	250.80	273.60	319.20
Beryllium	mg/kg	7	2	0.75	0.88	0.97	1.06	1.24	7	4	0.63	0.64	0.70	0.77	0.90	3	3	0.80	N/A	0.88	0.96	1.12
Cadmium	mg/kg	7	0	0.17	0.19	0.21	0.23	0.27	7	0	0.18	0.20	0.22	0.24	0.28	3	0	0.19	0.19	0.21	0.23	0.27
Chromium	mg/kg	7	0	58.43	72.50	79.75	87.00	101.50	7	0	42.43	63.00	69.30	75.60	88.20	3	0	42.00	43.00	47.30	51.60	60.20
Cobalt	mg/kg	7	0	14.04	15.70	17.27	18.84	21.98	7	0	8.93	9.54	10.49	11.45	13.36	3	0	17.33	18.00	19.80	21.60	25.20
Copper	mg/kg	7	0	29.71	32.70	35.97	39.24	45.78	7	0	37.86	41.70	45.87	50.04	58.38	3	0	24.67	25.90	28.49	31.08	36.26
Lead	mg/kg	7	0	8.00	8.94	9.83	10.73	12.52	7	0	6.47	6.98	7.68	8.38	9.77	3	0	5.97	6.35	6.99	7.62	8.89
Mercury	mg/kg	7	7	0.10	N/A	0.11	0.12	0.14	7	7	0.10	N/A	0.11	0.12	0.14	3	3	0.10	N/A	0.11	0.12	0.14
Molybdenum	mg/kg	7	0	1.02	1.17	1.29	1.40	1.64	7	0	1.67	1.91	2.10	2.29	2.67	3	0	4.13	4.78	5.26	5.74	6.69
Nickel	mg/kg	7	0	44.14	51.40	56.54	61.68	71.96	7	0	29.86	37.70	41.47	45.24	52.78	3	0	44.00	44.00	48.40	52.80	61.60
Selenium	mg/kg	7	7	1.00	N/A	1.10	1.20	1.40	7	5	0.54	1.00	1.10	1.20	1.40	3	3	1.00	N/A	1.10	1.20	1.40
Silver	mg/kg	7	6	49.00	34.42	37.86	41.30	48.19	7	7	0.4	N/A	0.44	0.48	0.56	3	3	0.40	N/A	0.44	0.48	0.56
Thallium	mg/kg	7	0	0.28	0.34	0.37	0.40	0.47	7	1	0.218	0.237	0.26	0.28	0.33	3	0	0.22	0.23	0.25	0.27	0.32
Tin	mg/kg	7	4	1.13	2.00	2.20	2.40	2.80	7	7	2	N/A	2.20	2.40	2.80	3	3	2.00	N/A	2.20	2.40	2.80
Uranium	mg/kg	7	0	3.61	4.18	4.60	5.02	5.85	7	0	7.11	8.13	8.94	9.76	11.38	3	0	3.63	3.88	4.27	4.66	5.43
Vanadium	mg/kg	7	0	48.29	56.10	61.71	67.32	78.54	7	0	32.86	34.70	38.17	41.64	48.58	3	0	42.33	43.00	47.30	51.60	60.20
Zinc	mg/kg	7	0	92.14	100.00	110.00	120.00	140.00	7	0	62.43	66.70	73.37	80.04	93.38	3	0	109.00	119.00	130.90	142.80	166.60
Radium-226	Bq/g	7	0	0.05	0.06	0.07	0.07	0.08	7	0	0.05	0.06	0.06	0.07	0.08	3	0	0.05	0.06	0.06	0.07	0.08
Lead-210	Bq/g	7	4	0.156667	0.175	0.19	0.21	0.25	7	4	0.170	0.187	0.21	0.22	0.26	3	0	0.17	0.25	0.27	0.30	0.35
Uranium-238	Bq/g	7	0	0.06	0.07	0.08	0.09	0.10	7	0	0.10	0.12	0.13	0.14	0.16	3	0	0.07	0.07	0.08	0.08	0.10
Polonium-210	Bq/g	7	0	0.09	0.13	0.14	0.16	0.18	7	0	0.11	0.15	0.16	0.18	0.21	3	0	0.10	0.13	0.15	0.16	0.19
Thorium-230	Bq/g	7	0	0.06	0.07	0.08	0.08	0.10	7	0	0.05	0.07	0.07	0.08	0.09	3	0	0.05	0.05	0.06	0.06	0.07

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

All data was less than the laboratory method detection limit. Baseline average is based on highest detection limit represented in the dataset.
 At least one lab was result was less than the method detection limit. Baseline averages for datasets with three or more detected concentrations were derived using ProUCL 5.2 - UCL Statistics for Data Sets with Non-Detects. ProUCL 5.2 provides Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs. Data with only one or two detected concentrations defaulted to the maximum concentration.

Table B-4 - Sediment Physical Properties and Benthic Community Baseline Results (2021 and 2022)

Rayrock AEMP Design Plan V 1.2
 Kwetipaa (Rayrock) Remediation Project
 Public Services and Procurement Canada

Lake	Sediment Classification		Sediment Organic Matter (%)		Total Organic Carbon (%)		Density (Organisms/m2)				Total Number of Distinct Taxa (family)			
	2021	2022	2021	2022	2021	2022	2021	2022	Average	Standard Deviation (+/-)	2021	2022	Average	Standard Deviation (+/-)
Sherman Lake B	Fine	Fine	25	11.3	15	6.7	20115.0	589.1	10352	10492	12	4	7.8	4.3
Sherman Lake L	Fine	Fine	19	13.7	11	8.1	2356.3	186.8	1272	1625	5	2	3.3	2.8
Sherman Lake K	Fine	Fine	20	11.3	12	6.5	9123.7	387.9	4756	6712	10	3	6.8	5.6
Alpha Lake	Fine	Fine	7	2.6	4	1.5	4267.3	330.5	2270	2188	6	3	4.3	2.1
Beta Lake	Fine	Fine	4.8	7.6	2.8	4.4	6652.3	373.6	3513	3566	7	3	3.2	1.2
Gamma Lake	Fine	Fine	17	34.7	9.7	20	3189.7	675.3	1932	2279	5	4	4.5	1.5
Lake A	Fine	Fine	34	24.3	20	14.3	301.7	344.8	323	140	3	3	2.8	0.9
Kwetsq̄tia	Fine	Fine	39	31.7	23	18.3	15216.0	1120.7	8168	7360	11	4	8.7	5.1
Dlah Lake	No Data	Fine	No Data	45	No Data	26.3	No Data	287.4	287	73	No Data	2	2.3	0.5
New Control Lake	Fine	Fine	17	33.3	10	19.3	4669.7	1925.3	3297	2427	7	3	4.7	2.3
Alternate Reference Lake	Course	Fine	53	28	31	16	3506.0	143.7	1825	2116	6	2	4.3	2.2
Lake B	Fine	Fine	18	32.3	11	19	22859.3	775.9	11818	11217	8	3	5.3	2.6

Notes: The baseline values for average Density (per m²) and average number of Distinct Taxa (Family) were calculated as the average of the samples collected in 2021 and 2022.

Based on the variability in data between 2021 and 2022 the proposed Response Framework Action Levels for benthic invertebrates is the baseline value (average) +/- one standard deviation. The effectiveness of this approach will be revisited in each annual report and changes or alternatives will be put forward as required.

Table B-5 - Benthic Tissue Baseline Results and Action Levels (2021 and 2022: Metals - m/ko/wet weight; Radionuclides - Bolo dry weight)
 Rayrock AECMP Design Plan V 1.2
 Keweenaw (Rayrock) Remediation Project
 Public Services and Procurement Canada

Parameters	New Control Lake (n=2)				Alternative Reference Lake (n=1)			Lake A (n=1)				Lake B (n=1)				Sherman Lake B (n=1)				Sherman Lake K (n=2)					
	2021, 2022 *	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2021, 2022 *	Low (+10%)	Medium (+20%)	High (+40%)	
Moisture	%	87	-	-	83	-	-	-	86	-	-	-	85	-	-	-	84	-	-	-	85	-	-	-	
Metals (Wet Weight)																									
Aluminum	mg/kg	201	221.1	241.2	281.4	175	192.5	210	245	303	333.3	363.6	424.2	223	245.3	267.6	312.2	376	347.6	379.2	442.4	393	432.3	471.6	550.2
Antimony	mg/kg	0.018	0.020	0.021	0.025	0.003	0.0037	0.0041	0.0048	0.004	0.0041	0.0044	0.0052	0.004	0.0040	0.0043	0.0050	0.013	0.0139	0.0151	0.0176	0.0092	0.0099	0.0098	0.0115
Arsenic	mg/kg	0.64	0.70	0.76	0.89	0.599	0.66	0.72	0.84	0.833	0.48	0.52	0.61	0.432	0.48	0.52	0.60	0.39	0.43	0.47	0.55	0.433	0.48	0.52	0.61
Barium	mg/kg	15	16.5	18	21	20.3	22.33	24.36	28.42	29.4	32.34	35.28	41.16	25.8	28.38	30.96	36.12	10.1	11.11	12.12	14.14	20.2	22.22	24.24	28.28
Beryllium	mg/kg	0.0072	0.0079	0.0086	0.0101	0.007	0.0074	0.0080	0.0094	0.01	0.0110	0.0120	0.0140	0.009	0.0096	0.0103	0.0120	0.012	0.013	0.015	0.017	0.0166	0.0183	0.0199	0.0232
Bismuth	mg/kg	0.0043	0.0047	0.0052	0.0060	0.003	0.0029	0.0031	0.0036	0.004	0.0045	0.0049	0.0057	0.004	0.0042	0.0046	0.0053	0.007	0.0075	0.0082	0.0095	0.0076	0.0084	0.0091	0.0106
Boron	mg/kg	0.97	1.07	1.16	1.36	0.33	0.36	0.40	0.46	1.4	1.54	1.68	1.96	0.84	0.92	1.01	1.18	0.64	0.70	0.77	0.90	0.46	0.51	0.56	0.64
Cadmium	mg/kg	0.019	0.021	0.023	0.027	0.040	0.044	0.048	0.056	0.017	0.019	0.020	0.024	0.019	0.021	0.023	0.027	0.024	0.027	0.029	0.034	0.033	0.036	0.039	0.046
Calcium	mg/kg	14100	15510	16920	19740	13500	14950	16300	18900	12200	13420	14640	17080	8120	8932	9744	11368	10200	11220	12240	14280	7910	8701	9492	11074
Chromium	mg/kg	0.50	0.55	0.60	0.70	0.50	0.55	0.60	0.69	0.582	0.64	0.70	0.81	0.54	0.59	0.65	0.76	0.906	1.00	1.09	1.27	0.96	1.06	1.16	1.35
Cobalt	mg/kg	0.14	0.16	0.17	0.20	0.18	0.20	0.22	0.25	0.199	0.22	0.24	0.28	0.22	0.24	0.26	0.30	0.295	0.32	0.35	0.41	0.40	0.44	0.48	0.56
Copper	mg/kg	12.10	13.31	14.52	16.84	6.87	7.56	8.24	9.62	13.70	15.07	16.44	19.18	7.78	8.56	9.34	10.89	6.66	7.33	7.99	9.32	9.56	10.52	11.47	13.38
Iron	mg/kg	344	378.4	412.8	481.6	527	579.7	632.4	737.8	344	378.4	412.8	481.6	377	414.7	452.4	527.8	585	643.5	702	819	529	581.9	634.8	740.6
Lead	mg/kg	0.814	1.005	1.097	1.280	0.109	0.120	0.131	0.153	0.108	0.119	0.130	0.151	0.142	0.156	0.170	0.199	0.206	0.226	0.246	0.287	0.193	0.212	0.232	0.270
Magnesium	mg/kg	359.0	394.9	430.8	502.6	450	495	540	630	441	485.1	529.2	617.4	410	451	492	574	388	426.8	465.6	543.2	466	512.6	559.2	652.4
Manganese	mg/kg	21.7	23.9	26.0	30.4	64.1	70.5	76.9	89.7	13.2	14.5	15.8	18.5	24.1	26.5	28.9	33.7	28.1	30.9	33.7	39.3	25.2	27.7	30.2	35.3
Mercury	mg/kg	0.017	0.018	0.020	0.023	0.0052	0.0057	0.0062	0.0073	0.0036	0.004	0.004	0.005	0.0040	0.0044	0.0048	0.0056	0.0026	0.0029	0.0031	0.0036	0.0069	0.0076	0.0083	0.0097
Molybdenum	mg/kg	0.119	0.131	0.143	0.167	0.149	0.164	0.179	0.209	0.124	0.136	0.149	0.174	0.196	0.216	0.235	0.274	0.091	0.100	0.109	0.127	0.164	0.180	0.197	0.230
Nickel	mg/kg	0.316	0.348	0.379	0.442	0.327	0.360	0.392	0.458	0.485	0.534	0.582	0.679	0.459	0.505	0.551	0.643	0.597	0.657	0.716	0.836	0.653	0.751	0.820	0.956
Phosphorus	mg/kg	1550	1705	1860	2170	1540	1694	1848	2156	1470	1617	1764	2058	1370	1507	1644	1918	1180	1298	1416	1652	1570	1727	1884	2198
Potassium	mg/kg	1450	1595	1740	2030	1360	1496	1632	1904	1350	1485	1620	1890	1500	1650	1800	2100	1320	1452	1584	1848	1600	1760	1920	2240
Selenium	mg/kg	0.12	0.13	0.14	0.17	0.083	0.091	0.100	0.116	0.093	0.10	0.11	0.13	0.063	0.069	0.076	0.088	0.144	0.16	0.17	0.20	0.115	0.127	0.14	0.161
Silver	mg/kg	0.03	0.033	0.036	0.042	0.023	0.025	0.028	0.032	0.011	0.012	0.013	0.016	0.014	0.015	0.017	0.019	0.005	0.0052	0.0056	0.0066	0.0156	0.017	0.019	0.022
Sodium	mg/kg	1250	1375	1500	1750	917.0	1008.7	1100.4	1283.8	981	1079.1	1172.2	1373.4	1050	1155	1260	1470	998.0	1097.8	1197.6	1397.2	999.0	1098.9	1198.8	1398.6
Strontium	mg/kg	26.6	29.3	31.9	37.2	41.0	45.1	49.2	57.4	60.6	66.7	72.7	84.8	43.0	47.3	51.6	60.2	23.8	26.2	28.6	33.3	38.0	41.8	45.6	53.2
Thallium	mg/kg	0.0054	0.0059	0.0064	0.0075	0.004	0.0043	0.0047	0.0055	0.006	0.0061	0.0066	0.0077	0.0046	0.0050	0.0055	0.0064	0.005	0.0059	0.0064	0.0075	0.0073	0.0081	0.0088	0.0103
Tin	mg/kg	0.117	0.129	0.140	0.164	<0.020	0.022	0.024	0.028	0.096	0.022	0.024	0.028	0.089	0.0979	0.1068	0.1246	0.032	0.0352	0.0384	0.0448	0.02	0.022	0.024	0.028
Titanium	mg/kg	9.0	9.9	10.8	12.6	7.69	8.459	9.228	10.766	11.9	13.09	14.28	16.66	11.1	12.21	13.32	15.64	17.4	19.14	20.88	24.36	20.4	22.44	24.48	28.56
Uranium	mg/kg	0.11	0.12	0.14	0.16	0.12	0.13	0.14	0.17	0.267	0.29	0.32	0.37	0.131	0.14	0.16	0.18	0.59	0.65	0.71	0.83	0.681	0.75	0.82	0.95
Vanadium	mg/kg	0.51	0.56	0.62	0.72	0.49	0.54	0.59	0.69	0.67	0.73	0.80	0.93	0.66	0.72	0.79	0.92	1.16	1.28	1.39	1.62	1.21	1.33	1.45	1.69
Zinc	mg/kg	13.4	14.74	16.08	18.76	13.8	15.18	16.56	19.32	8.62	9.48	10.34	12.07	11.9	13.09	14.28	16.66	13.2	14.52	15.84	18.48	15.0	16.50	18.00	21.00
Radionuclides (Dry Weight)																									
Radium 226	Bq/g	0.020	0.022	0.024	0.028	<0.010	0.011	0.012	0.014	0.044	0.0484	0.0528	0.0616	<0.010	0.011	0.012	0.014	0.074	0.081	0.089	0.104	0.024	0.026	0.029	0.034
Lead-210	Bq/g	<0.10	0.11	0.12	0.14	<0.10	0.11	0.12	0.14	0.12	0.132	0.144	0.168	<0.10	0.11	0.12	0.14	<0.10	0.11	0.12	0.14	<0.10	0.11	0.12	0.14
Uranium-238	Bq/g	0.010	0.011	0.012	0.014	<0.010	0.011	0.012	0.014	0.03	0.033	0.036	0.042	<0.010	0.011	0.012	0.014	0.04	0.044	0.048	0.056	0.02	0.022	0.024	0.028
Polonium-210	Bq/g	0.24	0.26	0.29	0.34	0.078	0.086	0.094	0.109	0.11	0.121	0.132	0.154	0.069	0.076	0.083	0.097	0.15	0.165	0.180	0.210	0.096	0.105	0.114	0.133
Thorium-230	Bq/g	0.06	0.066	0.072	0.084	<0.010	0.011	0.012	0.014	<0.01	0.011	0.012	0.014	<0.01	0.011	0.012	0.014	0.09	0.013	0.014	0.017	0.01	0.016	0.017	0.020

Notes:
 All datasets were based on one or two samplings seasons (2021 and 2022 or 2022 only). Therefore the maximum value was used for all datasets (n=2).
 * Radionuclide data from 2022 only (n=1)
 Response Framework Action Levels were set using the baseline value (Maximum) +10% (Low), +20% (medium), and 40% (High).

Table B-5 - Benthic Tissue Baseline Results and Action Levels (2021 and 2022: Metals - m/ko/wet weight; Radionuclides - Bolo dry weight)
 Rayrock AECMP Design Plan V 1.2
 Kwaitsas (Rayrock) Remediation Project
 Public Services and Procurement Canada

Parameters	Years Included	Alpha Lake (n=1)				Gamma Lake (n=1)				Beta Lake (n=1)				Kwatsqita (n=2)				Diah Lake (n=1)			
		2022	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)	2021, 2022 *	Low (+10%)	Medium (+20%)	High (+40%)	2022	Low (+10%)	Medium (+20%)	High (+40%)
Moisture	%	82.0	-	-	-	82.0	-	-	-	86.0	-	-	-	86	-	-	-	89	-	-	-
Metals (Wet Weight)																					
Aluminum	mg/kg	477	524.7	572.4	667.8	222	244.2	266.4	310.8	392	431.2	470.4	548.8	400	440	480	560	104	114.4	124.8	145.6
Antimony	mg/kg	0.018	0.0198	0.0216	0.0252	0.022	0.0237	0.0258	0.0301	0.006	0.0068	0.0074	0.0087	0.0147	0.0162	0.0176	0.0206	0.0025	0.0028	0.0030	0.0035
Arsenic	mg/kg	0.348	0.38	0.42	0.49	1.47	1.62	1.76	2.06	0.24	0.27	0.29	0.34	0.125	0.14	0.15	0.18	0.26	0.29	0.31	0.37
Barium	mg/kg	7.92	8.712	9.504	11.088	12.70	13.97	15.24	17.78	5.01	5.511	6.012	7.014	4.5	4.95	5.4	6.3	17.5	19.25	21	24.5
Beryllium	mg/kg	0.044	0.0487	0.0532	0.0620	0.019	0.0212	0.0232	0.0270	0.014	0.015	0.016	0.019	0.0132	0.0145	0.0158	0.0185	0.005	0.0053	0.0058	0.0067
Bismuth	mg/kg	0.0899	0.0989	0.1079	0.1259	0.025	0.0279	0.0305	0.0356	0.009	0.0102	0.0112	0.0130	0.0061	0.0067	0.0073	0.0085	0.0017	0.0019	0.0020	0.0024
Boron	mg/kg	0.97	1.07	1.16	1.36	0.22	0.24	0.26	0.31	0.34	0.37	0.41	0.48	0.36	0.40	0.43	0.50	0.21	0.23	0.25	0.29
Cadmium	mg/kg	0.027	0.030	0.033	0.038	0.0068	0.0075	0.0082	0.0095	0.013	0.015	0.016	0.018	0.0079	0.0087	0.0095	0.011	0.013	0.014	0.015	0.018
Calcium	mg/kg	12300	13330	14360	17220	16800	18480	20160	23520	5160	5676	6192	7224	2950	3245	3540	4130	25100	27610	30120	35140
Chromium	mg/kg	1.360	1.50	1.63	1.90	1.35	1.49	1.62	1.89	0.97	1.07	1.16	1.36	0.90	0.99	1.08	1.27	0.24	0.26	0.29	0.33
Cobalt	mg/kg	0.365	0.40	0.44	0.51	0.25	0.27	0.30	0.35	0.237	0.26	0.28	0.33	0.23	0.25	0.27	0.32	0.126	0.14	0.15	0.18
Copper	mg/kg	27.70	30.47	33.24	38.78	45.60	50.16	54.72	63.84	6.03	6.63	7.24	8.44	3.21	3.53	3.85	4.49	3.09	3.40	3.71	4.33
Iron	mg/kg	745	819.5	894	1043	1130	1243	1356	1592	572.0	629.2	686.4	800.8	570	627	684	798	396	432.6	469.2	512.4
Lead	mg/kg	0.569	0.626	0.683	0.797	0.882	0.970	1.058	1.235	0.159	0.175	0.191	0.223	0.123	0.135	0.148	0.172	0.086	0.073	0.079	0.092
Magnesium	mg/kg	486.0	534.6	583.2	680.4	269	295.9	322.8	376.6	312.0	343.2	374.4	436.8	297	326.7	356.4	416.8	312	343.2	374.4	436.8
Manganese	mg/kg	41.0	45.1	49.2	57.4	28.10	30.9	33.7	39.3	20.4	22.4	24.5	28.6	18.2	20.0	21.8	25.5	18.9	20.8	22.7	26.5
Mercury	mg/kg	0.0038	0.0042	0.0046	0.0053	0.0012	0.0013	0.0014	0.0017	0.0033	0.0036	0.0040	0.0046	0.0078	0.0086	0.0094	0.0109	0.0029	0.0032	0.0035	0.0041
Molybdenum	mg/kg	0.113	0.124	0.136	0.158	0.178	0.196	0.214	0.249	0.082	0.090	0.099	0.115	0.0647	0.069	0.102	0.119	0.108	0.119	0.130	0.151
Nickel	mg/kg	0.774	0.851	0.929	1.084	0.559	0.615	0.671	0.783	0.669	0.736	0.803	0.937	0.647	0.712	0.776	0.906	0.287	0.316	0.344	0.402
Phosphorus	mg/kg	1050	1155	1260	1470	820	902	984	1148	974	1071.4	1168.8	1363.6	1150	1265	1380	1610	922	1014.2	1106.4	1290.8
Potassium	mg/kg	1350	1485	1620	1890	777	854.7	932.4	1087.8	1250	1375	1500	1750	1460	1595	1740	2030	1060	1166	1272	1484
Selenium	mg/kg	1.03	1.13	1.24	1.44	0.64	0.71	0.77	0.90	0.61	0.68	0.74	0.86	0.113	0.12	0.14	0.16	0.070	0.077	0.084	0.098
Silver	mg/kg	0.019	0.021	0.023	0.027	0.007	0.0081	0.0089	0.0104	0.005	0.0053	0.0058	0.0067	0.006	0.0066	0.0072	0.0084	0.012	0.013	0.015	0.017
Sodium	mg/kg	866.0	952.6	1039.2	1212.4	719.0	790.9	862.8	1006.6	905	995.5	1086	1267	1020	1122	1224	1428	1020	1122	1224	1428
Strontium	mg/kg	16.4	18.0	19.7	23.0	24.8	27.3	29.8	34.7	5.25	5.8	6.3	7.4	4.97	5.5	6.0	7.0	46.2	50.8	55.4	64.7
Thallium	mg/kg	0.008	0.0092	0.0100	0.0117	0.009	0.0090	0.0098	0.0114	0.006	0.0071	0.0078	0.0090	0.00556	0.0061	0.0067	0.0079	0.002	0.0025	0.0027	0.0032
Tin	mg/kg	0.14	0.154	0.168	0.196	0.047	0.0517	0.0564	0.0658	0.097	0.1067	0.1164	0.1358	0.182	0.2002	0.2184	0.2548	0.081	0.0891	0.0972	0.1134
Titanium	mg/kg	19.5	21.45	23.4	27.3	8.96	9.856	10.752	12.544	20.2	22.22	24.24	28.28	19.2	21.12	23.04	26.88	4.93	5.423	5.916	6.902
Uranium	mg/kg	3.1	3.41	3.72	4.34	3.99	4.39	4.79	5.59	3.02	3.32	3.62	4.23	2.41	2.65	2.89	3.37	0.075	0.082	0.090	0.104
Vanadium	mg/kg	1.24	1.36	1.49	1.74	1.60	1.76	1.92	2.24	0.97	1.07	1.17	1.36	0.874	0.96	1.05	1.22	0.25	0.28	0.30	0.35
Zinc	mg/kg	15.1	16.61	18.12	21.14	9.77	10.75	11.72	13.68	12.6	13.86	15.12	17.64	14.1	15.51	16.92	19.74	10.4	11.44	12.48	14.56
Radionuclides (Dry Weight)																					
Radium 226	Bq/g	2.6	2.86	3.12	3.64	5.7	6.27	6.84	7.98	0.27	0.297	0.324	0.378	<0.010	0.011	0.012	0.014	0.013	0.014	0.016	0.018
Lead-210	Bq/g	4.4	4.84	5.28	6.16	6.3	6.93	7.56	8.82	0.3	0.33	0.36	0.42	<0.10	0.11	0.12	0.14	<0.10	0.11	0.12	0.14
Uranium-238	Bq/g	0.27	0.30	0.32	0.38	0.33	0.36	0.40	0.46	-	-	-	-	0.17	0.187	0.204	0.238	0.023	0.025	0.028	0.032
Polonium-210	Bq/g	4.20	4.62	5.04	5.88	7.50	8.25	9.00	10.50	0.44	0.48	0.53	0.62	0.108	0.119	0.130	0.151	0.068	0.075	0.082	0.096
Thorium-232	Bq/g	3.0	3.30	3.60	4.20	21.0	23.10	25.20	29.40	0.77	0.85	0.92	1.08	0.02	0.022	0.024	0.028	<0.01	0.011	0.012	0.014

Notes:
 * All datasets were based on one or two sampling seasons (2021 and 2022 or 2022 only). Therefore the maximum value was used for all datasets (n=2).
 * Radionuclide data from 2022 only (n=1)
 Response Framework Action Levels were set using the baseline value (Maximum) +10% (Low), +20% (medium), and 40% (High).

Table B-6: Historical Summary - Fish Tissue Baseline Results and Action Levels (Metals - mg/kg wet weight; Radionuclides - Bq/g dry weight)
Rayrock AEMP Design Plan V 1.2
Kwetúᓃà (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Sherman Lake Muscle Tissue							Sherman Lake - Liver							Sherman Lake - Bone						
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Moisture	%	30	-	79.6	-	-	-	-	30	-	72.03	-	-	-	-	10	-	69.8	-	-	-	-
Aluminum	mg/kg	30	1	0.72	1.47	1.62	1.76	2.06	30	0	2.11	4.35	4.79	5.22	6.09	10	0	2.50	4.68	5.15	5.61	6.55
Antimony	mg/kg	30	20	0.0015	0.0024	0.0026	0.0029	0.0033	30	14	0.00165	0.00331	0.002	0.0020	0.0023	10	0	0.0055	0.0107	0.012	0.013	0.015
Arsenic	mg/kg	30	0	0.038	0.049	0.054	0.059	0.068	30	0	0.029	0.044	0.048	0.053	0.062	10	0	0.04	0.07	0.073	0.080	0.094
Barium	mg/kg	30	0	0.146	0.263	0.289	0.316	0.368	30	1	0.033	0.065	0.07	0.08	0.09	10	0	7.01	14.22	15.64	17.06	19.91
Beryllium	mg/kg	30	30	0.0010	N/A	0.0011	0.0012	0.0014	30	30	0.0010	N/A	0.0011	0.0012	0.0014	10	10	0.0010	N/A	0.001	0.0012	0.0014
Bismuth	mg/kg	30	2	0.002	0.002	0.0022	0.0024	0.0028	30	0	0.006	0.009	0.0098	0.0107	0.0124	10	3	0.0013	0.0017	0.0019	0.0021	0.0024
Boron	mg/kg	30	30	0.20	N/A	0.22	0.24	0.28	30	30	0.20	N/A	0.220	0.2400	0.2800	10	9	0.032	0.200	0.220	0.240	0.280
Cadmium	mg/kg	30	30	0.0010	N/A	0.0011	0.0012	0.0014	30	0	0.027	0.043	0.047	0.052	0.060	10	0	0.002	0.004	0.004	0.004	0.005
Calcium	mg/kg	30	0	579.0	1011.0	1112.1	1213.2	1415.4	30	0	61.97	116.40	128.04	139.68	162.96	10	0	30990	39270	43197.0	47124.0	54978.0
Chromium	mg/kg	30	25	0.030	0.057	0.063	0.068	0.080	30	22	0.015	0.024	0.027	0.029	0.034	10	0	0.049	0.095	0.10	0.11	0.13
Cobalt	mg/kg	30	2	0.0021	0.0028	0.0031	0.0034	0.0040	30	0	0.035	0.048	0.05	0.06	0.07	10	0	0.007	0.011	0.012	0.013	0.015
Copper	mg/kg	30	0	0.19	0.28	0.310	0.338	0.395	30	0	42.81	111.40	122.54	133.68	155.96	10	0	0.36	0.47	0.52	0.57	0.66
Iron	mg/kg	30	0	3.08	6.34	6.97	7.60	8.87	30	0	178.68	481.60	529.76	577.92	674.24	10	0	8.50	10.95	12.05	13.14	15.33
Lead	mg/kg	30	3	0.0023	0.0047	0.0051	0.0056	0.0066	30	3	0.0039	0.0087	0.010	0.010	0.012	10	0	0.0088	0.0156	0.02	0.02	0.02
Magnesium	mg/kg	30	1	314.7	339.7	373.7	407.6	475.6	30	0	176.90	236.00	259.60	283.20	330.40	10	0	601.7	747.9	822.69	897.48	1047.06
Manganese	mg/kg	30	0	0.47	0.86	0.94	1.03	1.20	30	0	1.40	2.25	2.47	2.69	3.14	10	0	15.82	20.78	22.86	24.94	29.09
Mercury	mg/kg	30	0	0.22	0.35	0.39	0.42	0.49	30	0	0.104	0.224	0.25	0.27	0.31	10	0	0.076	0.121	0.13	0.15	0.17
Molybdenum	mg/kg	30	30	0.004	N/A	0.004	0.0048	0.0056	30	0	0.187	0.278	0.31	0.33	0.39	10	1	0.005	0.007	0.007	0.008	0.009
Nickel	mg/kg	30	26	0.018	0.024	0.0264	0.0288	0.0336	30	3	0.023	0.039	0.043	0.047	0.055	10	0	0.024	0.041	0.04	0.05	0.06
Phosphorus	mg/kg	30	1	2582.8	2878.0	3165.80	3453.60	4029.20	30	0	3166	4358	4793.8	5229.6	6101.2	10	0	16630	20355	22390.5	24426.0	28497.0
Potassium	mg/kg	30	0	4112.4	4351.0	4786.10	5221.20	6091.40	30	0	3097.3	3731.0	4104.1	4477.2	5223.4	10	0	2135	2382	2620.2	2858.4	3334.8
Selenium	mg/kg	30	0	0.13	0.15	0.16	0.18	0.21	30	0	1.45	2.07	2.27	2.48	2.89	10	0	0.12	0.14	0.16	0.17	0.20
Silver	mg/kg	30	30	0.0010	N/A	0.0011	0.0012	0.0014	30	0	0.14	0.29	0.31	0.34	0.40	10	10	0.0010	N/A	0.001	0.0012	0.0014
Sodium	mg/kg	30	0	286.86	331.30	364.43	397.56	463.82	30	0	669.53	831.70	914.87	998.04	1164.38	10	0	1613.0	1943.0	2137.3	2331.6	2720.2
Strontium	mg/kg	30	0	0.68	1.26	1.39	1.52	1.77	30	0	0.09	0.18	0.195	0.212	0.248	10	0	43.99	61.61	67.77	73.93	86.25
Thallium	mg/kg	30	0	0.0015	0.0019	0.0021	0.0023	0.0026	30	0	0.0032	0.0048	0.005	0.006	0.007	10	0	0.0011	0.0013	0.0015	0.0016	0.0019
Tin	mg/kg	30	29	0.020	0.036	0.022	0.0240	0.0280	30	30	0.02	N/A	0.022	0.0240	0.0280	10	10	0.02	N/A	0.022	0.0240	0.0280
Titanium	mg/kg	30	0	0.26	0.37	0.41	0.44	0.52	30	0	0.35	0.61	0.669	0.730	0.851	10	0	0.69	0.90	0.99	1.08	1.26
Uranium	mg/kg	30	10	0.0016	0.0044	0.0048	0.0052	0.0061	30	0	0.0042	0.0071	0.008	0.009	0.010	10	0	0.01	0.02	0.020	0.022	0.025
Vanadium	mg/kg	30	30	0.02	N/A	0.022	0.0240	0.0280	30	0	0.18	0.42	0.458	0.499	0.582	10	1	0.04	0.07	0.079	0.086	0.100
Zinc	mg/kg	30	0	4.35	5.42	5.96	6.50	7.59	30	0	47.18	67.42	74.16	80.90	94.39	10	0	39.40	45.78	50.36	54.94	64.09
Radionuclides (Dry Weight)																						
Radium-226	Bq/g	30	10	0.01	N/A	0.011	0.012	0.014	30	30	0.01	N/A	0.011	0.012	0.014	10	9	0.011	0.011	0.0121	0.0132	0.0154
Lead-210	Bq/g	30	10	0.10	N/A	0.110	0.120	0.140	10	10	0.10	N/A	0.110	0.120	0.140	10	10	0.10	N/A	0.110	0.120	0.140
Uranium-238	Bq/g	30	10	0.01	N/A	0.011	0.012	0.014	10	10	0.01	N/A	0.011	0.012	0.014	10	10	0.01	N/A	0.011	0.012	0.014
Polonium-210	Bq/g	30	10	0.01	N/A	0.011	0.012	0.014	30	20	0.028	0.060	0.066	0.072	0.085	10	10	0.01	N/A	0.011	0.012	0.014
Thorium-230	Bq/g	30	10	0.01	N/A	0.011	0.012	0.014	30	30	0.01	N/A	0.011	0.012	0.014	10	10	0.01	N/A	0.011	0.012	0.014

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

Fish sampling information, size measurements, and health assessments are reported in the AEMP annual reports

All data was less than the laboratory method detection limit. Baseline average is based on highest detection limit represented in the dataset.

At least one lab was result was less than the method detection limit. Baseline averages for datasets with three or more detected concentrations were derived using ProUCL 5.2 - UCL Statistics for Data Sets with Non-Detects. ProUCL 5.2 provides Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs.

Table B-6: Historical Summary - Fish Tissue Baseline Results and Action Levels (Metals - mg/kg wet weight; Radionuclides - Bq/g dry weight)
Rayrock AEMP Design Plan V 1.2
Kwetiqā (Rayrock) Remediation Project
Public Services and Procurement Canada

Parameter	Units	Alternate Reference Lake Muscle Tissue							Alternate Reference Lake - Liver							Alternate Reference Lake - Bone						
		n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)	n	ND	Average	95th Percentile	Low (+10%)	Medium (+20%)	High (+40%)
Moisture	%	13	-	78.2	-	-	-	-	13	-	72.1	-	-	-	-	10	-	68.1	-	-	-	-
Aluminum	mg/kg	13	0	0.86	1.87	2.05	2.24	2.62	13	0	0.82	1.58	1.74	1.90	2.21	10	0	5.79	9.52	10.47	11.42	13.32
Antimony	mg/kg	13	0	0.004	0.011	0.012	0.014	0.016	13	4	0.0025	0.0037	0.004	0.004	0.005	10	0	0.018	0.037	0.04	0.04	0.05
Arsenic	mg/kg	13	0	0.057	0.072	0.08	0.09	0.10	13	0	0.023	0.035	0.04	0.04	0.05	10	0	0.045	0.054	0.06	0.06	0.08
Barium	mg/kg	13	0	0.15	0.45	0.50	0.54	0.63	13	0	0.054	0.102	0.11	0.12	0.14	10	0	7.52	14.89	16.38	17.87	20.85
Beryllium	mg/kg	13	13	0.0010	N/A	0.001	0.0012	0.0014	13	13	0.002	N/A	0.002	0.002	0.003	10	10	0.001	N/A	0.001	0.0012	0.001
Bismuth	mg/kg	13	0	0.0044	0.0075	0.008	0.009	0.011	13	0	0.009	0.017	0.02	0.02	0.02	10	1	0.0031	0.0046	0.01	0.01	0.01
Boron	mg/kg	13	13	0.20	N/A	0.22	0.24	0.2800	13	13	0.20	N/A	0.22	0.24	0.280	10	10	0.20	N/A	0.22	0.24	0.280
Cadmium	mg/kg	13	12	0.0011	0.0011	0.0012	0.0013	0.0015	13	0	0.014	0.024	0.03	0.03	0.03	10	0	0.0029	0.0046	0.01	0.01	0.01
Calcium	mg/kg	13	0	500.1	904.0	994.4	1084.8	1265.6	13	0	53.49	75.58	83.14	90.70	105.81	10	0	34380	47950	52745.0	57540.0	67130.0
Chromium	mg/kg	13	10	0.027	0.030	0.03	0.04	0.04	13	4	0.018	0.0276	0.0304	0.0331	0.0386	10	0	0.088	0.209	0.23	0.25	0.29
Cobalt	mg/kg	13	1	0.002	0.00284	0.00312	0.00341	0.00398	13	0	0.023	0.0291	0.0320	0.0349	0.0407	10	0	0.009	0.014	0.02	0.02	0.02
Copper	mg/kg	13	0	0.17	0.26	0.29	0.32	0.37	13	0	18.58	48.60	53.46	58.32	68.04	10	0	0.427	0.743	0.82	0.89	1.04
Iron	mg/kg	13	0	2.85	4.13	4.55	4.96	5.79	13	0	194.97	348.20	383.02	417.84	487.48	10	0	11.276	14.90	16.39	17.88	20.86
Lead	mg/kg	13	0	0.0045	0.0104	0.011	0.012	0.015	13	0	0.006	0.012	0.013	0.015	0.017	10	0	0.022	0.038	0.04	0.05	0.05
Magnesium	mg/kg	13	0	313.4	340.8	374.9	409.0	477.1	13	0	134.66	187.00	205.7	224.4	261.8	10	0	621.20	785.50	864.05	942.60	1099.70
Manganese	mg/kg	13	0	0.38	0.58	0.64	0.70	0.81	13	0	0.99	1.45	1.59	1.74	2.03	10	0	14.10	26.99	29.69	32.39	37.79
Mercury	mg/kg	13	0	0.17	0.35	0.39	0.42	0.49	13	1	0.072	0.161	0.18	0.19	0.23	10	0	0.066	0.152	0.17	0.18	0.21
Molybdenum	mg/kg	13	13	0.004	N/A	0.004	0.005	0.0056	13	0	0.128	0.187	0.21	0.22	0.26	10	1	0.010	0.016	0.02	0.02	0.02
Nickel	mg/kg	13	9	0.015	0.017	0.019	0.020	0.024	13	8	0.015	0.017	0.019	0.021	0.024	10	0	0.036	0.067	0.07	0.08	0.09
Phosphorus	mg/kg	13	0	2556.4	2810.0	3091.0	3372.0	3934.0	13	0	2393.1	3442.0	3786.2	4130.4	4818.8	10	0	18230	24810	27291.00	29772.00	34734.00
Potassium	mg/kg	13	0	4110.9	4338.0	4771.8	5205.6	6073.2	13	0	2659.2	3208.0	3528.8	3849.6	4491.2	10	0	2163	2430	2673.00	2916.00	3402.00
Selenium	mg/kg	13	0	0.071	0.092	0.10	0.11	0.13	13	0	0.960	1.142	1.26	1.37	1.60	10	0	0.074	0.087	0.10	0.10	0.12
Silver	mg/kg	13	13	0.0010	N/A	0.0011	0.0012	0.0014	13	0	0.098	0.258	0.28	0.31	0.36	10	10	0.0010	N/A	0.0011	0.0012	0.001
Sodium	mg/kg	13	0	290.2	361.6	397.8	433.9	506.2	13	0	719.23	851.40	936.54	1021.68	1191.96	10	0	1572	1753	1928.30	2103.60	2454.20
Strontium	mg/kg	13	0	0.56	1.17	1.29	1.41	1.64	13	0	0.081	0.143	0.16	0.17	0.20	10	0	44.40	63.50	69.85	76.20	88.90
Thallium	mg/kg	13	0	0.0029	0.0051	0.0056	0.0061	0.0071	13	0	0.004	0.006	0.007	0.007	0.008	10	0	0.0025	0.0038	0.004	0.005	0.005
Tin	mg/kg	13	13	0.02	N/A	0.0220	0.024	0.0280	13	12	0.02	0.024	0.022	0.024	0.028	10	6	0.034	0.040	0.04	0.05	0.06
Titanium	mg/kg	13	0	0.17	0.31	0.34	0.37	0.43	13	0	0.16	0.37	0.41	0.45	0.52	10	0	0.82	1.01	1.11	1.21	1.41
Uranium	mg/kg	13	11	0.00077	0.00075	0.00082	0.00090	0.00104	13	4	0.00066	0.00094	0.00103	0.00112	0.00131	10	0	0.0036	0.0062	0.007	0.007	0.009
Vanadium	mg/kg	13	13	0.02	N/A	0.022	0.024	0.0280	13	3	0.18	0.394	0.433	0.473	0.552	10	5	0.125	0.164	0.18	0.20	0.23
Zinc	mg/kg	13	0	4.27	5.27	5.80	6.32	7.38	13	0	43.72	89.50	98.45	107.40	125.30	10	0	38.15	46.15	50.77	55.38	64.61
Radionuclides (Dry Weight)																						
Radium-226	Bq/g	13	13	0.01	N/A	0.0110	0.0120	0.0140	13	13	0.01	N/A	0.0110	0.0120	0.014	10	10	0.01	N/A	0.0110	0.012	0.014
Lead-210	Bq/g	13	13	0.10	N/A	0.1100	0.120	0.1400	13	13	0.10	N/A	0.1100	0.120	0.140	10	10	0.10	N/A	0.1100	0.120	0.140
Uranium-238	Bq/g	13	11	0.012	0.012	0.0127	0.0138	0.0161	13	5	0.023	0.035	0.0253	0.0276	0.032	10	10	0.01	N/A	0.0110	0.012	0.014
Polonium-210	Bq/g	13	10	0.0114	0.0140	0.0125	0.0137	0.0160	13	3	0.0718	0.0946	0.0790	0.0862	0.101	10	7	0.0136	0.0193	0.0150	0.0163	0.019
Thorium-230	Bq/g	13	13	0.01	N/A	0.0110	0.0120	0.0140	13	13	0.01	N/A	0.0110	0.0120	0.014	10	10	0.01	N/A	0.0110	0.0120	0.014

Notes: The 95th Percentile of the baseline dataset for each lake was calculated in ProUCL 5.2 using all of the baseline data collected in 2021, 2022, and 2023. In cases where non detects were present in the dataset values were derived using ProUCL 5.2 Statistics for Data Sets with Non-Detects. Response Framework Action Levels were set using the baseline value (95th percentile) +10% (Low), +20% (medium), and 40% (High).

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