Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 21-H6.1A

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Supplementary Information

Presentation from
Orano Canada Inc.

Renseignements supplémentaires

Présentation d'
Orano Canada Inc.

In the Matter of the

À l'égard de

Orano Canada Inc.,
McClean Lake Operation

Orano Canada Inc.,
Établissement minier de McClean Lake

Application for licence amendment for the expansion of the JEB Tailings Management Facility (TMF) at the McClean Lake Operation

Demande de modification de permis pour l'agrandissement de l'installation de gestion des résidus (IGR) JEB à l'établissement de McClean Lake

Commission Public Hearing

Audience publique de la Commission

October 4, 2021

4 octobre 2021

Canada

Presentation to the Canadian Nuclear Safety Commission

Application for Amendment of the McClean Lake Operation Operating Licence for the Expansion of the JEB Tailings Management Facility

CMD 21-H6.1

October 04, 2021

Jim Corman, Vincent Laniece & Tina Searcy

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Overview of Presentation

- Orano Overview
- McClean Lake Operation
- Summary of Licence Request
- JEB Tailings Management Facility
- Key Safety Control Areas
- Engagement
- Other Regulatory Matters – Financial Assurance
- Conclusion

Errata - Orano CMD 21-H6.1

Section 3.4.1 Relevance and Management – page 35

Current Text:

Slope Stability – Probabilistic Analysis

…. Calculated mean factor of safety values and reliability indices from the probabilistic analysis for the proposed slopes 2H:1V (or flatter) met the required factor of safety value and the industry recommended (Whitman 1984) reliability index values of 1.5 and 2.5, accordingly.

Revised Text:

….Calculated mean factor of safety values and reliability indices from the probabilistic analysis for the proposed slopes 2H:1V (or flatter) met the required factor of safety value and the industry recommended reliability index value of 1.5 and 2.5, accordingly.

Orano Canada

- A **leader** in uranium exploration & processing
- Over **55** years in northern Saskatchewan; including exploration, mining & milling and successful decommissioning of a modern uranium mine, mill & tailings management facility
- **420** employees
- **300** employees at the McClean Lake Operation
- Corporate Office located in **Saskatoon** Saskatchewan

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Orano Canada
McClean Lake Operation

- Located in the **Athabasca Basin** over 750 km north of Saskatoon and 400 km (via road) north of La Ronge
- Only uranium facility in the world designed to process **high-grade Uranium** ore without dilution
- Currently processing high-grade ore from the Cigar Lake mine
- Over **13%** of the world's annual uranium production comes from the Athabasca Basin
- Licence renewed in 2017 for a 10-year term; expiring June 30, 2027

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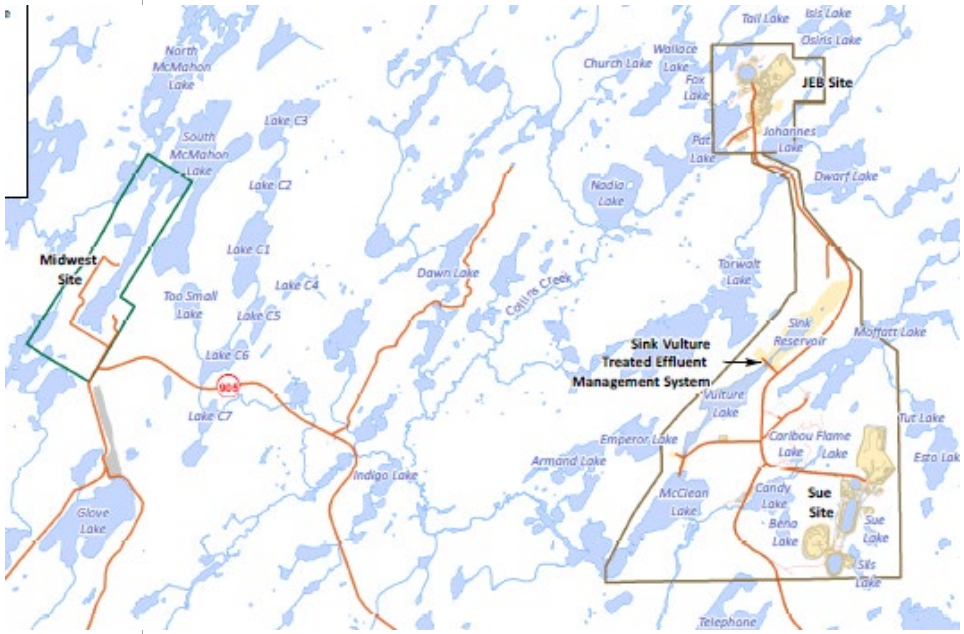
McClean Lake Operation



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Summary of Licence Request

Licence Amendment Request

- Amend the licence conditions handbook section G.1 to allow for the disposal of tailings in the JEB TMF up to a consolidated tailings elevation of 462 mASL, which is the approximate high point of the natural ground elevation
- To accommodate the increased tailings elevation, as well as JEB TMF pond water during operations, the construction and placement of a soil - bentonite amended liner to an elevation of 468 mASL is required

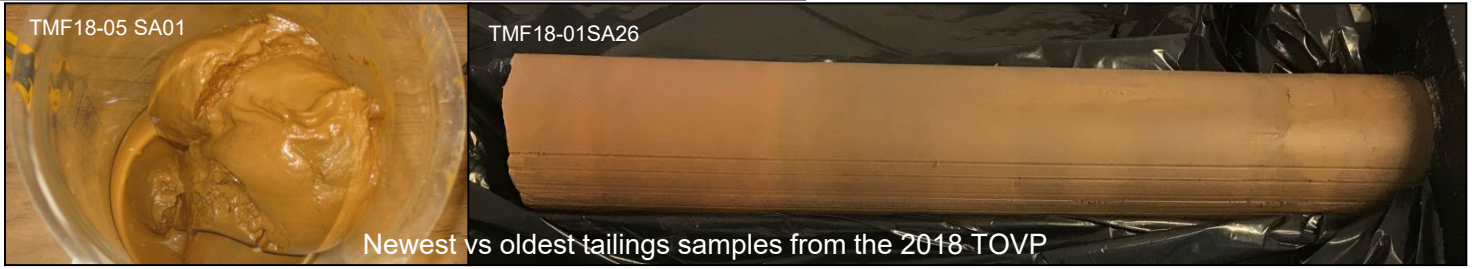
Acceptance of Revised Financial Guarantee

- Orano is requesting to amend the McClean Lake Operation LCH Section G.3 to reflect an updated financial guarantee from $107,241,000 (CAN) to $102,098,000 (CAN).

Overview of the JEB TMF

- Natural ground level (low) = 448 mASL
- Natural ground level (high) = 462 mASL
- Decommissioning:
  - consolidated tailings mass with a low hydraulic conductivity
  - removal of pond and pore water
  - placement of an engineered cover
- No anticipated adverse environmental impacts

*mASL: meters above sea level



Newest vs oldest tailings samples from the 2018 TOVP

Expanding the JEB TMF

- 2017 **approved** expansion of low side of TMF to 457.5 mASL
  - Construction of embankment completed in 2021
  - Placement of liner in 2023
  - Top of placed tailings = 452 mASL
  - **Top of consolidated tailings (all "in-pit") = 448 mASL**
- **Additional** tailings capacity required by **2027** to sustain operations and secure future projects

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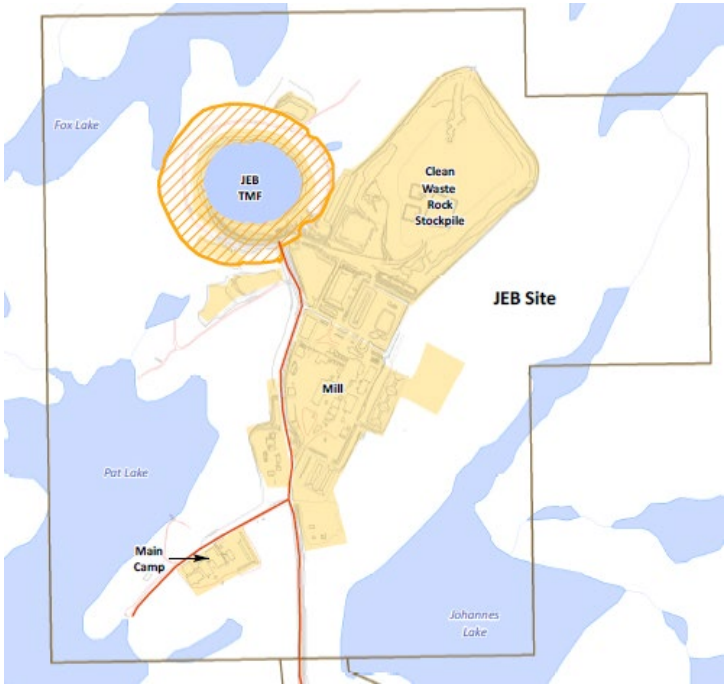
Expanding the JEB TMF



Alternatives Revisited - Preferred Option Remains to Expand the JEB TMF:

- Use of **existing** footprint & infrastructure
- **Within existing** surface lease
- **No additional effects** on the landscape or wildlife
- Surface and groundwater quality remain **below** thresholds
- Environmental effects are **within existing** EA's and ERA's

Vertical expansion:

- Embankment to 468 mASL
  - 6 meters above natural ground high side
- Top of placed tailings to 465.5 mASL
- Top of consolidated tailings to 462 mASL
  - At or below natural ground high side
- Additional capacity of **2.3 Mm3**

https://www.youtube.com/watch?v=rIRBm7eQ048

Safety Control Areas

- All 14 SCAs are presented in Orano's CMD
- The following SCA's are highlighted in this presentation
  - Operating Performance
  - Safety Analysis
  - Physical Design
  - Environmental Protection

Over the licence term Orano has received satisfactory ratings of all 14 SCA's from the CNSC staff for the McClean Lake Operation

Operating Performance

The expanded JEB TMF will continue to achieve operational and post-closure objectives to ensure the protection of people and the environment, through:

- water management; and
- physical and chemical passive controls

Operating Performance – Validation

TOVP Sampling Barge and Drill 2021

Tailings Management TID/Validation Program

- **evaluate** the physical and chemical characteristics of the tailings
- **validate** the predications of post decommissioning environmental risk
- updated in 2020

Environmental Performance TID

- evaluates current **environmental performance** and conducts an **environmental risk assessment** based on current and anticipated future activities
- 2016 ERA concluded that predicted **effects remain** within the predictions of previous EAs and ERAs

*TID: Technical Information Document

***both TIDs are updated every 5 years**

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Embankment Safety Analysis

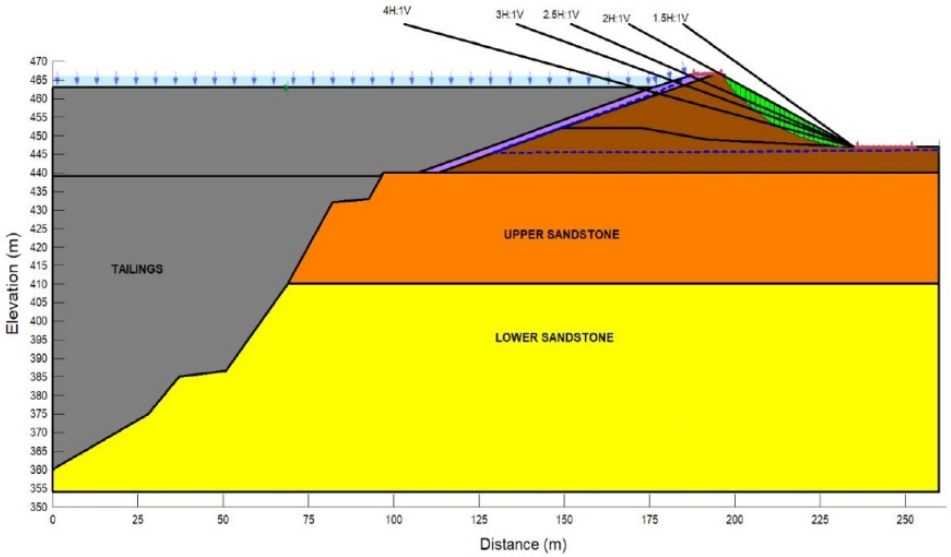
Embankment design incorporates factors of safety to be:

- **stable** at the end of operations when water level reaches its peak
- **stable** post decommissioning, for the long-term

Dozer working on the approved embankment 2021

Post-closure landform will be physically stable, safe, and self-healing, allowing transfer to Institutional Control with the Province

Embankment Stability Analyses



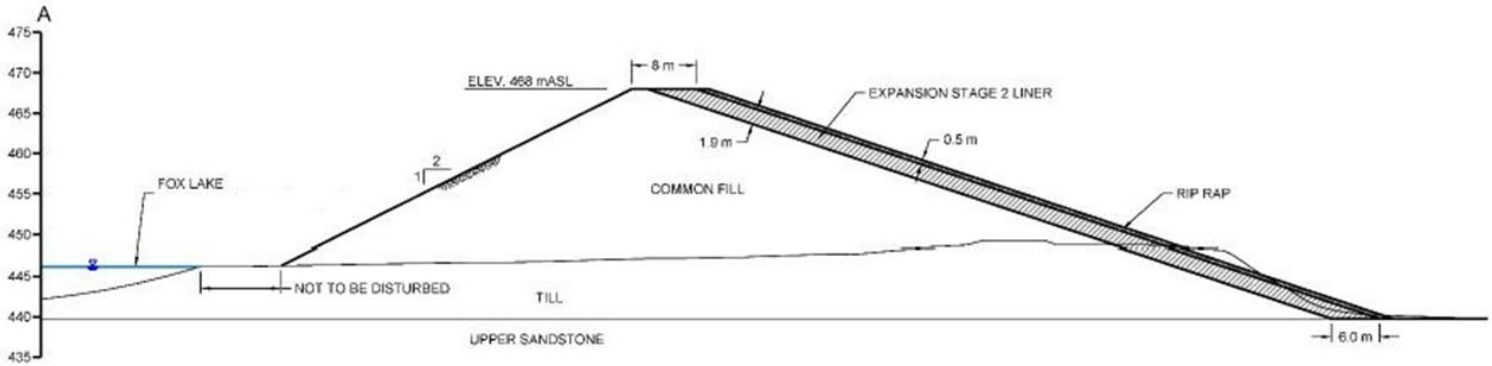
- ✓ **Deterministic slope stability analyses** against minimum factor of safety defined by the Canadian Dam Association under conditions representative of both at the **end of construction** and at the **end of TMF operating period**
- ✓ **Probabilistic slope stability analyses** met the required factor of safety and reliability indices in all cases
- ✓ **Designed** in accordance with the Canadian Dam Association with regard to **seismic loading.**

Foundation Stability

Embankment foundation underlain by a sequence of dense to very dense till units

Subgrade prepared by removing the organics layer and any stones >50mm then scarifying and recompacting the top 150mm surface

Review of recent tailings dam collapses have informed the design



Dam Failure Review

- Mount Polley, BC
- Brumadinho, Brazil
- International Council of Mining and Metals (ICMM) – Global Standard on Tailings Management

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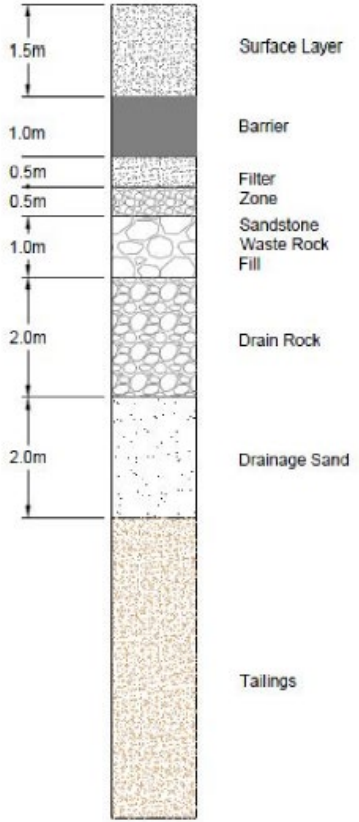
Decommissioning Cover Physical Design



Conceptual cover design with two primary goals **minimize infiltration and provide a physical barrier** between the tailings and humans and the environment

Development of detailed cover design will be based on performance of **cover test plots** and **soil-plant-atmosphere** modelling and simulations

Decommissioning - Landform

Final landform design designed using a **geomorphic** approach

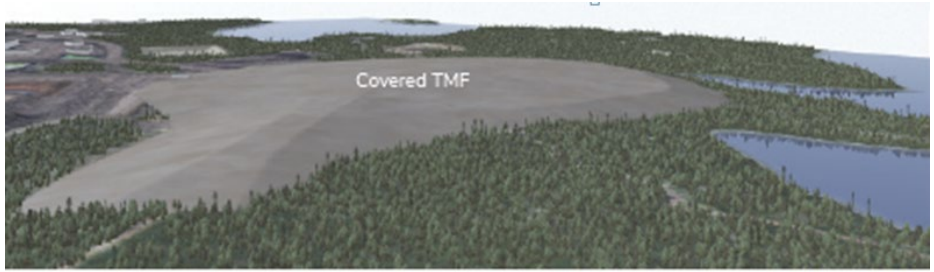
Landform design considers physical characteristics of nearby landforms (**e.g. slope angles, slope lengths, and drainage features**) as well as **regional climatic conditions**

End-state objectives:

- Long-term stability
- Passive controls
- No unreasonable risk to the environment
- Decommissioned tailings, at or below natural high side
- Tailings will be consolidated and unable to flow
- Passively controlled contaminant transport

Beyond Design Basis - Erosion Analysis

- no additional risks expected



Environmental Protection

Comprehensive environmental management program

- environmental monitoring program
- groundwater protection
- control and monitor releases

Decommissioned Facility

- containment of tailings
- prevent the release of radiological & hazardous chemical to air
- controlled release of contaminant transport

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Environmental Performance

Environmental performance reports

- evaluate current environmental performance

Environmental risk assessments

- predicted effects remain within the predictions of previous environmental assessments and risk assessments.

Consequence of failure assessment

- water bodies downstream of Fox Lake would not be negatively impacted over the short or long term

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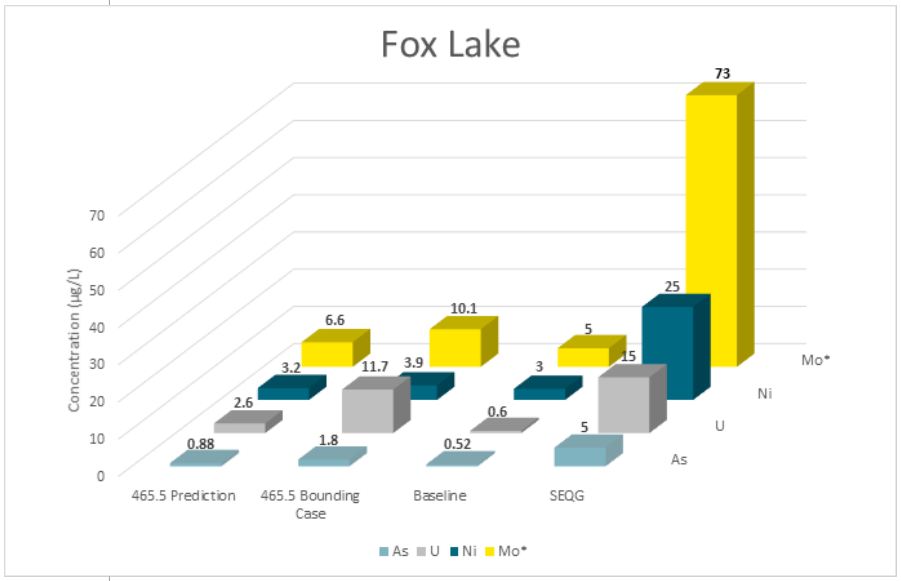
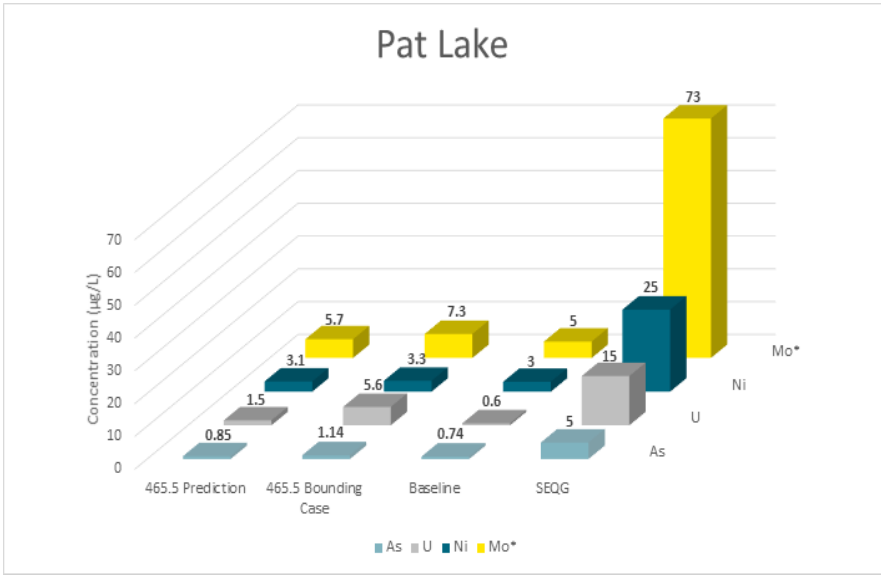
Environmental Protection





Long-term water quality remains below guidelines and protective of the receiving environment

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Indigenous Engagement and Public Involvement

- **2011 through 2015**
  - Community open houses (annual)
  - Meetings with leadership
  - Focused multi-day workshop with EQC
  - Focused meetings with EQC/AWG
- **2018**
  - Focused meetings with AJES/EQC regarding potential revitalization of expansion
- **2019 – updated Project Description Submitted**
- **2020/2021**
  - Focused meetings with AJES
  - Focused meeting with employees
  - Presentation to JIC
  - Mail out to Athabasca Basin community residents, leadership and representative organizations
  - Mail out to various central and west side community and /or First Nation leadership
  - Mail out to Metis Nation of Saskatchewan Region 1 and Region 3
  - Mail out to Metis Nation of Saskatchewan President and Environment Minister
  - Focused meetings with Ya'thi'Néné Lands and Resource Office
  - Mail out to EQC chair
  - Project information in Ya'thi'Néné Lands and Resource Office newsletter (quarterly)
  - Provision of project information to Ya'thi'Néné Lands and Resource Office
  - Direct communication with Basin First Nation and municipal leadership
  - Provision of participant funding opportunity to stakeholders
  - Project video to YouTube and shared with stakeholders

2020 tour with AJES, EQC and YTN LRO

Key Discussion Points:

- Project details; including design, monitoring & emergency response
- Within existing footprint; use of existing mine workings
- Within existing surface lease; does not take up new lands
- Environmental effects are within those previously assessed
- Risk of potential impacts on the environment are unlikely to cause new impacts to Indigenous and/or treaty rights
- No expressed concerns regarding the infringement on Indigenous or Treaty Rights
- Other areas of interest: employment; schedule

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Other Regulatory Matters – Financial Assurance

- As per LCH condition 11.2 the McClean Lake Operation must maintain a decommissioning strategy
  - To be revised at least every 5 years
  - Upon revision the cost estimate must be reviewed
- In 2020 the McClean Lake Operation's Preliminary Decommissioning Plan (PDP) was revised and resulted in a change in cost estimate from $107,241,000 (CAN) to $102,098,000 (CAN)
- The revised PDP and cost estimate has been reviewed and accepted by the CNSC staff and Saskatchewan Ministry of Environment

Regulatory Request: acceptance by the Commission to update the cost estimate; resulting in an amendment to LCH condition G.3

Conclusion

Orano submits that it is:

- **a competent and responsible operator which conducts its operations in a manner consistent with the requirements of the *Nuclear Safety Control Act*; and**
- **the necessary measures are in place to ensure Orano continues to conduct its operations consistent with the requirements of the *Nuclear Safety Control Act* and in a manner that:**
  - limits the risks to the health and safety of workers and the public;
  - limits the risks to the environment;
  - limits the risks to national security; and
  - is consistent with Canada's international obligations.

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Giving nuclear energy its full value