Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

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Date: 2025-11-24

Supplementary Information

Written Submission from Denison Mines Corporation

In the matter of

Denison Mines Corporation

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

Commission Public Hearing
Part 2

December 8-11, 2025

Renseignements supplémentaires

Mémoire de Denison Mines Corporation

À l'égard de

Denison Mines Corporation

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

Audience publique de la Commission
Partie 2

8-11 décembre 2025

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Canada

TO:	**FROM:**
Denison Mine	Ecometrix
RE: Wheeler River Project Hearing Part 1 Inquiry– Effluent Quality Information	**DATE:** 17 November 2025

The following memo has been prepared in response to a question raised by Commission Member Dr. Remenda in the Wheeler River Commission Hearing Part 1, held on October 8, 2025. The relevant portion of the hearing transcript has been included below to provide context with a response following.

Part 1 Hearing Transcript

MEMBER REMENDA: So if we go back to your decision that was taken to go with the ISR technology as opposed to conventional mining, clearly there's quite a different volume of waste, of solid waste that you will deal with. But I haven't heard if there is a comparison to the volume of liquid waste that you will have to deal with when you're using this technology. So how do these volumes compare between liquid waste for conventional and liquid waste for ISR technology?

JANNA SWITZER: Janna Switzer, for the record. I will ask Kevin to provide some details, but what I would give perspective on is the amount of water that we're releasing to the environment. We are intending to intake about 40 cubic metres of water for the processing and drilling. And our discharge is about the same, around 40 cubic metres per hour. When you compare that to mining sites around the region, it's about a tenth of what they're discharging to the environment through their effluent. Kevin, anything else to ...?

KEVIN HIMBEAULT: Kevin Himbeault, for the record. For comparison, we have our effluent discharge retention ponds that we have are about 3,300 cubic metres in size. It takes us about three days to fill those versus, you know, equivalent 4,000 at some of the other sites that are filled every day, so within a 24-hour period. So the volume of water is quite a bit less from that side.

MEMBER REMENDA: Okay, so then the volume of water is less, but what about the concentration of contaminants of potential concern in that smaller volume of water? How do those compare?

JANNA SWITZER: Janna Switzer, for the record. I don't have an exact comparison of concentrations. What we have done is through the environmental assessment is evaluated the discharge, the discharge rate, and the concentration in the mixing zone within Whitefish Lake to which we have found that there's no significant effects from the discharge. But I don't have the numbers at hand to show you a comparison.

Commission Question (paraphrased)

Can Denison provide a comparison of its effluent quality (expected implied) to other operations in the basin.

Context of the Question

The question came up within the context of the relatively low volumes of water that will be discharged and overall ideas around water recycling.

> *So if water (effluent) quantity is relatively low (positive) what about water (effluent) quality – how does it compare*

Response

Direct comparison of effluent quality among the regional operations is discussed below but some context for the comparison is important as there are a variety of factors that are considered when deriving effluent quality criteria which is in part the basis of what the chemical / radiological composition of an effluent is from a practical mine/mill operations point of view.

Effluents (effluent quality) are by their nature site-specific. The specific composition of an influent to an Effluent Treatment Plant (ETP) (or more generically an effluent treatment system) is related to, or a function of, the specific contributions from the influent source areas – for example, the geochemical characteristics of the ore and mine wastes, the contributions from other contact water sources and ore processing inputs. Similarly, the specific composition of an effluent that is released from an ETP is affected by the elements and design of the effluent treatment train (i.e., what constituents are targeted for treatment) and also the specific characteristics of the effluent receiving environment (i.e., the assimilative capacity of the receiving environment).

Despite the above, in concept the quality (composition) of an effluent, regardless of the source, needs to fit into both the regulatory framework(s) and meet any and all statutory requirements that apply. By these measures therefore, it is possible to compare effluent quality among regional operations in the Athabasca basin to the preliminary maximum estimation of effluent quality associated with the Wheeler River Project (WRP). At a high level all effluents would be subject to discharge criteria such that the effluent (1) is non-acutely lethal, (2) is within a pre-defined pH range (typically pH 6 to 9.5) and (3) has constituent concentrations that would meet water quality objectives that are protective of aquatic life at the edge of the mixing zone[1]. By that standard or context therefore the characteristics of any of the effluents discharged by operations in the Athabasca basin are similar, and Denison would be committed to meeting such standards during all mine life phases.

More explicit consideration of the comparison of effluent quality among regional operations in the Athabasca basin can also be made. As it concerns the WRP, at this time and commensurate with the approvals processes within which Denison is engaged, a preliminary representation or an estimate of maximum expected effluent quality has been developed - the preliminary estimate is based on predictive modeling and laboratory-based column leach tests that generated uranium bearing solution (UBS) that was processed and used to represent an ETP influent. This representation of the ETP influent is seen as conservative[2] as it is solely represented by the UBS and does not include contributions from other sources (e.g., runoff from contact water areas on site) that would be part of the ETP influent as will be the case during the operations phase of the project.

"Preliminary" is highlighted above since the estimate of the maximum expected effluent quality is a work in progress and will continue to be refined though ongoing regulatory processes, that include selection and design of preferred treatment technologies. Given the above, any comparison of actual constituent concentrations between values derived to date by Denison and values that are available from other operations in the Athabasca basin should be taken within the context that it is for information purposes only. Any attempt to interpret the information beyond that for which it has been presented is discouraged. Additional caution is expressed in terms of interpreting the comparison constituent concentrations between values derived to date by Denison and values that are available from other operations in the basin since, in the case of existing operations the values are reflective of site-specific source contributions, treatment

[1] Specific statutory numeric effluent quality limits for select constituents would also be defined through federal (Metal and Diamond Mine Effluent Regulations; CNSC RegDoc 2.9.2) and provincial (Environmental Management and Protection Act, 2010, E-10.22) instruments.

[2] Conservative in this context reflects an expectation that the estimated preliminary maximum expected effluent quality has been overpredicted based on the reasons stated.

technologies employed and the characteristics of the receiving environment to which the effluent is discharged.

The table below includes the preliminary estimate of maximum expected effluent quality in comparison to the range of concentrations measured in treated effluents at other uranium mining / milling operations in the Athabasca basin. The measured concentrations for the constituents shown for the existing uranium mining / milling operations were sourced from publicly available information and thus represents information available to Denison as is available to others and was not provided to Denison based on special request for access to such data. For additional context constituent loadings are also presented in the table. The constituent loads represent the estimated mass of a constituent (kg) released per time unit (year).

With respect to the effluent constituent concentration and effluent constituent load information provided in the table the following is noted:

- The concentrations of constituents measured in effluents from operating sites is variable, ranging on the order of one to three orders of magnitude between the lower and upper bound concentrations.
- Estimated maximum concentrations of copper, arsenic, and nickel in the preliminary WRP effluent were in the range of those measured in treated effluents in the basin, whereas the concentrations of other constituents in the preliminary estimated maximum WRP effluent were greater than the upper bound of measured concentrations.
- Constituent loads measured in effluents from operating sites is variable ranging on the order of one to two orders of magnitude between the lower and upper bound loading rates.
- Estimated constituent loading rates for the preliminary estimated maximum WRP effluent were within the range of the those measured in associated with treated effluents in the basin, with the exception of molybdenum.

DATE: 17 November 2025

TO: Denison Mine

REF: Wheeler River Project Part 2 Hearing Prep – Comparison of WRP Effluent within the context of other operations in the basin

Constituent	Constituent Concentrations			Constituent Loads		
	WRP – Preliminary Effluent Maximum Estimate (mg/L; Bq/L for Radium-226)	Lower Bound of Measured Data (mg/L; Bq/L for Radium-226)	Upper Bound of Measured Data (mg/L; Bq/L for Radium-226)	WRP – Preliminary Effluent Maximum Estimate (kg/year)	Lower Bound of Measured Data (kg/year)	Upper Bound of Measured Data (kg/year)
Uranium	0.057	0.0001	0.0259	18.2	1.43	38.4
Selenium	0.0419	0.0002	0.018	13.4	0.6	20.2
Molybdenum	2.5	0.003	0.16	799	4.2	450
Copper	0.0222	0.0002	0.030	7.1	1.1	30.7
Nickel	0.0138	0.001	0.257	4.4	2.7	327
Arsenic	0.006	0.0001	0.044	1.9	0.23	16.7
Lead	0.0003	0.00004	0.0001	0.1	0.03	13.3
Zinc	0.042	0.0008	0.012	13.4	0.3	13.9
Radium-226	0.150	0.006	0.09	47.9	1.9	162