



APPROVAL TO OPERATE POLLUTANT CONTROL FACILITIES

Ministry of Environment
Environmental Protection Branch
Uranium and Northern Operations

Issued pursuant to *The Environmental Management and Protection Act, 2010*, and the regulations there under.

APPROVAL NO. PO24-012

WHEREAS, Orano Canada Inc. of Saskatoon, Saskatchewan (the "Company") has applied for approval pursuant to Section 26(1) of *The Environmental Management and Protection Act, 2010 (EMPA 2010)*, Section 9 of *The Mineral Industry Environmental Protection Regulations, 1996 (MIEPR)*, Section 7(1)(a) and 9 of *The Environmental Management and Protection (General) Regulations, c.e-10.22 Reg 1 (EMPA Reg 1)*, and Section 9 of *The Hazardous Substances and Waste Dangerous Goods Regulations (HSWDGR)*, for their McClean Lake Operation located near McClean Lake, in the Province of Saskatchewan at approximate UTM Grid Zone 13/6467300mN/568200mE.

PURSUANT to Section 27(2)(a) of EMPA 2010, Section 26 of MIEPR, Section 7(1) and 9 of EMPA Reg 1, and Section 11 of HSWDGR, the Minister of Environment (the "Minister") hereby issues to the Company an Approval to Operate Pollutant Control Facilities, Approval No. PO24-012 subject to the terms and conditions set forth herein or attached hereto.

This Approval expires on October 31, 2029 unless sooner terminated.

To renew this Approval, an application for renewal as described in Section 9 of *The Mineral Industry Environmental Protection Regulations, 1996*, must be submitted at least 120 days prior to the expiry date of this Approval.

Dated at Saskatoon, Saskatchewan this 31st day of January 2024.

Handwritten signature of Casey Frantik in blue ink.

Recommended by
Casey Frantik
Environmental Protection Officer

Handwritten signature of Tim Moulding in blue ink.

Tim Moulding, Manager, Uranium and Northern Operations,
acting for and on behalf of the Minister of Environment

1.0 DEFINITIONS

- 1.1** Subject to Condition 1.2, all words and phrases used in this Approval have the same definition as in The Environmental Management and Protection Act, 2010 and the regulations thereunder.
- 1.2** In this Approval and for the purposes of this Approval:
- “competent person” means, with respect to a particular task or duty, a person that possesses the knowledge, experience and training, to perform that particular task or duty.
- “EMPA 2010” means *The Environmental Management and Protection Act, 2010*.
- “Regulations” mean any regulations made pursuant to the EMPA, 2010 and other Acts as indicated.
- “Code” means *The Saskatchewan Environmental Code* and attendant standards.
- “Ministry” means the Ministry of Environment of the Province of Saskatchewan.
- “Schedule” refers to an attachment to this Approval.
- “Bi-Monthly” means every two (2) months.

2.0 AUTHORIZATION

- 2.1** Subject to the terms and conditions in this Approval, the Company is authorized to operate the following in accordance with the applicable Company operations manuals:
- a) Pollutant Control Facilities and supporting infrastructure associated with the McClean Lake Operation including the McClean Lake Mill and JEB Tailings Management Facility (TMF), the Sue and SABRE sites, and the Sink-Vulture Treated Effluent Management System;
 - b) Air pollution monitoring and/or abatement equipment approved by the Ministry;
 - c) Sewage treatment associated with the McClean Lake Operation;
 - d) Landfills used for the disposal of contaminated waste;
 - e) Landfills used for the disposal of industrial waste;
 - f) Landfill and incinerator used for the disposal of domestic waste;
 - g) The contained areas on top of the JEB waste rock stockpile used for remediation of hydrocarbon contaminated soil; and,
 - h) Hazardous Substances and Waste Dangerous Goods Storage Facilities associated with the McClean Lake Operation.
- 2.2** Subject to the terms and conditions in this Approval, the Company is authorized to continue temporary closure of Pollutant Control Facilities associated with the Midwest Project. Conditions in this Approval related to the Midwest Project replace the Midwest Project’s Ministerial Approval to Temporarily Close Pollutant Control Facilities IT-39.

TERMS AND CONDITIONS

3.0 GENERAL CONDITIONS

- 3.1** The Company shall not construct, operate, alter, extend, or decommission any facilities or works without first having obtained and complied with an approval, permit, license, or order issued pursuant to EMPA 2010, the regulations, and the code.
- 3.2** In the event of a conflict between this Approval and any provincial Acts, Regulations, or the Code, the requirements of the provincial legislation shall prevail, unless the requirements of this Approval are more stringent.
- 3.3** All aspects of construction, operation and reclamation of the approved facilities or works shall be conducted in such a manner as to minimize any adverse effect on the environment.
- 3.4** Any alteration of information provided in an application made to obtain this Approval, in whole or in part, will require prior, written approval from the Ministry.
- 3.5** Any changes to the Environmental Monitoring Program (EMP) and the associated Locations, Frequencies and Parameters tables listed in Appendix A will require prior written approval from the Ministry.
- 3.6** All facilities, and all plans and records pertaining to their environmental management, shall be made available at all reasonable times for inspection and audit by representatives of the Ministry.
- 3.7** The Company shall advise the Ministry in writing of any plans regarding changes in ownership of the facilities and works at least 60 days in advance of the change where the change can be reasonably anticipated.

4.0 WORKS AND FACILITIES SPECIFIC CONDITIONS

4.1 Waste Rock Management

- 4.1.1** The Company shall manage special waste rock and clean waste rock for onsite construction and/or other activities in accordance with the McClean Lake Waste Rock Management Standard. The Company shall geochemically characterize waste rock produced from any future mining before it is used as clean fill or for construction material to ensure that it meets clean waste rock criteria as defined under the McClean Lake Waste Rock Management Standard.
- 4.1.2** All mineralized and potentially acid generating waste rock storage pads or facilities shall be operated and maintained such that the material is fully contained within the designated areas at all times.

4.2 Material Storage, Handling, and Transportation

- 4.2.1** The Company shall store all hazardous substances and waste dangerous goods in the

authorized storage facilities listed in Appendix B in accordance with the requirements of *The Hazardous Substances and Waste Dangerous Goods Regulations*.

4.3 Air Management

- 4.3.1 In accordance with Ministerial Approvals issued for the McClean Lake Operation under The Environmental Assessment Act, the Company shall conduct air quality monitoring for the listed parameters at the frequencies noted in Tables 6, 7, 8, 9, and 10 of the McClean Lake Operation EMP to ensure compliance with Schedule 2 standards while remaining consistent with the predicted contaminants described in the environmental impact statements.
- 4.3.2 The Company shall follow the commitments described in their approved Industrial Source Air Quality (ISAQ) Environmental Protection Plan (EPP), Notification No: 10061989, for the Facility.
- 4.3.3 The Company shall ensure the approved ISAQ EPP, Notification Number: 10061989, is updated as may be required to reflect changes made to the conditions of this Approval and its monitoring requirements.
- 4.3.4 The Company shall take all immediate and diligent actions to prevent or keep as low as reasonably achievable concentrations of air contaminant emissions from all sources within the facilities or works, ensuring concentrations do not exceed the standards described in Schedule 2.
- 4.3.5 Should monitoring at approved ambient air quality stations listed in Tables 6, 7, and 8 of the McClean Lake Operation EMP exceed or it is anticipated that they are likely to exceed those standards described in Schedule 2, or if the Ministry has reason to believe that there are any air quality issues with the facilities or works, the Ministry may request additional air monitoring.
- 4.3.6 The Company shall, to the maximum practicable extent, minimize fugitive dust emissions from within the boundaries of the Facility including haul roads, ore and waste rock storage areas, and areas where mineral processing and crushing activities take place.
- 4.3.7 The Company shall evaluate methods for reducing air contaminant emissions at the facilities or works, when operating. Results of this evaluation shall be included in the Environmental Performance Reports and Annual Reports required by this Approval and include but not be limited to:
- a) a discussion of any reduction measures implemented at the facilities or works; and
 - b) potential options for further reducing air contaminant emissions.
- 4.3.8 Facilities or works equipped with air pollution abatement equipment shall be operated such that:
- a) the air pollution abatement equipment is operational when the associated process equipment is operational;
 - b) proper operational procedures, equipment maintenance, and operator training are provided to ensure efficient performance and operation of equipment; and
 - c) subject to the applicable terms and conditions of this Approval.
- 4.3.9 The Company may burn clean wood waste, defined as trees, brush, and lumber or wood that

has not been painted, stained, treated, or preserved in any manner or fashion and has all associated combustible hardware removed, provide it is done in accordance with the following conditions;

- a) clean wood waste and tree products shall be segregated from other types of refuse at the disposal location;
- b) prior to burning, the Company must inspect the pile to ensure that it only contains clean wood waste;
- c) the Company must ensure that all plastic, rubber, metal, painted or treated wood and all other material that is not clean wood is removed from the burn pile prior to burning;
- d) burning shall be conducted on a day when wind speeds and direction are satisfactory and any smoke will not cause an adverse effect;
- e) the fire shall be supervised at all times if there is a potential for it to spread;
- f) fire suppression equipment shall be at the waste disposal ground or on standby during burning and immediately following burning activities;
- g) the Company shall immediately cease burning and suppress a fire if the fire has caused or is causing an air contaminant or adverse effect as defined by EMPA, 2010; and
- h) the Company shall abide by *The Wildfire Act, 2015* during the wildfire season.

4.4 Water/Wastewater Management

- 4.4.1 As much clean surface water as reasonably possible shall be diverted away from any areas at the facilities or works where that water may become contaminated, including but not limited to any mining areas, processing areas, waste management areas, waste rock piles and ore stockpiles.
- 4.4.2 Water usage shall be minimized wherever practical, to reduce the volume of wastewater to be treated and released to the environment.
- 4.4.3 All waters that become contaminated from the operation shall be collected and treated.
- 4.4.4 No contaminated water shall be discharged to the environment unless approved by the Ministry.
- 4.4.5 All contaminated wastewater and process water shall be treated prior to discharge to the environment from the final point of control. The concentrations of contaminants in the treated effluent at the final point of control shall be as low as reasonably achievable, and shall not exceed the Effluent Quality Limits specified in the attached Schedule 1. The final point of control for the JEB WTP is CM01B and the final point of control for the Sue WTP is SC01.
- 4.4.6 In the event that the concentration of any contaminant in the treated effluent released to the environment exceeds the limits specified in Schedule 1, the Company shall immediately terminate the release, initiate remedial action, and notify the Ministry.
- 4.4.7 No water shall be utilized for the purpose of diluting contaminants to achieve effluent quality limits noted in Schedule 1.
- 4.4.8 The Company shall evaluate methods for reducing effluent volume and contaminant concentrations, when operating. Results of this evaluation shall be included in the

Environmental Performance and Annual Reports required by this Approval and include but not be limited to:

- a) a discussion of any water reduction measures implemented at the facilities and works; and
- b) potential options for further reducing fresh water usage.

4.4.9 During the filling and emptying of the water treatment plant monitoring ponds, a composite water sample shall be collected for analysis:

- a) If the treated effluent quality analysis of the composite sample taken during filling of the JEB WTP monitoring pond (CM01) meets limits listed in Schedule 1 of this Approval, the treated effluent can be released to Sink Reservoir; and
- b) If the 12 hour continuous discharge composite sample (Station SC01) taken at the Sue WTP meets limits listed in Schedule 1 of this Approval, treated effluent can be discharged to Sink Reservoir.

4.4.10 The flow of water released from Sink Reservoir shall not exceed the lesser of:

- a) one part water treatment plant effluent flow to five parts Collins Creek flow as measured below the outlet of McClean Lake to Collins Creek; and
- b) a flow rate that would cause the Collins Creek flow to exceed 4.52 m³/sec.

4.4.11 All drainage diversions and runoff collection facilities shall be constructed, operated, and maintained so as to minimize erosion.

4.4.12 All ponds containing treated and untreated effluent, sludge material, and runoff water shall maintain a minimum freeboard of at least 1.0 m unless approved by the Ministry.

4.4.13 All mill tailings shall be transferred to the JEB TMF and contained therein unless otherwise approved by the Ministry.

4.4.14 There shall be no discharge of liquid effluents from the JEB TMF directly into the environment unless approved by the Ministry. All liquids reclaimed from the JEB TMF shall be directed to the JEB Water Treatment Plant (WTP) for treatment.

4.4.15 The JEB TMF shall be maintained and operated in a manner acceptable to the Ministry. The JEB TMF shall be operated in accordance with the Company's most recent revision of the "McClean Lake Operation Procedure 504 Tailings Management Facility Unit Process". The Company shall provide the most recent version of this procedure to the Ministry when requested.

4.4.16 The mill and effluent treatment system shall be maintained and operated in accordance with the most recent revision of the "McClean Lake Operation Unit Process Procedure" for each circuit. The Company shall provide the most recent versions of these procedures to the Ministry when requested.

4.4.17 Water in the JEB overburden/waste rock pond shall be diverted to the JEB TMF if water quality from the pond exceeds Saskatchewan Environmental Quality Guidelines (SEQG) for the protection of fresh water aquatic life.

4.4.18 Water collected in/from the following locations shall be treated in the JEB WTP either directly or indirectly via the JEB TMF or the Tailings Preparation Circuit:

- a) JEB special waste storage pad;
- b) JEB ore storage pad;
- c) Ore pad runoff pond;
- d) McClean Lake Mill Terrace, which shall be diverted to, and contained within the mill terrace runoff collection pond; and
- e) The Mill Terrace runoff collection pond.

4.4.19 Water from the following locations may report to the Sue pre-sedimentation ponds, the Sue pits, or be treated in the Sue WTP:

- a) Minewater, including from the SABRE site;
- b) Ore transfer pad ditches;
- c) Sue site runoff pond; and
- d) Surface runoff.

4.4.20 Water from the pre-sedimentation ponds may be directed to the Sue C/A pit, or be directed to the Sue WTP. Water from the sedimentation ponds and 12-hr and 36-hr settling ponds within the Sue WTP system may be directed to the pre-sedimentation ponds.

4.4.21 A minimum of 1.0 m freeboard shall be maintained in the Midwest Project Settling Ponds No. 1 and 2.

4.4.22 If the 1.0 m freeboard is exceeded in the Midwest Project Settling Ponds, excess water above the 1.0 m freeboard shall be pumped into the test mine shaft provided a 1.0 m freeboard is maintained in the shaft after pumping is completed.

4.4.23 Any Midwest Project valves that if opened would allow contaminant release to the environment shall be locked out in the closed position or fitted with a blank flange to prevent accidental release.

4.4.24 The Company may place solid sewage waste within the Solid Sewage Waste Management Area.

4.4.25 Notwithstanding Condition 4.4.24, all sewage is to be directed to the JEB WTP for treatment.

4.4.26 Operating records of the sewage collection systems shall be maintained for the JEB and Sue sites and shall include estimated monthly volumes based on the volume of potable water treated.

4.4.27 The Company shall review and evaluate chemical usage at least annually to minimize environmental loading from effluent released at the final point of control. The results of the review and evaluation shall be included in the Annual Report.

4.5 Waste Handling, Transportation, and Disposal

4.5.1 The Company shall maintain a waste management program based on the 4 R's - Reduce, Reuse, Recycle, and Recover. This program shall be reviewed on an annual basis and results of this review shall be reported in the Annual Report.

4.5.2 The Company shall ensure the type, quantity, disposal location, and disposal method is accurately recorded and logged for all waste generated at the facilities and works and reported in the Annual Report.

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- 4.5.3 Domestic wastes, consisting of green waste (food and kitchen wastes), clothing, linens, and non- recyclable materials from camp and the mill office, may be disposed in the domestic landfill.
- 4.5.4 The acceptance, spreading, compacting and covering of wastes at the landfill shall meet the requirements of Section 7(2) and 7(3) of *The Municipal Refuse Management Regulations*. The domestic landfill shall be operated according to the company’s most recent revision of McClean Lake Operation Work Instruction “Domestic Landfill Operation” which shall be developed to meet the MRMR requirements.
- 4.5.5 The Company shall operate, maintain, and service the INFRATECH Model 200MC Mixed Waste incinerator in accordance with the most recent Incinerator Operating Procedures, manufacturer’s specifications, and ISAQ EPP commitments.
- 4.5.6 The incinerator shall be used for domestic waste only.
- 4.5.7 Industrial wastes, consisting of industrial packaging materials, scrap wood, tires, screening, insulation, furniture, metal, non-recyclable industrial plastic, and other waste construction materials, shall be disposed of within one of the industrial landfills located at the JEB site, Sue site or the Contaminated Landfill.
- 4.5.8 The operation and disposal of industrial wastes into the industrial landfills shall be conducted in accordance with the Company’s most recent revision of McClean Lake Operation Work Instruction “Industrial Landfill Operation”.
- 4.5.9 No radioactive material or Waste Dangerous Goods may be deposited in the domestic or industrial landfills.
- 4.5.10 Chemically and radiologically contaminated wastes shall be disposed in the Contaminated Landfill in the Sue C/A pit.
- 4.5.11 The operation and disposal of chemically and radiologically contaminated wastes into the Contaminated Landfill in the Sue C/A pit shall be conducted in accordance with the Company’s most recent revision of McClean Lake Operation Work Instruction “Contaminated Landfill Operation”.
- 4.5.12 Groundwater monitoring near the landfills shall be conducted in accordance with the approved environmental monitoring program described in Table 11 of the McClean Lake Operation EMP
- 4.5.13 Hydrocarbon contaminated soils may be remediated in the contained area on top of the JEB waste rock stockpile and used for future reclamation efforts and operated according to the Company’s most recent revision of McClean Lake Operation Work Instruction “Hydrocarbon Contaminated Soil Land Farm Operation.”
- 4.6 Handling and Transportation of Ore and Mineralized Waste Rock**
- 4.6.1 The Ore Receiving Facilities shall be maintained and operated in accordance with the most recent revision of the McClean Lake Operation Procedure “Ore Slurry Receiving Unit Process”.
- 4.6.2 The Company is authorized to process ore from Cigar Lake, McArthur River and ore and mineralized waste rock from Sue facilities, McClean Lake, Midwest Project, and Caribou.

- 4.6.3 The Company shall provide a construction application for Ministry review and approval before mining activities at the Midwest Project and Caribou commence.
- 4.6.4 The Company is authorized to place low grade ore, mineralized waste rock, and mineralized materials associated with site maintenance activities on approved ore storage pads.

5.0 INSPECTIONS

- 5.1 The Company shall ensure daily environmental inspections of the McClean Lake facilities and monthly inspections of the Midwest facility are completed by competent persons following approved work procedures and instructions. Findings and all actions taken shall be recorded and reported in a manner acceptable to the Ministry.
- 5.2 All synthetic-lined structures used to contain or store contaminated or potentially contaminated material or hazardous material such as surface collection ponds, contaminated water ponds, monitoring ponds, or fuel storage facilities shall undergo a detailed inspection annually. The results of the inspections shall be submitted with the Annual Report along with a discussion of the measures taken by the Company in response to the inspections findings.
- 5.3 A liner integrity assessment shall be conducted for the Ore Storage pad, ore transfer pad, and waste rock pad if there is evidence or indication that their liners are not performing (i.e. groundwater monitoring indications).
- 5.4 Inspections of all structures, buildings, and facilities that are designed to act as secondary containment and used to contain, process, transport or store contaminated or potentially contaminated material, waste dangerous goods, or hazardous materials shall undergo a detailed inspection and maintenance performed by competent persons and as per the Company's secondary containment inspection program. The results of the inspections shall be submitted with the Annual Report along with a discussion of the measures taken by the Company in response to the inspections findings.
- 5.5 Geotechnical structures shall undergo a detailed geotechnical inspection annually, are to be performed by a Qualified Person and the report shall be submitted to the Ministry.
- 5.6 The Company shall maintain inspection logbooks and monitoring data on file until written authorization for disposal of this data is granted by the Ministry.
- 5.7 The runoff diversion works surrounding the overburden and waste rock storage pads, the Sink Reservoir containment dam, and the Vulture Lake/McClean Lake control structure and discharge pipe shall be inspected by a qualified person annually to assess performance and determine any repairs necessary. The results of the inspections shall be submitted with the Annual Report along with a discussion of the measures taken by the Company in response to the inspections findings.

6.0 MONITORING

- 6.1 Monitoring programs shall be conducted by the Company in accordance with Appendix A Tables 2 to 16(inclusive) of the McClean Lake Operation EMP. Sample collection and analytical methodology shall be those that are acceptable to the Ministry and shall follow the Company's quality assurance and quality control programs.
- 6.2 The Company shall maintain an ongoing quality assurance and quality control program for field and laboratory procedures that is acceptable to the Ministry. The Company shall ensure that laboratories used have a quality assurance and quality control program and are accredited or accepted, and conform to accepted standards for analysis conducted on behalf of the Company. This program shall be reviewed annually by the Company and reported in the Annual Report.
- 6.3 Where Ministry staff collect compliance samples during Ministry inspections, the Company shall collect duplicate samples where directed by the assigned site Environmental Protection Officer. The analysis of the Company's sample shall be completed for the same parameters being analyzed by the Ministry. The results of these samples analyses shall be reported in the Annual Report. The Ministry will provide the Company with the results of their sample analyses.
- 6.4 The Company shall maintain and operate all monitoring systems pertaining to environmental monitoring and control at their facilities and works in accordance with the plans and specifications for which the applicable permission was issued, unless approval to alter such monitoring systems has been obtained from the Ministry.
- 6.5 The Company shall review and evaluate the adequacy and proper functioning of monitoring and control systems related to control of discharges pursuant to the *Discharge and Discovery Chapter* of the Saskatchewan Environmental Code, annually. This review shall include but not be limited to:
- a) inspection patrols by Company personnel;
 - b) care and maintenance of monitoring instrumentation, control, and alarms;
 - c) calibration of instrumentation;
 - d) inspection and monitoring record-keeping and reporting;
 - e) training of all personnel involved in maintaining the monitoring and control system for emergency response procedures; and
 - f) a mock emergency response exercise will be conducted annually to test the environmental response procedures specific to a discharge pursuant to the *Discharge and Discovery Chapter* of the Saskatchewan Environmental Code, notifying the Ministry ahead of any exercise to provide Ministry staff the opportunity to participate and/or observe.

Any changes that occur to environmental monitoring and discharge control policy and procedures resulting from this review and evaluation shall be reported in the Annual Report.

7.0 REPORTING

7.1 Reporting Format

The results of all monitoring programs required in this Approval shall be submitted in a format and frequency acceptable to the Ministry.

7.2 Event Reporting

7.2.1 Discharges and discoveries:

- a) As described in the November 30, 2018 letter from Cameco and Orano to the Ministry, per the *Discharge and Discovery Reporting Standard*, there is no obligation to report the intentional, lawful and prudent use of a substance that is generally recognized as accepted, ordinary and normal. This includes fugitive emissions resulting from commissioning, operating, or decommissioning a works. Regarding pressurized systems of propane and/or anhydrous ammonia:
 - i. Small leaks from packing on a valve stem, seepage from seats of a pressure relief valve or from the threads of fittings, intentional opening of properly drained systems for maintenance, minor emissions at connections during offloading, and minor pinhole leaks that are not the result of larger mechanical integrity issues, that occur on well maintained and properly operated systems that do not affect worker or public health and safety, or cause negligible environmental impact or other adverse effect, are not reportable.
 - ii. Without limiting the following, leaks that occur from equipment failure such as corroded piping, tank fails, or with the exception of commissioning, a pressure relief valve being activated, are reportable.
- b) In the event of a discharge or discovery as described in the Discharge and Discovery Reporting Chapter of EMPA Reg1, the Company shall immediately notify the 24 hour Spill Control Centre at (1-800-667-7525) and employ the appropriate level of response from their environmental contingency plan commensurate with minimizing environmental damage and public safety hazards, both from the discharge and from the corrective actions employed and submit to the Ministry a follow up written report as per the Code.
- c) The reporting of on-site discharges and releases of Class 7 (radioactive) substances will be completed in accordance with the June 3, 2015 submission “On-Site Releases of Class 7 (Radioactive) Substances Pursuant to the Saskatchewan Environmental Code” (Appendix C). Where radioactive material has been discharged, the affected area will be cleaned up to a maximum gamma radiation level of background plus 0.5 µSv/hr at 1.0 m above the affected area, and an after-cleanup gamma grid survey of the affected area is to be included in reports documenting the event.

7.2.2 The Company shall notify the assigned site Environmental Protection Officer of the following events as soon as possible during regular business hours:

- a) A verified monitoring program result that indicates that the quantity or concentration of a substance is outside of the expected and acceptable range of variability for that monitoring

station;

- b) An environmental risk that threatens or threatened the safety of workers, the environment, or Facility infrastructure (e.g. fire, flood, wildlife interaction); and
- c) For the events described in a) and b), the Company shall submit a report to the Ministry describing the event and event resolution as directed by the site Environment Officer unless directed otherwise by EMPA 2010, the regulations, Code, or attendant standards.

7.2.3 The Company shall notify the assigned site Environmental Protection Officer or designate of any unplanned or uncontrolled releases of substances identified in Table 1 of the Discharge and Discovery Reporting Standard from areas of primary containment into secondary containment where the quantity exceeds the onsite reportable quantity noted in Table 1 of the Discharge and Discovery Reporting Standard as an environmental incident within 72 hours of the event.

7.2.4 In the event that concentrations measured at approved ambient air quality monitoring stations exceed those described in Schedule 2, the Company shall:

- a) notify the Ministry upon discovery;
- b) investigate the cause of the emission exceedance;
- c) implement the appropriate corrective measures as approved by the Ministry to correct the release and reduce the probability of reoccurrence; and
- d) submit a report detailing the occurrence and actions taken within 30 days of the initial notification to the Ministry.

7.3 Quarterly Reporting and Semi-Annual Reporting

The Company shall submit a semi-annual report by August 31 of each year that includes 7.3 a) to l). The information required by 7.3 (k) and (l) will continue to be reported on a quarterly frequency.

- a) The results of the air, surface water, and groundwater monitoring programs as per Tables 3 to 13 (inclusive) of the McClean Lake Operation EMP and presented in Appendix A. The data shall be reviewed prior to the submission with respect to accuracy and completeness, effluent quality limits, and SEQG freshwater aquatic surface water guidelines providing interpretation for any unusual results or excursions.
- b) Results of inspections, including findings and actions taken;
- c) Reporting of mass loading of As, Cu, Ni, Pb, U, Ra-226, Mo, Se, and TSS contaminants discharged to the environment.
- d) Tables and graphs for specific parameters at stations requested by the Ministry. The graphical format will present individual sampling analysis for specific parameters and be presented as an accumulation of data presenting at least the most recent 12 months of data.
- e) A summary of environmental incidents as described in Condition 7.2.3 and recordable releases as described in Condition 7.2.1 b) including, but not limited to the following:
 - i. The date and times the event occurred;
 - ii. The geographic coordinates of the location(s) of the event, presented in decimal degrees of latitude and longitude;

- iii. The types and volumes of the substance released; and
 - iv. Details of the event including, where appropriate, a description of the event, the cause, actions taken, disposal methods and locations, and actions taken to prevent similar events.
- f) Estimated volumes of sewage based on the volume of potable water treated;
- g) Water balance for the JEB and Sue sites;
- h) The following JEB TMF operating details:
- i. Tailings volumes deposited in the JEB TMF and an estimation of the available storage capacity at the end of the reporting period;
 - ii. Quantity and quality of water being removed by the raise wells and reclaim system, as available;
 - iii. Pond water, raise well, and TMF monitoring well levels;
 - iv. Tailings underflow porewater and solids chemical analysis;
 - v. Average monthly tailings density;
 - vi. Any other information obtained during the reporting period that has an environmental relevance to the performance of the JEB TMF.
- i) Potable water chlorination testing results, raw and treated water turbidity and coliform sample results in accordance with the frequency and locations specified in the current 'Permit to Operate Waterworks'; and,
- j) any other information obtained during the period that has an environmental significance.
- k) The surface water quality data collected for the Sink/Vulture Treated Effluent Management System (SVTEMS) (Stations WQ09E, CM03, WQ10E and CM04) and for the following stations on Collins Creek. The two Reference stations WQ02C (Collins Creek Upstream of Indigo Lake), WQ15C (McClean Lake West) and the following exposure stations WQ11E (McClean Lake East), WQ12E (Collins Creek immediately downstream of McClean Lake East) and WQ13 (Collins Creek downstream of Highway 905).
- l) The effluent water quality data for the Jeb Water Treatment Plant (CM01B) and the Sue Water Treatment Plant (SC01) along with the JEB TMF raise well water (Station CM05) and JEB TMF Pond Water (Station CM06) that feed to the JEB WTP.

The semi-annual report for the second half may be included with the Annual Report.

7.4 Annual Reporting

An Annual Report, based on the previous calendar year, shall be submitted by March 31 of the following year. This report shall include the information as described in the most recent version of the Canadian Nuclear Safety Commission/Saskatchewan Government Administrative Agreement on Harmonized Annual Reporting Requirements and include but not limited to the following:

- a) Data from the environmental monitoring programs, summaries, and a detailed interpretation of the data, as specified in Tables 3 to 16 (inclusive) in the McClean Lake Operation EMP and detailed in Appendix A;
- b) Total amounts of parameters of concern with assessment of mass loadings and material

- balances as a result of the discharge of treated mill effluent;
- c) Comparisons of the results of water quality monitoring to the SEQS for the Protection of Aquatic Life in surface water, for Collins Creek;
 - d) Results of the annual review of the environmental monitoring and control systems related to the control of discharges in accordance with Condition 6.5;
 - e) Water balances for the JEB and Sue sites;
 - f) A discussion of the operational performance of the JEB TMF, including the following:
 - i. Quantity and quality of water being removed by raise wells and reclaim system;
 - ii. Pond water, raise well and TMF monitoring well levels;
 - iii. Tailings underflow porewater and solids chemical analysis;
 - iv. Average monthly tailings density;
 - v. Actual tailings placement pattern changes for the reporting period;
 - vi. Any other information obtained during the previous year that has an environmental significance or relevance to the performance of the JEB TMF; and
 - vii. Results of the tailings monitoring program, including geochemistry, and interpretation of these results as they relate to performance of the tailings facility;
 - g) Comparison of ambient air quality data to applicable Saskatchewan standards (Schedule 2) or, where no Saskatchewan standard exists, to baseline data and/or suitable standards from other jurisdictions;
 - h) Total annual stack emissions of SO₂
 - i) Amount of waste rock and special waste rock generated and their geochemical and acid base accounting results acquired throughout the reporting year;
 - j) A summary of decommissioning and reclamation activities for the past year including the results of any monitoring of decommissioned and reclaimed areas and the activities proposed for the upcoming year;
 - k) A summary of proposed decommissioning and reclamation activities for the next five years; and,
 - l) An annual dewatering report that discusses dewatering operations including the following:
 - i. Presentation and discussion of water quality and quantity associated with dewatering operations;
 - ii. Graphical presentation, in plan view and cross-section, of the artificial water table associated with all dewatering operations; and,
 - iii. A discussion and interpretation of the data presented.
 - m) Update on the quality assurance program for the field and laboratory procedures performed by the Company and the accreditation status of their external analytical laboratories;
 - n) Results of any certification or proficiency testing done by the onsite laboratory with external certification or licensing bodies or laboratories. This applies to onsite laboratories used for any analyses required by this approval;
 - o) Results of the annual review of the environmental contingency plans in accordance with Condition 9.2;

- p) A summary of the results of the inspections per Condition 5.0 and a description of any work that was done to address concerns identified;
- q) Types and amounts of waste dangerous goods removed from the site;
- r) A summary of all events reported under Condition 7.2 along with the actions taken;
- s) A figure showing the McClean Lake and Midwest surface lease area and site layout;
- t) A figure(s) showing all environmental monitoring stations;
- u) A discussion on findings from the chemical usage review detailed in Condition 4.4.26;
- v) A summary of the method, type, and quantity of wastes disposed of at the operation and a discussion as to any environmental significance as per Conditions 4.5.2;
- w) Documentation of any or proposed operational changes, changes in the treatment systems, or any significant events that could affect the environment;
- x) Annual production rates and an estimate of mineable ore reserves remaining;
- y) Reporting requirements pursuant to the site Permit to Operate Waterworks;
- z) Per Condition 5.2, a table summarizing liner inspection dates, findings, recommendations, date of repair, and description of repair; and,
- aa) A summary of secondary containment inspection results described in Condition 5.4

7.5 Environmental Performance Reporting

- 7.5.1 The Company shall submit Environmental Performance Reports in a manner and time acceptable to the Ministry. This report shall include applicable information as described in the most recent version of the Environmental Performance Reporting Guideline. This report shall cover the period from January 1, 2022 to December 31, 2024 and be submitted to the Ministry no later than December 31, 2025, subject to change upon mutual agreement between the Company and the Ministry. A subsequent Environmental Performance Report will be required for the next five (5) year period from January 1, 2025 to December 31, 2029, and is due on December 31, 2030.
- 7.5.2 The Company shall conduct tailings and pond water monitoring in the JEB TMF for the following tailings performance aspects per the “Environmental Performance Report Guideline” and report findings to the Ministry as part of the next Tailings Optimization and Validation Program submission.
- a) Geochemistry;
 - b) Geotechnical;
 - c) Hydrogeology; and,
 - d) Capacity.

8.0 DECOMMISSIONING AND RECLAMATION

- 8.1 No part of the facility may be decommissioned or reclaimed without prior approval from the Ministry.
- 8.2 The Company shall maintain a Preliminary Decommissioning Plan, Schedule and Financial Assurance as accepted by the Ministry.

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- 8.3** Prior to the completion and closure of any developed areas, the Company shall prepare and submit for approval of the Ministry, a detailed final decommissioning plan for the reclamation of the developed areas, including a schedule and commitment to undertake the proposed site decommissioning and reclamation activities.
- 8.4** Notwithstanding the requirements of 8.1, the Company shall, for all areas and facilities no longer being used, and for which there is no further use, submit proposals to the Ministry for decommissioning the facilities and reclaim the areas as soon as practical.
- 8.5** The Company shall at a minimum of every 5 years, or sooner if warranted by major changes to the site facilities and operations, conduct a review and update of the decommissioning and reclamation plan for the complete site. Coinciding with the review and update of the decommissioning plan, the cost estimates for establishing the financial assurance will also be updated. The revised decommissioning and reclamation plan and cost estimates will be submitted to the Ministry for review and approval. The next updated decommissioning and reclamation plan along with the updated cost estimates shall be submitted to the Ministry for review by January 31, 2025
- 8.6** Upon completion of the review and approval of the decommissioning plan and cost estimate, the financial assurance shall be adjusted accordingly within a period acceptable to the Ministry, to reflect the new cost estimates for decommissioning and reclamation.
- 8.7** The Company shall complete site decommissioning and reclamation work as approved by the Ministry.
- 8.8** Release from decommissioning or reclamation requirements or decommissioned sites may only be completed with approval from the Ministry.
- 8.9** In the event that a decision is made for permanent closure of the Midwest Project, the Company shall notify the Ministry at least 60 days before commencing permanent closure, and shall review the approved decommissioning and reclamation plan and assurance fund in accordance with Section 16(1) (c) of *The Mineral Industry Environmental Protection Regulations, 1996*.
- 9.0 ENVIRONMENTAL CONTINGENCY PLAN**
- 9.1** The Company shall maintain an Environmental Contingency Plan, which shall include but not be limited to the following:
- a) An Emergency Response Contingency Plan required pursuant to *The Hazardous Substances and Waste Dangerous Goods Regulations*, for all hazardous substances and waste dangerous goods to be stored on site;
 - b) An Emergency Response Contingency Plan for hazardous substance or dangerous goods transportation incidents that may be a reference to a corporate plan;
 - c) A General Emergency Response Contingency Plan to include, but not be limited to the

following:

- i. Response to reportable discharges or discoveries as per the code; and
- ii. Response to an event whereby treated effluent quality approaches or exceeds effluent quality limits specified in Schedule 1.
- d) an onsite emergency equipment inventory and location index; and
- e) A communication/notification plan.

9.2 The Environmental Contingency Plan shall be reviewed annually by the Company and modified as necessary to reflect changes in operations and technology. The results of these reviews shall be included in the Annual Report. The Company shall provide the most recent version of the plan to the Ministry whenever it is amended.

9.3 Communication of The Environmental Contingency Plan to employees, and associated training and drills, shall be recorded and presented in the Annual Report.

9.4 The Company shall ensure that their wildfire emergency response plan and Company contact information is updated and provided to the area Forest Protection Officer by the end of April each year.

10.0 ALTERATIONS

10.1 The Company may not, except as described in Condition 10.2, carry out alterations to existing pollutant control facilities without first obtaining an approval pursuant to Section 5 of *The Mineral Industry Environmental Protection Regulations, 1996*.

10.2 Condition 10.1, notwithstanding, the Company may in an emergency, carry out such alterations at their own discretion and without prior notification of the Ministry, in order to protect persons, property, or the environment, providing:

- a) The Ministry is notified within 24 hours of the alteration(s) carried out, with full details submitted for approval within seven (7) days; and
- b) The Company recognizes that the Ministry may require changes to the alterations following a review of the submitted information.

10.3 The Company shall provide “as constructed” plans and specifications of alterations referred to in Condition 10.1 and 10.2 within ninety (90) days of their completion, unless otherwise approved by the Ministry.

**SCHEDULE 1
ORANO CANADA INC. – McCLEAN LAKE OPERATION
EFFLUENT QUALITY LIMITS**

Contaminant	Maximum Monthly Mean Concentration (1, 2)	Maximum Composite Sample Concentration	Maximum Grab Sample Concentration
Total Arsenic	0.30 mg/L	0.45 mg/L	0.60 mg/L
Total Copper	0.30 mg/L	0.45 mg/L	0.60 mg/L
Total Lead	0.10 mg/L	0.15 mg/L	0.2 mg/L
Total Nickel	0.50 mg/L	0.75 mg/L	1.0 mg/L
Total Selenium	0.60 mg/L	0.90 mg/L	1.2 mg/L
Total Uranium	2.50 mg/L	3.75 mg/L	5.0 mg/L
Total Vanadium	0.50 mg/L	0.75 mg/L	1.0 mg/L
Total Zinc	0.50 mg/L	0.75 mg/L	1.0 mg/L
Total Ra-226	0.37 Bq/L	0.74 Bq/L	1.11 Bq/L
Total Th-230	1.85 Bq/L	2.78 Bq/L	3.7 Bq/L
Total Pb-210	0.92 Bq/L	1.38 Bq/L	1.84 Bq/L
Total Suspended Solids	15.0 mg/L	22.5 mg/L	30.0 mg/L
Un-ionized Ammonia (3)	0.5 mg/L	0.75 mg/L	1.0 mg/L

- Notes: pH: The pH of water discharged to the environment shall be between 6.0 and 9.5 in 100% of samples during any month, and the pH level of the effluent in a grab samples shall always be equal to or greater than 6.0 and less than 9.5.
1. Maximum monthly arithmetic mean concentration applies to both composite and grab samples.
 2. Concentrations are in the units noted.
 3. Un-ionized ammonia is that portion of the total ammonia nitrogen that is in the form NH₃. The Un-ionized concentration in the effluent is dependent upon the pH and temperature of the effluent and the receiving waters.
 4. Effluent quality limits are based on the Metal and Diamond Mining Effluent Regulations under the Federal Fisheries Act.

**SCHEDULE 2
ORANO CANADA INC. – McCLEAN LAKE OPERATION
SASKATCHEWAN AMBIENT AIR QUALITY STANDARDS**

Contaminant	Average Concentration For Applicable Time Period		
	1 Hour	24 Hours	Annual
Particulate Matter (PM _{2.5})		28 (1)	10
Particulate Matter (PM ₁₀)		50	
Total Suspended Particulates (TSP)		100	60 (2)
Nitrogen Dioxide (NO ₂)	300 (159 ppb)	200 (106 ppb)	45 (3) (24 ppb)
Sulphur Dioxide (SO ₂)	450 µg/m ³ (172 ppb)	125 µg/m ³ (48 ppb)	20 µg/m ³ (8 ppb) (3)

- Notes: 1. The 3 year average of the annual 98th percentile of the daily 24-hour average concentrations
2. Geometric Means
 3. Arithmetic Means
 4. Sampling will be in a manner and location specified by the Minister

APPENDIX A
McCLEAN LAKE ENVIRONMENTAL MONITORING PROGRAM LOCATION,
FREQUENCIES AND PARAMETERS V11

Table 2: Parameter Classes

Class	Component Analyzed	Parameters
Class A	Water	HCO ₃ /CO ₃ , Ca, Cl, Mg, K, Na, SO ₄ , TKN, Total N, NO ₃ , Total P, pH, Conductivity, Turbidity, Total Hardness, Sum of Ions, TOC, NH ₃ , TSS, TDS, Pb-210, Ra-226, Po-210, Th-230, U, Al, As, B, Ba, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Se, V, Zn
Class B1	Groundwater	HCO ₃ /CO ₃ , Ca, Cl, K, Mg, Na, SO ₄ , pH, TDS, Alkalinity, Total Hardness, Conductivity, Sum of Ions, Nitrate, Ammonia, As, Cd, Cu Fe, Mn, Mo, Ni, Pb, Se, U, Zn, Ra-226, Pb-210, Po-210 and Th-230
Class B2	Groundwater	HCO ₃ /CO ₃ , Ca, Cl, K, Mg, Na, SO ₄ , pH, TDS, Alkalinity, Total Hardness, Conductivity, Sum of Ions, Nitrate, Ammonia, As, Cd, Cu Fe, Mn, Mo, Ni, Pb, Se, U, Zn
Class B3	Groundwater	HCO ₃ /CO ₃ , Ca, Cl, K, Mg, Na, SO ₄ , pH, TDS, Alkalinity, Total Hardness, Conductivity, Sum of Ions
Class B4	Groundwater	HCO ₃ /CO ₃ , Ca, Cl, K, Mg, Na, SO ₄ , pH, TDS, Alkalinity, Total Hardness, Conductivity, Sum of Ions, Nitrate, Ammonia, As, Cd, Cu Fe, Mn, Mo, Ni, Pb, Se, U, Zn, Ra-226, Pb-210, Po-210, Th-230 and Hydrocarbons
Class C	Water	TDS, TSS, Ra-226, U, As, Cu, Fe, Ni, Zn, Pb, pH, Conductivity, Total Hardness, Turbidity, Sum of Ions
Class E	Sediment	Ra-226, Pb-210, U, Th-230, Po-210, As, Pb, Zn, Cu, Se, Ni, Mo, Al, Cd, Hg, Co, V, % Moisture, Loss on Ignition, Fe, TOC
Class F	Fish Tissue	U, As, Ni, Pb, Zn, Cu, Mo, Al, Cd, Co, Se, Age, Sex, Weight, Length, Mass – all tissues Ra-226, Po-210, Pb-210, Th-230 – flesh and bones only
Class G	Particulates	U, Ra-226, Pb-210, Po-210, Th-230, TSP, As, Mo, Ni, Cu, Co, Pb, Zn, Cd
Class H	Soil	% Moisture, pH, As, Ni, U, Ra-226, Pb-210, Po-210, Th-230, SO ₄ , Cu, Mo, Pb, Zn, Cd, Co, Se, soil bulk density, organic matter content
Class I	Vegetation	% Ash, As, Ni, U, Ra-226, Pb-210, Po-210, Th-230, Cu, Pb, Zn, Cd, Co, Mo, Se
Class J	WTP Effluent	Volume (each pond), pH, Cond., Ra-226, U, Mo, As, Ni, Cu, Pb, Zn, NH ₃ , Cd, Se, SO ₄ , Cl, TSS, TDS, Ba, Fe, Pb-210, Po-210, Th-230, V
Class K	WTP Effluent	TSS, Ca, Mg, K, Na, CO ₃ /HCO ₃ , SO ₄ , Cl, TKN, Total P, TOC, NH ₃ , U, Pb-210, Ra-226, Po-210, Th-230, Cu, Pb, Cd, Co, Fe, Mn, Ba, Zn, Al, Mo, Se, As, Ni, V, pH, Cond, TDS, Turbidity

Note 1: For surface water samples all parameters will be analyzed for the total chemical concentrations for each parameter. Note 2: When required, dissolved Ra-226 will be analyzed and reported on treated effluent samples (filter size 3 µm).

Note 3: Groundwater samples shall be filtered through 0.45 µm filters.

Note 4: Potable water sampling and monitoring requirements are detailed in the current “Permit to Operate Water Works.”

Table 3: JEB Site – Water Quality and Flow Monitoring Requirements

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sample Type	Parameters ¹	Frequency
JEB Water Treatment Plant Effluent and TMF Monitoring Stations					
CM01	JEB Water Treatment Plant Effluent to Monitoring Ponds During Filling	6467022N 568293E	Comp During Filling ⁴	Ra-226, U, As, Ni, Cu, Mo, Pb, Se, Zn, TSS, pH	During Filling
CM01B	JEB Water Treatment Plant Effluent Discharge to Sink Reservoir	6467022N 568293E	Comp During Emptying ⁴	Ra-226, U, As, Ni, Cu, Pb, Zn, TSS, pH, SO ₄ ²⁻ , Cl ⁻ , Mo, Se, Volume	D
			Comp	Class J ³	M ⁵
			Grab	96hr Static Trout Bioassay and <i>Daphnia magna</i> testing ⁶ with coincident Class K	Q
CM02	Contaminated Water Feed to Water Treatment Plant	6467022N 568293E		Volume (m ³)	D
CM03	Sink Reservoir Outflow at Wet Well	6461420N 568370E	Grab	Sp Cond (field measurement), Flow	W/D ¹³
			Grab	Class K, TSS, field temp., Cond., pH, DOC	M
			Grab	Class A, DOC	Q
CM04	Vulture Lake Outflow to McClean Lake at Weir Structure	6459356N 566508E		Flow volume (m ³)	W
			Grab	Class K, field temp., Cond., pH, DOC	Q
			Grab	Class K, TSS, field temp., Cond., pH, DOC	M
CM05	TMF Raise Well Water	6467687N 568129E		Volume (m ³)	D
				Water Level (mASL)	D
			Grab	Ra-226, U, As, Ni, Cu, Pb, Zn, TSS, pH, SO ₄ ²⁻ , Cl ⁻ , Mo, Se	W ¹¹
CM06	TMF Pond Water	6467853N 567905E	Comp	Class K	M ⁵
				Volume (m ³)	D
			Grab	Ra-226, U, As, Ni, Cu, Pb, Zn, TSS, pH, SO ₄ ²⁻ , Cl ⁻ , Mo, Se	W ¹¹
CM08	Tailings Thickener Underflow	6467157N 568271E	Comp ⁷ (porewater)	Ra-226, U, As, Ni, Cu, Pb, Zn, pH	M ⁸
			Comp (solids) ⁸	U, As, Ni, Fe (total)	M ⁸
			Comp (solids) ⁹	Ra-226	M ^{8,9}
			Comp	Density	M ⁸
			Comp ⁷ (pore water)	Al, As, Ba, Ca, Cd, Cl, Co, CO ₃ /HCO ₃ , Cu, Fe, K, Mg, Mn, Mo, Na, NH ₃ , Ni, Pb, Pb-210, pH, Po-210, Ra-226, Se, SO ₄ , Sp. Cond., TDS, Th-230, TKN, Total P, U, V, Zn	A
			Volume (m ³)	D	

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sample Type	Parameters ¹	Frequency
JEB Water Treatment Plant Effluent and TMF Monitoring Stations					
TW08, 95-01B, 95-02 B, 95-03 B, 95-04 B, 95-05 B	TMF Monitoring Wells	6467622N 567818E, 6468075N 568240E, 6467525N 568163E, 6467585N 567691E, 6467737N 567563E, 6468051N 567689E	Grab	Water Level (mASL)	D (datalogger) ¹² M (manual)
			Grab	Class B1	Q

D= Daily; Q=Quarterly; W=Weekly, SA=Semi-Annually, M=Monthly.

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

¹ Parameter classes defined in Table 2

² Monthly composite samples are comprised of representative portions from collected 12hr composite samples.

³ pH measurements not required.

⁴ Auto samplers on discharge lines to monitoring pond and to Sink Reservoir

⁵ CM01B monthly composite samples are comprised of representative portions from collected 24 hr composite samples. CM05 and CM06 monthly composite samples are comprised of representative portions collected from daily grab samples.

⁶ The 96hr Static Trout Bioassay and *Daphnia Magna* testing shall follow procedures in "*Methods for Determining Acute Lethality of Effluents to Rainbow Trout*" (Report EPS-1-RM-13, July 1990).

⁷ CM08 analysis is for pore water chemistry; all parameters reported as dissolved concentrations following filtration through a 0.45 µm filter.

⁸ Consists of daily composite samples reported as a monthly average.

⁹ Radium result is the average of 2 duplicate samples.

¹⁰ Sample is filtered through a 0.45 µm filter and will not be analyzed for TOC, TSS and Turbidity.

¹¹ Weekly samples are a grab sample collected once/week

¹² Datalogger downloaded monthly

¹³ Weekly unless trigger met for daily

Table 4: Sue Site – Water Quality Monitoring Requirements

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sample Type	Parameters ¹	Frequency
Sue Waste Rock Storage Pad, Runoff Collection Ponds					
SW02	Site runoff collection pond	6458686N 570592E	Grab	Field pH and Conductivity, Class C ²	June and Sept.
Sue Water Treatment Plant and Associated Monitoring Stations					
SC01 ³	Sue WTP discharge (Filter discharge)	6458600N 570676E	Comp.	As, Ni, Cu, Mo, Pb, Zn, Ra-226, U, TSS, pH, NH ₃ , SO ₄ ²⁻ , Cl ⁻ , Volume (m ³)	Every 12 hrs
			Comp. ⁴	Class J ⁵	M
			Grab	96hr Static Trout Bioassay and <i>Daphnia magna</i> testing ⁶ with coincident Class K	Q
SC02 ³	Untreated contaminated water feed to WTP	6458600N 570676E		Volume (m ³)	Daily
SC03T	Sue C pit pond water (top)	6457898N 570127E	Grab ^{7,8}	pH, Ra-226, U, TSS, Water level (mASL)	M
			Grab ^{7,8}	Class J	Q
SC03B	Sue C pit pond water (bottom)	6457898N 570127E	Grab ^{7,8}	Class J	Q
SC04	Sue pre-sedimentation pond	6458516N 570221E	Grab ⁹	pH, Ra-226, U, TSS	Monthly in Spring, Summer, Fall
				Class J	Spring, Summer, Fall - alternate months
SC05T	Sue E pit pond water (top)	6456936N 569850E	Grab ⁸	Water level (mASL)	M
				Class J	Q
SC05B	Sue E pit pond water (bottom)	6456936N 569850E	Grab ⁸	Class J	Q
SC06T	Sue B pit pond water (top)	6458781N 570310E	Grab ⁸	Water level (mASL)	M
				Class J	Q
SC06B	Sue B pit pond water (bottom)	6457898N 570127E	Grab ⁸	Class J, Water level (mASL)	Q

D= Daily; Q=Quarterly; W=Weekly, SA=Semi-Annually, M=Monthly.

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

All Caribou area sampling is included only after Caribou mining operation proceeds.

¹ Parameter classes defined in Table 2

² Class C analyzed for total constituents

³ Sampling not required when Sue WTP not in operation.

⁴ Monthly composite samples are comprised of representative portions from collected 12hr composite samples

⁵ pH measurements not required⁶ The 96hr Static Trout Bioassay and *Daphnia magna* testing shall follow procedures in "Methods for Determining Acute Lethality of Effluents to Rainbow Trout" (Report EPS-1-RM-13, July 1990)

⁷ Sampling limited to periods without active waste rock placement

⁸ Depending on dewatering activity and water depth, sampling may be limited to collecting a top sample

⁹ Sampling limited to periods when pre-sedimentation ponds are not breached for runoff into active mining area

Table 5: Midwest Site – Water Quality Monitoring Requirements

Sampling Location	UTM Coordinates		Sample Type	Parameters	Frequency
	NAD83 (Zone 13)				
Midwest Settling Pond No 1 (North)	6458600N	570676E	Grab	pH, As, Cu, Fe, Ni, Zn, Pb, U, Ra-226	Whenever ponds are pumped to the test mine shaft
Midwest Settling Pond No 2 (South)	6457898N	570127E	Grab	pH, As, Cu, Fe, Ni, Zn, Pb, U, Ra-226	Whenever ponds are pumped to the test mine shaft

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

Sampling locations shown in Figure 14

Table 6: Exhaust Stack Emissions

Station Number	Sampling Location	UTM Coordinates		Sample Type	Parameters	Frequency
		NAD83 (Zone 13)				
SE01	Sulphuric Acid Plant stack ²	6467025N	5568245E	Continuous	SO ₂ Volume	Daily Average
SE02	Ammonium Sulphate Crystallization Plant after scrubber stack	6466978N	568203E	Grab	Particulates, Volume	SA
SE03	Ore Grinding Circuit after scrubber stack	6467200N	568312E	Grab	Particulates, Volume	SA
SE04	Yellowcake Calciner after scrubber stack	6467127N	568284E	Grab	Particulates, Volume	SA
				Grab	Ra-226, PB-210, Th-230, U, As, Ni Particulates, Volume SO ₂ , NH ₃	A ¹
SE05	Yellowcake Packaging after scrubber stack	6467123N	568295E	Grab	Particulates, Volume	SA
				Grab	Ra-226, PB-210, Th-230, U, As, Ni; Particulates, Volume	A ¹
SE06	Lime Silo After Dust Collector	6467123N	568295E		Preventative Maintenance	Three times per year (Spring, Summer, Fall)
SE07	Incinerator stack	6466369N	567780E	Grab	Particulate, Volume	Once every 5 years

Sampling locations shown in Figure 1 and 4.

¹Requires a standard method from an accepted standard setting organization (SSO).

²Sampling only required when Acid Plant is in Operation.

Table 7: Air Quality Sampling

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sampler Type	Sample Type	Parameters ²	Frequency
HVJ1	SE Side of Pit	6467418N 567990E	High Volume Air Sampler ¹	Comp.	Class G	Quarterly ¹
HVJ2	SE Mill Building	6466917N 568499E	High Volume Air Sampler	Comp.	Class G	Quarterly ¹
HVJ3	South of JEB Camp	6466314N 567827E	High Volume Air Sampler	Comp.	Class G	Quarterly ¹
HVJ4	South end of Vulture Lake	6459495N 566649E	High Volume Air Sampler	Comp.	Class G	Quarterly ¹
HVS1	East of Sue C Pit	6458278N 570459E	High Volume Air Sample	Comp.	Class G	Quarterly ¹
JM02	Mill Area	6466774N 568519E	SO ₂ Analyzer	Continuous	SO ₂	continuous

The high-volume monitors shall be maintained and operated such that at least twenty-four valid samples are collected from each location during a consecutive six-month period.

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines

Environment Canada Standard Reference Method (EPS-1-AP-73-2) will be used and monitors shall be calibrated at least twice during the term of this permit.

Locations shown in Figure 4.

¹ Samples collected weekly and analyzed Quarterly.

² Parameter classes defined in Table 3.

Table 8: Air Quality Monitoring for Radon-222

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sampler Type	Sample Type	Parameters	Frequency
TE-J1	S of N basin of Fox Lake	6467651N 567119E	Integrated Radon	Passive Detector	Rn - 222	Semi- Annually Placement and collection in June and December
TE-J2	S of Pat Lake	6465713N 566766E				
TE-J3	N of Osiris Lake	6469174N 569705E				
TE-J4	haul road E of Camp	6466370N 568247E				
TE-J6	S of Osiris Lake	6467350N 570091E				
TE-J7	W of Dwarf Lake	6465744N 569374E				
TE-M1	by Vulture Lake	6460160N 567120E				
TE-M2	S of Candy Creek	6458058N 567365E				
TE-M3	N of Candy Creek	6459063N 568570E				
TE-M4	road N of Telephone Lake	6457277N 567857E				
TE-M6	E of Candy Lake	6458693N 568916E				
TE-M8	E of Bena Lake	6458210N 569825E				
TE-S1	N of Sue Lake	6458365N 570589E				
TE-S2	NE of Candy Lake	6458690N 569937E				
TE-S3	SW of Esto Lake	6458809N 571286E				
TE-S6	East of Sils Lake	6457291N 571175E				
TE-S8	SW of Sue E pit	6456527N 569620E				
TE-S9	W of Sue E WRP	6457386N 569100E				
TE-C1	Mallen Lake	6474415N 566019E				

Locations shown in Figure 4.

Table 9: Precipitation Monitoring

Station Number	Sampling Location	Sample Type	Parameters	Frequency
AR02	McClean Lake Met. Station	Grab	pH	Once per Month ¹

Sampling location shown in Figure 4.

¹ pH reading is taken every month provided there is precipitation

Table 10: Meteorological Station Parameters, Frequencies and Sensor Specifications

Station Location	Parameter Number	Parameter and Frequency		
MS01	1	Real time and date (24-hour clock)		
	2	Hourly wind speed (kph)		
	3	Hourly wind directions (degrees quadrant)		
	4	Present wind speed and direction		
	5	Maximum wind speed and direction (time)		
	6	Minimum wind speed and direction (time)		
	7	Daily maximum temperature (°C)		
	8	Daily minimum temperature (°C)		
	9	Present temperature (°C)		
	10	Hourly solar radiation (reading and time)		
	11	Maximum solar radiation (reading and time)		
	12	Relative humidity		
	13	Daily precipitation (rain or snow)		
	Variable	Resolution	Accuracy	
	Air temperature	0.1 °C	± 0.50 °C	
	Wind velocity (2-d)	0.1 m/s		
	Humidity	1%		
	Precipitation	1 mm		

Sampling location shown in Figure 4.

Table 11: Groundwater Monitoring

Station Number	Northing	Easting	Unit for Tip Completion	Water Levels: Frequency	Sampling: Parameters Class ¹ / Frequency ²	Purpose
JEB Site Area						
JEB TMF Nearfield						
95-01A	6468072	568234	basement	Quarterly	B1/Annually	TMF nearfield
95-01C	6468082	568245	upper sandstone	Quarterly	B1/Annually	TMF nearfield
18-01D	6468082	568245	overburden	Quarterly	B1/Semi-Annually	TMF nearfield
95-02A	6467959	567393	basement	Quarterly	B1/Annually	TMF nearfield
95-02C	6467665	567397	upper sandstone	Quarterly	B1/Annually	TMF nearfield
95-02D	6467970	567398	overburden	Quarterly	B1/Semi-Annually	TMF nearfield
95-03A	6467593	567683	basement	Quarterly	B1/Annually	TMF nearfield
95-03C	6467589	567692	overburden	Quarterly	B1/Semi-Annually	TMF nearfield
95-04A	6467734	567565	basement	Quarterly	B1/Annually	TMF nearfield
95-04C	6467741	567564	upper sandstone	Quarterly	B1/Annually	TMF nearfield
95-04D	6467744	567563	overburden	Quarterly	B1/Semi-Annually	TMF nearfield
95-05A	6468048	567690	basement	Quarterly	B1/Annually	TMF nearfield
95-05C	6468055	567691	upper sandstone	Quarterly	B1/Annually	TMF nearfield
95-05D	6468060	567692	overburden	Quarterly	B1/Semi-Annually	TMF nearfield
JEB TMF Midfield						
95-10	6467427	568026	overburden	Quarterly	B1/Semi-Annually	TMF midfield/Ore Pad
96-01A	6467567	567297	lower sandstone	Annually	B3/Annually	TMF midfield
96-01B	6467572	567300	upper sandstone	Annually	B3/Annually	TMF midfield
96-01C	6467576	567302	overburden	Annually	B3/Annually	TMF midfield
96-02A	6467960	567393	lower sandstone	Annually	B3/Annually	TMF midfield
96-02B	6467659	567396	upper sandstone	Annually	B3/Annually	TMF midfield
96-02C	6467965	567397	overburden	Annually	B3/Annually	TMF midfield
96-02D	6467970	567398	overburden	Annually	B3/Annually	TMF midfield
96-03B	6468295	567798	upper sandstone	Annually	B/3Annually	TMF midfield
96-03C	6468310	567791	overburden	Annually	B3/Annually	TMF midfield
96-04	6468468	568297	lower sandstone	Annually	B3/Annually	TMF midfield
96-09A	6467296	567769	lower sandstone	Annually	B3/Annually	TMF midfield
96-09B	6467304	567781	upper sandstone	Annually	B3/Annually	TMF midfield
MW16	6467890	568200	overburden	Annually	B1/Annually	Industrial landfill nearfield
MW20	6468353	568118	overburden	Annually	B3/Annually	TMF midfield
JEB TMF Farfield						
95-06	6468483	568728	lower sandstone	Annually	B3/Biennially	TMF farfield
95-07	6466946	568485	lower sandstone	Annually	B3/Annually	TMF farfield
95-08	6467171	567278	lower sandstone	Annually	B3/Biennially	TMF farfield
95-09	6468634	567163	lower sandstone	Annually	B3/Biennially	TMF farfield
96-05B	6468249	567108	upper sandstone	Annually	B3/Biennially	TMF farfield
96-06B	6468259	567418	upper sandstone	Annually	B3/Biennially	TMF farfield
96-07A	6468652	567826	lower sandstone	Annually	B3/Biennially	TMF farfield
MW18	6467222	567512	overburden	Annually	B3/Biennially	TMF farfield

Station Number	Northing	Easting	Unit for Tip Completion	Water Levels: Frequency	Sampling: Parameters Class ¹ / Frequency ²	Purpose
JEB Mill Terrace						
01-07	6466844	568194	overburden	Quarterly	B1/Semi-Annually	Sludge ponds nearfield
05-07	6467079	568285	overburden	Quarterly	B1/Semi-Annually	SX circuit nearfield
14-03	6467213	568148	overburden	Quarterly	B1/Semi-Annually	Slurry receiving nearfield
14-04	6467068	568364	overburden	Quarterly	B1/Semi-Annually	SX circuit nearfield
14-05	6466990	568196	overburden	Quarterly	B1/Semi-Annually	CX/Acid Plant nearfield
16-03	6466838	568056	overburden	Quarterly	B4/ Semi-Annually	Liquid Petroleum Fuel Storage Area nearfield
16-07	6466652	568195	overburden	Quarterly	B1/Semi-Annually	Sludge ponds nearfield
16-08	6466951	568205	overburden	Quarterly	B1/Semi-Annually	CX nearfield
95-12	6466929	568012	overburden	Quarterly	B4/ Semi-Annually	Shop Area nearfield
14-01	6467464	568311	overburden	Quarterly	B1/Semi-Annually	Ore Pad nearfield
16-01	6467379	568270	overburden	Quarterly	B1/Semi-Annually	Ore Pad nearfield
16-02	6467475	568184	overburden	Quarterly	B1/Semi-Annually	Ore Pad nearfield
19-01	6467124	568164	overburden	Semi- Annually	B1/Semi-Annually	Precipitation midfield
21-01	6467200	568411	overburden	Semi- Annually	B4/ Semi-Annually	Ammonia & kerosene storage
21-02	6466979	568282	overburden	Semi- Annually	B1/Semi-Annually	Water treatment
21-04	6467212	568246	overburden	Semi- Annually	B1/Semi-Annually	CCD & Tails thickener
21-05	6466918	568474	overburden	Semi- Annually	B1/Semi-Annually	CX & Acid Plant
JEB Waste Rock						
96-08	6467499	568662	lower sandstone	Biennially	B1/Biennially	WR & midfield
07-08	6467913	568530	unconsolidated waste rock	Biennially	B1/Biennially	JEB WR pile
07-09	6467973	568754	unconsolidated waste rock	Biennially	B1/Biennially	JEB WR pile
07-10	6467764	568758	unconsolidated waste rock	Biennially	B1/Biennially	JEB WR pile
MW07A	6467483	568132	overburden	Quarterly	B1/Semi-Annually	WR & midfield
MW11	6467540	568731	overburden	Biennially	B1/Biennially	WR & midfield
MW12	6468246	568798	overburden	Biennially	B1/Biennially	WR & farfield
Sink Dam						
95-18	6461431	568359	Earth Fill	Monthly for Jun-Oct	N/A	Geotechnical
Sue Site Area						
Sue B and C/A: Nearfield						
97-01A	6458535	570380	basement	Quarterly	B1/Semi-Annually	Nearfield
97-01B	6458529	570381	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-01C	6458529	570372	overburden	Quarterly	B1/Semi-Annually	Nearfield
97-02A	6458140	570398	basement	Quarterly	B1/Semi-Annually	Nearfield
97-02B	6458137	570396	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-03A	6457927	570328	basement	Quarterly	B1/Semi-Annually	Nearfield
97-03B	6457924	570328	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-05A	6458045	569891	basement	Quarterly	B1/Semi-Annually	Nearfield
97-05B	6458045	569893	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-05C	6458053	569896	overburden	Quarterly	B1/Semi-Annually	Nearfield
97-06B	6458257	569950	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield

Station Number	Northing	Easting	Unit for Tip Completion	Water Levels: Frequency	Sampling: Parameters Class ¹ / Frequency ²	Purpose
97-07A	6457617	570327	basement	Quarterly	B1/Semi-Annually	Nearfield
97-07B	6457924	570328	lower sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-12	6458366	570492	overburden/ upper sandstone	Quarterly	B1/Semi-Annually	Nearfield
97-18	6458679	570154	overburden/ upper sandstone	Quarterly	B1/Semi-Annually	Ore transfer pad nearfield/Sue B pit nearfield
Sue E: Nearfield						
05-03	6457001	569587	lower sandstone	Quarterly	B1/Annually	Nearfield
05-04	6456620	569753	lower sandstone	Quarterly	B1/ Annually	Nearfield
05-05A	6456919	570057	lower sandstone	Quarterly	B1/ Annually	Nearfield
05-05B	6456918	570052	overburden	Quarterly	B1/Semi-Annually	Nearfield
Sue: Farfield						
97-09	6457844	570800	lower sandstone	Biennially	B2/biennial	Farfield
97-10	6457291	569952	lower sandstone	Biennially	B2/biennial	Farfield
97-11	6458171	569463	lower sandstone	Biennially	B2/biennial	Farfield
Sue: Waste Rock Piles						
97-15	6459339	571073	overburden/ upper sandstone	Quarterly	B1/Biennially	Sue C WR pile
97-16	6458903	571057	overburden/ upper sandstone	Quarterly	B1/Biennially	Sue C WR pile
97-08A	6459076	570369	lower sandstone	Quarterly	B1/ Annual	Sue C WR pile
97-08B	6459078	570375	overburden	Quarterly	B1/Semi-Annual	Sue C WR pile
07-11	6459356	570564	unconsolidated waste rock	Biennially	B1/Biennially	Sue C WR pile
07-12	6459770	570708	unconsolidated waste rock	Biennially	B1/Biennially	Sue C WR pile
07-13	6459287	570878	unconsolidated waste rock	Biennially	B1/Biennially	Sue C WR pile
07-14	6457590	569550	unconsolidated waste rock	Biennially	B1/Annual	Sue E WR pile
07-15	6457253	569348	unconsolidated waste rock	Biennially	B1/Annual	Sue E WR pile
05-01A	6457843	569266	lower sandstone	Quarterly	B1/Biennially	Sue E WR pile
05-01B	6457845	569262	overburden	Quarterly	B1/Biennially	Sue E WR pile
05-02A	6457451	569100	lower sandstone	Quarterly	B1/Biennially	Sue E WR pile
05-02B	6457460	569102	overburden	Quarterly	B1/Biennially	Sue E WR pile
SABRE						
MED05-01	6458433	567910	Lower sandstone	Bimonthly	B1/Semi-Annual	Nearfield
13-01	6458406	567786	overburden	Bimonthly	B1/ Semi-Annual	Nearfield
MED05-02	6458416	567780	Lower sandstone	Bimonthly	B1/ Semi-Annual	Nearfield
13-02	6458419	567663	overburden	Bimonthly	B1/ Semi-Annual	Nearfield
MED05-03	6458366	567709	Lower sandstone	Bimonthly	B1/ Semi-Annual	Nearfield
13-03	6458366	567717	overburden	Bimonthly	B1/ Semi-Annual	Nearfield
13-04	6458377	567765	overburden	Bimonthly	B1/ Semi-Annual	Nearfield
Moffat Lake Landfill						
97-19	6460258	568773	overburden	Annually	B2/Annually	Landfill
04-01	6460452	568665	overburden	Annually	B2/Annually	Landfill
04-02	6460457	568596	overburden	Annually	B2/ Semi-Annual	Landfill

WL = water level Biennially= once every two years Semi-Annual=twice per year
Sampling locations shown in Figure 5, Figure 6, Figure 7 and Figure 8.

The frequency of hydraulic head measurements will be increased if necessary to capture significant hydraulic event information.

¹ Parameter classes defined in Table 3

Table 12: Surface Water Elevation Measurements

Station Number	Location	UTM Coordinates NAD83 (Zone 13)	Frequency ¹
SG01C	Mallen Lake	6474650N 566297E	Monthly
SG02E	Fox Lake	6468025N 567724E	Monthly
SG03E	Pat Lake	6467090N 567487E	Semi-annually
SG04E	Sue Lake	6457972N 570473E	Semi-annually
SG06E	Sink Reservoir	6461435N 568386E	Weekly except when daily trigger met
SG07E	Vulture Lake	6461336N 568328E	Weekly
SG08E	Collins Creek (below McClean Lake)	6457883N 566812E	Daily (summer)
SG09E	McClean Lake	6458932N 566413E	Monthly
SG10E	Candy Lake	6458266N 567817E	Semi-annually
SG11E	Isis Lake	6468548N 569082E	Semi-annually
SG14E	Mofatt Lake	6460933N 569038E	Semi-annually
SG15E	Tut Lake	6459927N 571939E	Semi-annually
SG17E	Kewen Lake	6450466N 568725E	Monthly
SG18E	Sils Lake	6457431N 5701966E	Semi-annually
SG19C	Indigo Lake	6459214N 560025E	Monthly
SG20E	Bena Lake	6457663N 568906E	Semi-annually

SG = Staff Gauge C = Control Station E =

Exposure station Locations shown in Figure 9.

¹ Elevation measurements only collected during the open water season. Semi-annual measurements collected in spring and fall.

Table 13: Surface Water Quality Monitoring

Station Number	Sampling Location	UTM Coordinates NAD83 (Zone 13)	Sample Type ^{1,2}	Parameters ³	Frequency
WQ01C	Mallen Lake	6474726N 565117E	T/M/B	Class A	Semi-Annually (April and July)
WQ02C	Collins Creek near Indigo Lake	6459722N 560346E	Surface	Class A	Semi-Annually (April and October)
WQ20C	Henday Lake	6464885N 551600E	Surface	Class A	Annually (January)
WQ15C	McClean Lake West Basin	6457400N 564700E	Grab	Class A, field temp., cond., pH	Quarterly
WQ04E	Fox Lake North Basin	6468110N 567283E	Surface	Class A	Semi-Annually (April and October)
WQ05E	Pat Lake	6466094N 566918E	T/M/B	Class A	Annually (January)
WQ08E	Johannes Lake	6466401N 568500E	T/M/B	Class A	Annually (January)
WQ09E	Sink Reservoir	6462071N 569004E	Grab	Class A	Quarterly
WQ10E	Vulture Lake	6460630N 567379E	Grab	Class A	Quarterly
WQ11E	McClean Lake East Basin	6458556N 566492E	Grab	Class K, field temp., cond., pH, DOC	Monthly
			Grab	Class A	Quarterly
WQ12E	Collins Creek Below McClean Lake (flow metering actually at SG8)	6456662N 566307E		Flow (m ³ /day)	Daily (open water)
				Flow (m ³ /day)	Once per 3 weeks (ice)
			Grab	Class K, DOC	Monthly
			Grab	Class A,	Quarterly
WQ13E	Collins Creek Below Highway 905	6451179N 563624E	Surface	Class A	Semi-Annually (April and July)
WQ14E	Kewen Lake	6450021N 567386E	T/M/B	Class A	Semi-Annually
WQ16E	Sue Lake	6457632N 570648E	Grab	Class A	Annually (January)
WQ17E	Sils Lake	6456658N 570721E	Grab	Class A	Annually (January)
WQ18E	Candy Lake	6458447N 568400E	Grab	Class A	Semi-Annually (April and October)
WQ19E	Bena Lake	6457818N 568726E	Grab	Class A	Semi-Annually (April and October)

WQ = Water Quality Station C=Control Station E=Exposure Station.

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

¹ Surface= Samples to be collected approximately 0.5m below the surface

² T/M/B= Top, Middle and Bottom samples; depth samples collected using a Kemmerer Sampler

³ Parameter classes defined in Table 3

Table 14: Fisheries Resources Monitoring Program Fish Tissue Monitoring and Fish Health Assessment

Station Number	Sampling Location	Parameters ¹	Frequency ²
Reference Locations			
F06C	Henday Lake	Population statistics, Class F	3-year cycle
F08C	Konner Lake	Population statistics Class F	3-year cycle
Exposure Locations			
F03E	Vulture Lake	Population statistics, Class F	3-year cycle
F05E	Kewen Lake	Population statistics, Class F	3-year cycle
F09E	Sink Reservoir	Population statistics, Class F	3-year cycle
F10E	McClean Lake east basin	Population statistics, Class F	3-year cycle

Population and health statistics as per most recent MDMER Environmental Effects Monitoring study design
 F= Fish Sampling Station C=Control Station E=Exposure Station.
 Sampling methodology as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

Northern pike and White sucker shall be collected from all locations. 5 fish per species will be sampled for flesh, bone, liver, kidney and ovary (when available) class F parameter analysis.

Lake whitefish shall be collected from McClean Lake east basin. 5 females will be sampled for flesh and ovary.

A variety of methods may be used to ensure a sample representative of all age classes. With regard to fish population statistics, the following information will be collected at the time of sampling:

- population structure (year class distribution)
 - length,
 - weight,
 - and age
- gonad weight
- liver weight
- kidney weight
- egg size
- ovary weight and ripeness
- fecundity of females
- external condition (*i.e.* lesions, parasites, discolouration, etc.).

However, if only weight and length are to be provided, only non-destructive sampling techniques will be used.

¹ Parameter classes defined in Table 3

² Next 3-year cycle begins 2024

Table 15: Benthic Macroinvertebrate¹ and Sediment Quality Monitoring²

Designation	Station Number	Sampling Locations	Parameters ³	Frequency ⁴
Depositional				
Control Lake	BM16C/S29C	Konner Lake	Sediment - Class E & Particle Size, Community Structure	3-year cycle
Exposure Lake	BM03E/S09E	Sink Reservoir		
Exposure Lake	BM04E/S10E	Vulture Lake		
Exposure Lake	BM08E/S14E	Kewen Lake		
Control Lake	BM10C/S15C	McClean Lake West	Sediment - Class E & Particle Size, Community Structure	3-year cycle
Exposure Lake	BM05E/S11E	McClean Lake East		
Exposure Lake	BM13E/S04E	Fox Lake		
EEM-Specific Sampling				
Benthic Invertebrate Community monitoring		As per most recent MDMER Environmental Effects Monitoring study design		

BM = Benthic Macroinvertebrates Sampling Station S = Sediment sampling C = Control Station E = Exposure Station
Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

¹ Benthic macroinvertebrate community composition and structure

² The sediment chemistry parameters will be completed on the 0-2cm horizon only. Three replicates at each station.

³ Parameter classes defined in Table 3

⁴ Next 3-year cycle begins 2024

Table 16: Soil and Terrestrial Vegetation Sampling

Station Number	Sampling Location	Sample Type	Parameters ¹	Frequency ²
J01 J02 J03 J04 J05 J06 J07 J08	Circumscribing the JEB mill and TMF	Soil Lichen Blueberry (stems with leaves and berries) Labrador Tea (stems with leaves)	Class H, I Class I Class I Class I	6-year cycle
M09 M10 M11 M12 M13 M14 M15 ³ M16	Circumscribing the McClean Lake Area	Soil Lichen Blueberry (stems with leaves and berries) Labrador Tea (stems with leaves)	Class H, I Class I Class I Class I	6-year cycle
S17 ⁴ / S17_2011 S18 S19 S20 ⁴ / S20_2011 S21 ⁵ S22 ⁶ / S22_2011 S23	Circumscribing the Sue Mine Area	Soil Lichen Blueberry (stems with leaves and berries) Labrador Tea (stems with leaves)	Class H, I Class I Class I Class I	6-year cycle
C24 C25 C26 C27 C28 C29 C30	Mallen Lake Control	Soil Lichen Blueberry (stems with leaves and berries) Labrador Tea (stems with leaves)	Class H, I Class I Class I Class I	6-year cycle

Sampling guidelines as outlined in the most recent version of the Ministry of Environments Environmental Monitoring Program Guidelines.

¹ Parameter classes defined in Table 3

² Next 6-year cycle begins in 2027

³ Original location M15 was destroyed by the Sue E overburden pile and has been relocated.

⁴ Original locations S17 and S20 were destroyed by forest fires in 2010. Beginning in 2011, these stations were moved to suitable nearby locations until the original sites recover and these stations were renamed S17_2011 and S22_2011.

⁵ Original location S21 was destroyed by the Sue E waste rock pile and has been relocated.

⁶ Original location S22 was destroyed by forest fires in 2010. The station was replaced and relocated to a suitable area during the 2011 sampling season and renamed S22_2011.

APPENDIX B
ORANO CANADA INC. – McCLEAN LAKE OPERATION
APPROVED HAZARDOUS SUBSTANCES AND WASTE DANGEROUS GOODS STORAGE FACILITIES

Tank Number	Site	Serial Number	Type - Product	Capacity
Above Ground Storage Tanks/ Containers				
71005M	JEB		Diesel	50,000 Litres
71505	JEB		Diesel	95,000 Litres
71601M	Sue		Diesel	75,000 Litres
71001M	JEB		Diesel	10,000 Litres
71006M	Sue	24873	Diesel	2,273 Litres
71008M	JEB	E29C10297	Diesel	1,135 Litres
72047	JEB	E29C10362	Diesel	682 Litres
71003M	JEB		Diesel	2,232 Litres
41002M	JEB	63990136	Diesel	2,475 Litres
41003M	Sue	63990139	Diesel	2,475 Litres
41005M	JEB	26Y54023	Diesel	1,135 Litres
71004M	JEB		Gasoline	50,000 Litres
72010	JEB		Kerosene	80,000 Litres
72012	JEB		Kerosene	80,000 Litres
72903	JEB	29866	Waste Oil	25,000 Litres
72904	Sue	28965	Waste Oil	25,000 Litres
3004	JEB		Lime Silo (Pebble CaO)	600,000 Litres
72009	JEB		Lime, Hydrated (15% slurry)	298,000 Litres
72516	JEB		Lime, Hydrated	18,750 Litres
71639	Sue		Lime, Hydrated	44,440 Litres
72064	JEB		Lime, Hydrated	298,000 Litres
72061	JEB		Hydrogen Peroxide (70% sol'n)	56,000 Litres
72062	JEB		Hydrogen Peroxide (70% sol'n)	56,000 Litres
35022	JEB		Anhydrous Ammonia	70,000 Litres
35004	JEB		Anhydrous Ammonia	83,380 Litres
35023	JEB	13625-01	Anhydrous Ammonia	87,200 Litres
71501	JEB		Ferric Sulphate (20% sol'n)	72,250 Litres
71633	Sue		Ferric Sulphate	24,770 Litres
71085	JEB		Ferric Sulphate	47,600 Litres
71020	JEB		Ferric Sulphate	24,410 Litres
72555	JEB		Ferric Sulphate	125,000 Litres
72556	JEB		Ferric Sulphate	166,200 Litres
73052	JEB		Ferric Sulphate	150,000 Litres
71630	Sue		Barium Chloride	24,770 Litres
71012	JEB		Barium Chloride	14,000 Litres
72514	JEB	A9541114	Barium Chloride	8820 Litres
72512	JEB		Sulphuric Acid (93%)	22,080 Litres
72636	Sue		Sulphuric Acid (93%)	24,480 Litres
72402	JEB	1765	Molten Sulphur	510,000 Litres
72405	JEB	1763	Sulphuric Acid	944,000 Litres
72407	JEB	1764	Sulphuric Acid	108,000 Litres
72017	JEB		Sulphuric Acid	944,000 Litres
72020	JEB		Sodium Carbonate	11,000 Litres

APPENDIX B
ORANO CANADA INC. – McCLEAN LAKE OPERATION
APPROVED HAZARDOUS SUBSTANCES AND WASTE DANGEROUS GOODS STORAGE FACILITIES

Tank Number	Site	Serial Number	Type - Product	Capacity
72089	JEB		Diesel	50,000 Litres
35061	JEB		Oxygen	31,500 Litres
72111	JEB		Diesel	3,000 Litres
72112	JEB	71420	Diesel	3,000 Litres
72113	JEB	71427	Diesel	3,000 Litres
72114	JEB	66703	Diesel	3,000 Litres
72115	JEB	66702	Diesel	3,000 Litres
72116	JEB	66705	Diesel	3,000 Litres
71049	JEB	9605079555	Sodium Hydroxide	71,200 Litres
72080	JEB	13401-101	Sodium Carbonate	26,500 Litres
Warehouse/ Yard Storage				
Mill Reagents	JEB		Barium Chloride	70,000 kg
JEB WTP	JEB		Barium Chloride	16,000 kg
HAZMAT Pad	JEB		HSWDG	420 m ²
			2 Containers: Classes 3, 7, 8, 6.1, and 5.1	49 m ³
Propane Refill Station	JEB		Propane	30 m ²
Large Compound Area	JEB		Acetylene	6 m ²
Camp PWTP	Camp		Sodium Hypochlorite	64 m ²
Mill/Office PWTP	JEB		Sodium Hypochlorite	98 m ²
Yellowcake Storage Building	JEB		Barium Chloride	665 m ²
Sue Utilities Building	Sue		Sodium Hypochlorite	180 m ²
Sue Maintenance Shop Racks	Sue		Acetylene, Propane	12 m ²
Propane Tanks				
35027	JEB	26364A	Propane	68,600 Litres
35026	JEB		Propane	95,760 Litres
35028	JEB		Propane	226,272 Litres
35029	JEB		Propane	226,272 Litres
35656	Sue		Propane	105,000 Litres
35084	JEB	40935A	Propane	226,900 Litres

APPENDIX C
AREVA RESOURCES CANADA INC. – McCLEAN LAKE OPERATION
CLASS 7 ON-SITE REPORTING REQUIREMENTS

Appendix C is a copy of the June 3, 2015 submission entitled “*On-Site Releases of Class 7 (Radioactive) Substances Pursuant to the Saskatchewan Environmental Code*”. This document contains 8 pages and includes:

- discussion and rationale for proposed on-site Class 7 discharge reporting
- reporting requirement for on-site Class 7 discharges
- definition of discharges related to solids, process solutions, and treated and untreated water
- definition of Recordable Radioactive Release (RRR)
- derivation of Recordable Radiological Release formulae



June 3, 2015

VIA EMAIL

Mr. Tim Moulding
Manager, Uranium and Northern Operations
Environmental Protection Branch
Saskatchewan Ministry of Environment
112 Research Drive
Saskatoon, SK S7N 3R3

Dear Mr. Moulding:

On-Site Releases of Class 7 (Radioactive) Substances Pursuant to the Saskatchewan Environmental Code

On April 8, 2015, Cameco Corporation (Cameco) submitted a proposal (*K. Nagy to T. Moulding*) to the Saskatchewan Ministry of the Environment (the Ministry) regarding the reporting of on-site discharges of Class 7 (radioactive) substances pursuant to the Saskatchewan Environmental Code (the Code) at permitted uranium mining and milling facilities. The purpose of this letter is to update that proposal based on clarification provided by the Ministry regarding the Code at the May 21, 2015 meeting of the Saskatchewan Mining Association (SMA) Environment Committee as well as a May 28, 2015 in-person meeting involving personnel from the Ministry, AREVA Resources Canada Inc. (AREVA) and Cameco. In addition, this letter should be considered a joint submission from AREVA and Cameco, reflecting a proposed approach for regulatory notification of on-site releases of Class 7 substances for both companies upon the June 1, 2015 coming into force date of the Code.

The current criteria for reporting on-site discharges of Class 7 substances to the environment, as noted in Table 1 of the Discharge and Discovery Reporting Standard, is "*Any quantity that could pose a risk to human health, or the environment*". As noted within the April 8, 2015 correspondence, uranium mine and mill sites have security programs in place to prevent public access, as well as comprehensive safety and health management, environment, and radiation protection programs to protect workers, the public, and the environment. As a result of these controls, it is not anticipated that an on-site release of a Class 7 substance would result in a risk to human health, to the environment, or an exceedance of the effective dose limits for the public or nuclear energy workers (NEWs) as described within the *Radiation Protection Regulations*. Thus, the discharge criteria for 'industrial waste' of 1,000 L or 1,000 kg within Table 1 of the

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Discharge and Discover Reporting Standard is a more restrictive threshold for these substances at uranium mine and mill sites than a risk to human health, or the environment.

The majority of solids at our operations meet the definition of 'industrial waste' in accordance with the Substance Characterization Chapter of the Code. Further, the Ministry clarified on May 21, 2015 that any process solution or solid that is released to the environment will also be interpreted by the Ministry to meet the definition of 'industrial waste'. As such, starting on June 1, 2015 a release of a solid or process solution containing Class 7 substances will be considered a 'discharge' of 'industrial waste' pursuant to the Code if the quantity of the release is greater than or equal to 1,000 L or 1,000 kg.

From discussions with Ministry personnel throughout the Code consultation process, it is recognized that notification regarding on-site releases of Class 7 substances is warranted as an indicator of the continued effectiveness of operational environmental management systems. Pursuant to the federal *Nuclear Substances and Radiation Devices Regulations*, s. 38.(1)(e)(i), there is a requirement to provide notification if "*there is a spill of an unsealed radioactive nuclear substance that is set out in column 1 of Schedule 1, that has produced in excess of 100 times the activity set out in column 3*".

Specific to our northern Saskatchewan operations, Uranium 238 is the most appropriate substance to use from Schedule 1, corresponding to a maximum activity of 1×10^6 Bq. Importantly, an on-site release of a Class 7 substance with an activity greater than 1×10^6 Bq does not correspond to a risk to public health or the environment; however, it is viewed as a reasonable criterion to preserve the existing reporting culture at uranium mine and mill sites.

Cameco and AREVA are proposing that such releases be classified as '*recordable radiological releases*' (RRR) with a description of the actions to be taken in the event of a RRR provided below. These actions are consistent with the current practices at our operations under the current *Environmental Spill Control Regulations*.

- Notification will be provided to the Project Officers of the Ministry and the CNSC within 72 hours of the occurrence,
- The area affected by the release will be cleaned-up, and
- A record of the event (RRR) will be captured in the next applicable quarterly or annual environmental report.

With this framework, and for greater clarity and consistency, we have set forward the reporting thresholds below.

Solids and Process Solutions

As stated above, the majority of solids at our operations meet the definition of 'industrial waste' pursuant to the Substance Characterization Chapter of the Code. However, in accordance with clarification provided by the Ministry on May 21, 2015, any process solution or solid that is released to the environment will also be interpreted by the Ministry to meet the definition of 'industrial waste'. Thus, starting on June 1, 2015, a release of a solid or process solution containing Class 7 substances will be considered:

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- a 'discharge' of 'industrial waste' pursuant to the Code if the quantity of the release is greater than or equal to 1,000 L or 1,000 kg, or
- a RRR if the total activity of the release is greater than 1×10^6 Bq and the quantity is less than 1,000 L or 1,000 kg.

Untreated Water

Untreated water containing Class 7 substances at our operations meets the definition of 'industrial waste' pursuant to the Substance Characterization Chapter of the Code. Thus, starting on June 1, 2015, a release of untreated water containing Class 7 substances will be considered:

- a 'discharge' of 'industrial waste' pursuant to the Code if the quantity of the release is greater than or equal to 1,000 L, or
- a RRR if the total activity of the release is greater than 1×10^6 Bq and the quantity is less than 1,000 L.

Treated Water

Treated water that meets required criteria to be discharged is of extremely low risk to the environment. Thus, starting on June 1, 2015, a release of treated water will be considered:

- a 'recordable release' if the quantity of the release is greater than 1,000 L, but less than 100,000 L, or
- will be considered a 'discharge' pursuant to the Code if the release of treated water has caused significant erosion of the soil in the area of the release or has reported to a water body that is not authorized for release of treated water, if the quantity of the release is greater than 1,000 L, or
- will be considered a 'discharge' pursuant to the Code if the quantity of the release is greater than 100,000 L.

It should be noted that the actions to be taken in the event of a recordable release of treated water will be the same as the aforementioned actions for a RRR.

For ease of reference, two attachments to this correspondence have been prepared. Attachment A summarizes the interpretation of releases of Class 7 substances and the commitment of uranium mine sites to continue to report RRRs, as presented above. We believe Attachment A provides a suitable reference for Ministry operating approvals. Attachment B presents example calculations for the application of the RRR criteria, suitable for incorporation into site operating procedures.

Cameco and AREVA will continue to complete corrective actions for releases of Class 7 substances to the environment at our operations whether they will be classified as recordable or not. Thus, the change in classification of events as either RRRs or 'discharges' will not compromise protection of the environment, or the safety of employees at our operations.

In addition of clarification of the application of the definition of 'industrial waste' under the Code, the Ministry also presented expectations on environmental protection plans (EPPs) for permitted industrial facilities at the SMA meeting of May 21, 2015. Based on this presentation, and subsequent discussions, it is the understanding of Cameco and AREVA that the

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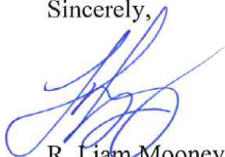
Environmental Protection Branch of the Ministry has the following expectations related to EPPs at permitted industrial facilities:

- EPPs are voluntary;
- EPPs are substance specific; however, similar substances (e.g. hydrocarbons) may be grouped into a single EPP;
- EPPs do not need to be site-specific and can be representative of a company or industry approach, and
- EPPs should contain:
 - a description of the immediate response actions in the event of a discharge (e.g. emergency response measures),
 - a description of the medium-term corrective actions to be taken (e.g. endpoint and reclamation technology), and
 - a description, if required, of the long-term plan for the discharge (e.g. integration within the site-specific decommissioning and reclamation plan and corresponding financial assurance).

Given the current understanding of the uranium industry as it relates to EPPs under the Code, Cameco and AREVA have no plans to submit EPPs to the Ministry at this time. Cameco and AREVA will comply with the results-based objectives of the Code through the application of an acceptable or alternative solution as they are described within the specific chapters of the Code and the accompanying Ministry guidance document.

Should you have any questions concerning this information please contact the undersigned at (306) 956-6685 (Liam Mooney) or (306) 343-4058 (Dale Huffman).

Sincerely,



R. Liam Mooney
Vice President
Safety, Health, Environment & Quality and
Regulatory Relations
Cameco Corporation



Dale Huffman
Vice President
Safety, Health, Environment, and
Quality
AREVA Resources Canada Inc.

Attachments

c:	Cameco:	K. Nagy	W. Anderson	K. England	S. Harriman	K. Lamont	K. Himbeault
		R. Morrison	J. Pryznyk	D. McIntyre	R. VanStone	T. Hamilton	T. Swenson
		R. Washenfelder	K. DeBruyne	K. Hanke	K. Park	J. Henderson	
		Regulatory Records					
	AREVA:	T. VanLambalgen	A. Rosaasen	M. Neal			
	SMOE:	W. Kotyk	A. Merkowsky	V. Bourhis	J. Lung	G. Bihun	
	CNSC:	J. LeClair	M. Langdon	UMMD Records			

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Attachment A: On-Site Class 7 Discharges and Recordable Radiological Releases

Discharges

Solids, Process Solutions, and Untreated Water

A release of a Class 7 substance will be considered a discharge of industrial waste pursuant to the Code if the quantity of the release is greater than or equal to 1,000 L or 1,000 kg.

Treated Water

Treated water will be considered a discharge pursuant to the Code if the quantity of the release is greater than 100,000 L.

If the release of treated water has caused significant erosion of the soil in the area of the release or if the release of treated water has reported to a water body that is not authorized for release of treated water, treated water will be considered a discharge pursuant to the Code if the quantity of the release is greater than 1,000 L.

Recordable Radiological Release (RRR)

Solids, Process Solutions, and Untreated Water

A release of Class 7 substances will be considered a RRR if the total activity of the release is greater than 1×10^6 Bq and the quantity is less than 1,000 L or 1,000 kg.

Treated Water

A release of treated water will be considered a recordable release if the quantity of the release is greater than 1,000 L, but less than 100,000 L.

Recordable radiological releases will require:

- notification to the Project Officers of the Ministry and the CNSC within 72 hours of the occurrence
- the area affected by the release will be cleaned-up, and
- a record of the RRR event will be captured in the next applicable quarterly or annual environmental report.

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Attachment B: Derivation of Recordable Radiological Release Formulae

The formulae provided below will be used on an event-specific basis to determine whether a release of a Class 7 substance is considered a RRR. The determination will be based on the uranium assay concentration (for liquids) and the measured gamma dose rate on contact (for solids) as shown in the formulae below.

Calculating the total activity of a liquid release to the environment is done using the following conservative assumptions:

- Uranium is in equilibrium with all its progeny.
- Solutions are homogeneously mixed.

Given the uranium assay value (mg/L), the recordable radiological release volume to the environment is calculated using the following formula:

$$V_{Limit} = \frac{5800}{U_{Concentration}}$$

where: V_{Limit} is the recordable radiological release threshold in liters, and
 $U_{Concentration}$ is the uranium assay concentration in mg/L.

The conversion value of 5800 was determined by first converting the uranium concentration in mg/L to an activity concentration of Bq/L by multiplying by the specific activity of natural uranium (U-238, U-234, and U-235).

$$A_{UNatVol} \left[\frac{Bq}{L} \right] = U_{Concentration} \left[\frac{mg}{L} \right] * A_{UNat} \left[\frac{Bq}{mg} \right]$$

The current value is now an activity per volume, but it is of all uranium isotopes only. The next step is to scale down to the activity of only U-238 and then assume equilibrium conditions (all U-238 decay chain constituents have equal activities) and scale up to the total activity.

$$\begin{aligned} A_{TotalVol} \left[\frac{Bq}{L} \right] &= U_{Concentration} \left[\frac{mg}{L} \right] * A_{UNat} * \frac{A_{U238} \left[\frac{Bq}{mg} \right]}{A_{UNat}} * N_{Constituents} \\ &= U_{Concentration} \left[\frac{mg}{L} \right] * A_{U238} \left[\frac{Bq}{mg} \right] * N_{Constituents} \\ &= U_{Concentration} \left[\frac{mg}{L} \right] * 12.35 \left[\frac{Bq}{mg} \right] * 14 \\ &= U_{Concentration} \left[\frac{mg}{L} \right] * 172.9 \left[\frac{Bq}{mg} \right] \end{aligned}$$

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The total activity concentration can then be used to determine the total activity based on the release volume to the environment.

$$A_{Total}[Bq] = V_{Spill}[L] * A_{TotalVol} \left[\frac{Bq}{L} \right]$$

Rearranging, substituting the above equation, and using the 1×10^6 Bq criteria allows for the determination of the conversion factor.

$$V_{limit}[L] = \frac{A_{Total}[Bq]}{A_{TotalVol} \left[\frac{Bq}{L} \right]}$$

$$V_{limit}[L] = \frac{A_{Total}[Bq]}{U_{Concentration} \left[\frac{mg}{L} \right] * 172.9 \left[\frac{Bq}{mg} \right]}$$

$$V_{limit}[L] = \frac{1,000,000 [Bq]}{U_{Concentration} \left[\frac{mg}{L} \right] * 172.9 \left[\frac{Bq}{mg} \right]}$$

$$V_{limit}[L] = \frac{5783.69 [mg]}{U_{Concentration} \left[\frac{mg}{L} \right]}$$

The formula for recordable radiological releases of solids to the environment uses the following assumptions:

- Uranium is in equilibrium with all its progeny.

Given the contact gamma dose rate measurement ($\mu\text{Sv/hr}$), the recordable release mass limit to the environment is calculated using the following formula:

$$M_{limit} = \frac{30}{DR_{Contact \gamma}}$$

where: M_{limit} is the recordable radiological release threshold in kg, and

$DR_{Contact \gamma}$ is the contact gamma dose rate in $\mu\text{Sv/hr}$.

The conversion value of 30 is determined by using two conversion values for a given percentage ore grade:

$$\text{Gamma Dose Rate: } 45 \frac{\mu\text{Sv/hr}}{\% \text{ Ore Grade}}, \text{ and}$$

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$$\text{Total Activity: } 1.5 \frac{\frac{MBq}{kg}}{\% \text{ Ore Grade}}$$

The gamma dose rate conversion is the generally accepted value used by the Government of Saskatchewan¹. The total activity conversion is simply the total activity of all the uranium ore constituents, as used in the calculation for a liquid release to the environment, but scaled by the amount of uranium in ore (U_3O_8):

$$172.9 \left[\frac{Bq}{mg_U} \right] * 0.848 \left[\frac{mg_U}{mg_{Ore}} \right] * \frac{1}{1,000,000} \frac{MBq}{Bq} * \frac{1,000,000 \text{ } mg}{1 \text{ } kg} = 147 \frac{MBq}{kg}$$

This value is for 100% ore so a conversion factor that is dependent upon percent grade is then:

$$\frac{145 \frac{MBq}{kg}}{100 \% \text{ Ore Grade}} = 1.5 \frac{MBq}{\% \text{ Ore Grade}}$$

The total activity of a release of solids is then given by the following formula:

$$A_{Total} = \frac{DR_{Contact \gamma} * M_{Limit} * 1.5 \left[\frac{\frac{MBq}{kg}}{\% \text{ Ore Grade}} \right]}{45 \left[\frac{\mu Sv/hr}{\% \text{ Ore Grade}} \right]}$$

Rearranging and using the *Nuclear Substance and Radiation Devices Regulations* criteria of 1×10^6 Bq as the threshold activity allows for the determination of the conversion factor.

$$M_{Limit} = \frac{1 [MBq] * 45 \left[\frac{\mu Sv/hr}{\% \text{ Ore Grade}} \right]}{DR_{Contact \gamma} * 1.5 \left[\frac{\mu Sv/hr}{\% \text{ Ore Grade}} \right]}$$

$$M_{Limit} [kg] = \frac{30 [kg \mu Sv/hr]}{DR_{Contact \gamma} [\mu Sv/hr]}$$

Note that these formulae are relevant for substances containing uranium ore, but are not valid for substances that have processed out many of the uranium ore progeny from the solid phase (e.g. yellowcake and tailings). The criteria for a RRR can be easily calculated for such radioactive substances based on a known specific activity. For example, calcined and non-calcined yellowcake at the Key Lake operation have known specific activities of 21×10^6 Bq/kg and 17×10^6 Bq/kg, respectively. This corresponds to respective recordable radiological release quantities of 0.05 kg and 0.06 kg based on the RRR activity limit stated above.

¹ Chambers et al. 1981. *Design for Radiation Protection in the Mining of High Grade Uranium Ore*, International Conference on Radiation Hazards in Mining: Control, Measurements and Medical Aspects, 4-9 October, 1981, Golden, Colorado.

**Ministry of Environment
Environmental Protection**
112 Research Drive
Saskatoon Canada S7N 3R3

Ministry File: S25050-50/ML/03/10061419

April 17, 2024

Mr. Brett Mitchell
Manager, Health, Safety Environment and Regulatory Relations
Orano Canada Inc.
SASKATOON, SK S7K 3X5

Dear Mr. Mitchell:

Saskatchewan Ministry of Environment (ministry) staff have received the following Orano Canada Inc. (Orano) submission:

- November 11, 2023 “Orano Application to Increase Collins Creek Bankfull Capacity” GDS10061419;

Based on discussion with Orano staff and review of the above submission the Ministry is hereby amending the previous response (Frantik to Mitchell, January 24, 2024) to the following understanding:

- Orano has assessed Collins Creek bankfull capacity and is requesting approval to update the capacity from 4.52m³/s to 5.60 m³/s. Collins Creek bankfull capacity is defined as the maximum flow rate at which Sink Reservoir may discharge effluent into the downstream watershed;
- Discharge from Sink Reservoir is controlled so it does not cause flooding in Collins Creek. Flooding is experienced when bankfull capacity is reached;
- In 2023, bankfull capacity was determined using physical stream channel indicators. To determine bankfull height, the elevation of the banks were surveyed at three locations where vegetation transitions from wetter to dryer riparian species. The lowest surveyed value minus 10 cm was used as the bankfull height. Bankfull capacity was then calculated by substituting the bankfull height into the stage-discharge relationship established for Collins Creek;
- Orano utilizes a stage-discharge curve for measuring discharge at Collins Creek downstream of the outlet of McClean Lake during open water season. Orano is requesting to use the updated stage-discharge curve to calculate discharge from stage;

- The environmental performance assessment completed in 2022 identified an update of the stage-discharge relationship was required due to the increased precipitation between 2016-2021;
- Three discharge curve relationships were used to calculate discharge throughout the operational monitoring period. Data collected during winter months is not included due to potential ice obstructions at the monitoring locations which may skew the stage-discharge relationship;
- The updated stage-discharge curve has a strong correlation ($r=0.996$) indicating the elevation of zero flow is representative;
- The stage-discharge curve will be reviewed at a maximum of every five years, or, if impacts are identified that show potentially significant changes to local hydrological conditions, the curve update will be performed at a higher frequency;
- The Environment and Climate Change Canada document “Hydrometric Manual – Data Computations Stage-Discharge Model Development and Maintenance, Water Survey of Canada Environment and Climate Change Canada, Report # qSOP-NA049-01-2016” will be used in future stage-discharge submissions; and
- A data gap exists at the higher end of the discharge curve during high flow conditions which usually occur when ice is still present on Collins Creek. Orano will continue to try to fill this gap by collecting high-flow data during open water months.

Based on the described understanding, the proposed increase to Collins Creek bankfull is approved and Conditions 4.4.10 of the Orano McClean Lake Operation Approval to Operate PO24-012 is hereby amended to the following:

- 4.4.10 The flow of water released from Sink Reservoir shall not exceed the lesser of:
- a) one part water treatment plant effluent flow to five parts Collins Creek flow as measured below the outlet of McClean Lake to Collins Creek; and
 - b) a flow rate that would cause the Collins Creek flow to exceed $5.60 \text{ m}^3/\text{sec}$.

Please attach a copy of this letter to all posted copies of Approval PO24-012.

In future bankfull capacity assessments please include the full channel cross section information and the collected field data (i.e. sediment composition, species identification, fluvial plain observations, etc.) for each surveyed location.

Brett Mitchell
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April 17, 2024

If you have any questions or concerns with the above please contact Casey Frantik at 306-531-3928 or by email at Casey.Frantik@gov.sk.ca.

Sincerely,

A handwritten signature in blue ink, appearing to read "Tim Moulding", with a long horizontal flourish extending to the right.

Tim Moulding, M.Sc.
Manager, Northern Region

cc: Casey Frantik, Environmental Protection, Ministry of Environment
Salman Akhter, Canadian Nuclear Safety Commission
UMMD, Canadian Nuclear Safety Commission
Regulatory Relations (Email), Orano Canada Inc.
