Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 25-H9.26

Date: 2025-10-24

Written Submission from Northwatch

Mémoire de Northwatch

In the matter of

À l'égard de

Denison Mines Corporation

Denison Mines Corporation

Licence Application to Prepare Site and Construct for Denison Mines' Wheeler River Mine and Mill Project

Demande de permis pour la préparation de l'emplacement et la construction du projet de mine et d'usine de concentration d'uranium Wheeler River de Denison Mines

Commission Public Hearing

Audience publique de la Commission

December 2025

Décembre 2025

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NORTHWATCH

October 24, 2025

Canadian Nuclear Safety Commission
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Ref. 2025-H-09

Commission Members:

Re. Denison Mines Corporation's licence application to prepare a site for and construct Wheeler River *in situ* Leaching Mine and Mill Project

On August 19, 2025 the Canadian Nuclear Safety Commission issued a revised notice of its intent to conduct public hearing on Denison Mines Corporation's licence application to prepare a site for and construct Wheeler River mine and mill project. The deadline for written submissions was announced as being October 24th.

According to the hearing notice Denison is proposing to develop an *in situ* recovery uranium mining and processing operation located in the Athabasca Basin in northern Saskatchewan, approximately 600 km north of Saskatoon. The proposed project is located within Treaty 10 territory, the homeland of the Métis, and within the traditional territories of the Dene, Cree, and Métis peoples. The property consists of 19 mineral claims totaling 11,720 hectares. It is located 35 km north-northeast of the Key Lake mill and 35 km southwest of the McArther River uranium mine, within the traditional territory of several Indigenous peoples. Denison Mines has an effective 95% ownership of the project.[1] The Wheeler River project would produce up to 5,400 tonnes of uranium oxide annually for up to 15 years.[2]

The Wheeler River Project will mark the first time the *in situ* extraction method is used at a Canadian uranium mining site.[3]

According to the U.S. Nuclear Regulatory Commission, the in situ method is used to "recover uranium from low-grade ores where other mining and milling methods may be too expensive or environmentally disruptive."[4]

Of note: the Wheeler Project deposits are not low-grade ores. The project two high-grade uranium deposits, the Phoenix and the Gryphon. The Phoenix deposit has an indicated resource of 70.2 million pounds at a grade of 19.1%, while the Gryphon deposit has an indicated resource of 61.9 million pounds of at a grade of 1.71%.

Denison intends to use the in-situ leaching method with the Phoenix deposit and the conventional mining method with the Gryphon deposit, i.e. the leaching method with the very high grade deposit and conventional mining with the still-high-but-not-as-high deposit.[5] This is wholly inconsistent with the rationale provided by the U.S. NRC for in-situ mining.

The NRC describes the method as involving injecting a solution called lixiviant (typically containing water mixed with oxygen and/or hydrogen peroxide, as well as sodium carbonate or carbon dioxide) is through a series of wells into the ore body to dissolve the uranium, after which the solution is collected in a series of recovery wells, through which it is pumped to a processing plant, where the uranium is extracted from the solution through an ion-exchange process.[6]

The chemical solution of "lixivants" that are injected into the aquifer hosting the uranium ore body into an aquifer that contains a uranium ore body (i.e. deposit) are typically sulfuric acid or ammonium carbonate. Under natural conditions, these ore bodies are localized and the radiation and heavy metals associated with them remain confined in small portions of an aquifer. Because under natural conditions the toxic substances associated with uranium ore bodies are locally confined, their host aquifers can be – and often are – used as drinking water sources. However, when lixiviant is injected into an aquifer, it creates a chemical reaction with the uranium, causing it to spread over large areas of an aquifer.[7]

The U.S. NRC acknowledges that, although ISL permits require complete restoration of groundwater conditions after mining operations, some of the "baseline parameters" have proved to be unachievable by mining companies. While the uranium mining industry insists that ISL mining methods are environmentally safe, numerous fines and violations by regulatory agencies have shown just how problematic ISL operations can be. The increase in ISL environmental violations in recent years has led many states to relax environmental standards rather than impose stricter regulations against the mining companies. Of the 8 currently operating ISL operations in the United States, only one has not had any reported environmental violations (Alta Mesa, Texas). Most ISL projects have had numerous spills, contaminated underground aquifers, and have failed to reclaim non-operating on site wells.[8]

While the uranium industry favours in-situ leaching due to the lowered cost of production, the disadvantages of the in-situ leaching technology include:

- the risk of spreading of leaching liquid outside of the uranium deposit, involving subsequent groundwater contamination,
- the unpredictable impact of the leaching liquid on the rock of the deposit,
- the impossibility of restoring natural groundwater conditions after completion of the leaching operations.

Moreover, in-situ leaching releases considerable amounts of radon, and produces certain amounts of waste slurries and waste water during recovery of the uranium from the liquid.

Northwatch has multiple concerns with this project and the application made by Denison Mining, including but not limited to the following area:

- the use of in situ leachate uranium mining in Canada is unprecedented and Northwatch is not satisfied that the Canadian regulatory framework is adequately developed for this very different extraction methodology
- the proposed use of freezer wall technology has limited operating experience, and no equivalent application; the use of a freeze wall at the Giant Mine might be the closest comparison, but that freeze wall had a ten year initial implementation period and monitoring and maintenance will be required indefinitely; technically complex at depth and requires continuous; if there are performance failures for any number of likely reasons (for example, a power failure) freezing performance will deteriorate and there will be a loss of containment
- international experience has demonstrated that aquifer / groundwater restoration is extremely difficult, and groundwater and the watershed more generally are advsersely affected by leachate mining; Denison's field tests were too limited to provide confidence in the future condition of the project area groundwater
- Denison's monitoring plans were inadequate, including groundwater monitoring
- Radionuclide profiling was inadequate and not well supported; the information in the application and supporting documents is too limited in the detail it provides, including with respect to waste form characterization and long-term waste management
- It is unclear whether Denison's financial assurances will be sufficient for extended monitoring and remediation that will be required
- There are numerous uncertainties about how responsibilities will transferred reliably if the licensee was to become an unviable entity (e.g. as a result of bankruptcy)

As noted by other intervenors, the environmental degradation caused by the use of sulfuric acid in in situ leachnate mining has both ecological and human health implications. Acidification of aquifers can eliminate microbial and aquatic life adapted to neutral pH conditions. Toxic metals and radionuclides may bioaccumulate in food chains, affecting plants, animals, and humans. Exposure to contaminated water can lead to health problems such as kidney damage, urological disorders, and increased cancer risks due to chronic ingestion of uranium and radium isotopes.

These are key issues and have not been adequately addressed by the licensee or by CNSC staff in their CMDs.

Northwatch's Interest in the Wheeler Project

Limited capacity has constrained Northwatch's ability to provide detailed comments on the Wheeler Project, but we wish to place our concerns and our opposition to the Wheeler Project on record with the Commission.

Northwatch is a public interest organization concerned with environmental protection and social development in northeastern Ontario. Founded in 1988 to provide a representative regional voice in environmental decision-making and to address regional concerns with respect to energy, waste, mining and forestry related activities and initiatives, Northwatch has a long term and consistent interest in the nuclear chain, and its serial effects and potential effects with respect to northeastern Ontario, including issues related to uranium mining, refining, nuclear power generation, and various nuclear waste management initiatives and proposals as they may relate or have the potential to affect the lands, waters and/or people of northern Ontario.

Northeastern Ontario is host to historic uranium mining extraction and exploration activities, and the legacy of hundreds of millions of tonnes of acid-leaching uranium mine waste which still require care and maintenance in our region.

We are concerned that the use of in situ leach mining of uranium in northern Saskachewan may be precedent setting and normative in Canada, leaving northeastern Ontario more vulnerable to future projects which attempt to use in situ leaching. Given the low-grade ore in northern Ontario, the availability of this lower cost mining method could have very adverse net effects in our region, i.e. the enabling of future low-grade uranium mines.

Secondly, as "host" the Blind River uranium refinery which will process the uranium from the Wheeler Project, Northwatch has an inherent concern with the extraction of uranium in northern Saskatchewan and its transfer through and processing in our region, given the adverse effects.

Finally, Northwatch continues to have concerns with the reliability of Denison as a mine operator, based on our own experience with Denison's operations – now closed – in the Serpent River watershed on the north shore of Lake Huron. Most recently, Northwatch retained Hutchinson Environmental Sciences Ltd. to provide a technical review of operations in the Elliot Lake basin, including operations by Denison Mines these operations consist of care an maintance of several closed mine sites which were "decommissioned" in the 1990s. Multiple concerns were flagged with respect to the outcome of Denison's care and maintenance, including but not limited to:

- increasing iron concentrations in primary discharges from Denison and Quirke TMAs, and
- increasing manganese at station D-3 of the Denison site

- several potentially concerning trends, such as the elevated acidity, sulphate, and iron concentrations downstream of Dam 17 at the Denison site
- at the Denison TMA-1 facility, the ETP influent (D-1) station annual average concentration of uranium (from 2019-2023) was "slightly higher than the past four years
- Uranium concentrations at D-2 (final discharge for the Stollery settling
- pond) were above benchmarks; this uranium exceedance at D-2 has occurred every
- year since 2013
- Periodic surface water monitoring of an unnamed pond adjacent to the Stanrock site (first discovered in 2015) detected elevated metals (Al, Co, Fe) and low pH. It was determined that the pond is likely influenced by TMA-affected groundwater. The report stated that "Denison is currently in discussions with regulators to determine a path forward for management of this pond and/or any discharges from this pond."
- Further downstream of Denison TMA-1, particularly downstream of Dam 17, groundwater had high acidity, iron, and sulphate, with acidity trending down over the past 5 years.
- At the Stanrock and Denison TMAs, it was reported that barium and radium-226 had increased slightly since 2003. The report mentioned that iron, acidity, and sulphate concentrations in porewater at the Stanrock TMA have not improved. Barium and radium loadings in discharge from the Denison mine site were also Barium and radium loadings in discharge from the Denison mine site also appeared to be increasing over time (from 2005 to 2019).
- Continuing exceedance of uranium in effluent (station D-2) at the Denison TMA-1 site

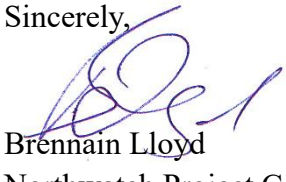
Conclusion

Northwatch requests that:

- Denison's application for a license application to prepare a site for and construct Wheeler River in situ Leaching Mine and Mill Project be denied
- In advance of any future applications for in situ leach mining be considered the CNSC carry out a science-based process to develop a regulatory framework with respect to in situ leach mining, including full consultation with the public, Indigenous peoples and independent experts

Thank you for your consideration. We look forward to a positive outcome of the Commission's review.

Sincerely,



Brennain Lloyd
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ENDNOTES

[1] https://wheelerriverproject.ca/
[2] https://www.cnsc-ccsn.gc.ca/eng/uranium/mines-and-mills/wheeler-river/
[3] https://wheelerriverproject.ca/
[4] https://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities
[5] https://denisonmines.com/projects/wheeler-river-project/
[6] https://www.nrc.gov/materials/uranium-recovery/extraction-methods/isl-recovery-facilities
[7] https://earthworks.org/issues/in_situ_leach_uranium_mining/
[8] https://earthworks.org/issues/in_situ_leach_uranium_mining/