Date: December 19th 2017

From: Anne Lindsey

To: Candida Cianci, Environmental Assessment Specialist
Canadian Nuclear Safety Commission

By email: cnsc.ea-ee.ccsn@canada.ca

Subject line: Comments on Whiteshell Reactor Draft EIS

CEAA Reference number: 80124

Comments:

Please find my comments attached.
Please send confirmation of receipt of email.
Thank you,

Kind regards,
Anne Lindsey, O.M, M.A

December 19, 2017

To: Candida Cianci, Environmental Assessment Specialist

Canadian Nuclear Safety Commission

By email: cnsc.ea-ee.ccsn@canada.ca

From: Anne Lindsey, Winnipeg, Manitoba

Comments on the Draft Environmental Impact Statement for the proposed In Situ Decommissioning of the Whiteshell Reactor #1

The proposed In-Situ Decommissioning (ISD) proposal is not a suitable resolution to the problem of disposing of the remains of the Whiteshell Reactor #1.

The Environmental Impact Statement (EIS) fails to provide evidence of long term safety to the environment and the public of this new proposal and does not convince the reader of any improvement over the currently licensed decommissioning option.

Rationale for new proposal:

The rationale provided – reducing nuclear legacy liabilities to future generations - is disingenuous and irresponsible. Future generations may be spared the immediate requirement to manage the remains of the reactor, but only because the materials are proposed to be removed from immediate sight, by this unproven shallow burial technique. The truth is that the liabilities are simply transferred even further into the future when the radioactivity is released to the environment at which point it cannot be controlled.

Consideration of Alternatives:

The methodology for determining the "preferred option" utilizes circular logic in that some of the evaluation criteria pre-determine the conclusion of "best" alternative, 2.5.1-2. For example: "Does the alternative minimize the transport of hazardous waste"? And "Does the alternative require offsite disposal of wastes"?

The EIS document itself states that the currently licensed decommissioning option of "*complete removal of the facility is considered to be the* ***safest long-term option*** *with respect to the public near the WL site, compared to an ISD alternative*", 2.5.3.1 In addition, "*Compared to an ISD alternative, complete removal also eliminates the potential risk associated with groundwater leaching through the WR-1 ISD structure that could migrate to surface water and then adversely affect human health and the ecological health of terrestrial and aquatic ecosystems.*" 2.5.3.2. Since groundwater contamination is the major potential source of various risk pathways, eliminating risk to groundwater contamination is the strongest possible option for safety.

Risk to workers is an important consideration, however, reactor dismantling is common practice around the world with well-established protocols to protect worker health and safety.

What is actually being entombed?

The Technical Document **WR-1 Reactor Radiological Characterization Summary** (provided upon request by Mitch MacKay of CNL) suggests that the actual radiological content of the materials to be entombed is not well understood:

Reactor Core. *The activity estimates of the reactor core are based on* ***computer modelling performed in 1992 using computer codes and methods that were acceptable at the time****. Modelling and calculations* ***could be*** *repeated using current up-to-date and industry accepted computer codes and methods to verify the original reactor core radionuclide activity estimates given in Reference [8].*

WR-1 Biological Shield. *There are* ***no known documents providing computer modelling and estimation of the activation products and total radioactivity in the WR-1 biological shield****. The activity estimates given in this document are based on analysis of a single reactor core taken from the near mid point of the reactor [11]. Modelling and calculation* ***could be done*** *using current industry accepted computer codes and methods to provide radionuclide inventory estimates and the AECL 1998 study [11] then used to validate results.*

Heavy Water and Helium System. *Characterization coupons obtained obtained (sic) in 2015 from the heavy water dump tank and helium accumulator tank indicates internal surfaces have low level 14C contamination.* ***No total radionuclide inventory estimate has been made****. Further radiological characterization* ***could be performed*** *to determine and/or verify 14C distribution and activity levels and an estimate performed of the system's total activity inventory.*

Primary Heat Transport System and Experimental Loops. There has been no radionuclide characterization of contaminants contained within closed systems of the primary transport system or the experiment loop to determine the relationship of fission products and actinide activity*. Radiological characterization surveys and sampling could be performed to determine radionuclide distributions in contaminated systems and levels of acintide (sic) radioactivity. In-situ gamma spectroscopy and/or inference activity calculations using shielding codes and measured external dose rates could be performed to validate 1994 radioative (sic) inventory estimates given in Reference [19]. Current industry accepted computer codes and methods* ***could be used*** *to evaluate and verify released fission product and actinide activity estimates given in this document based on WR-1 specific burn-up values and reactor fuel types.* (2) (Emphasis added).

The draft EIS contains pages of information about the behaviour of the radioactive inventory over time, yet it seems the conclusions are based on incomplete information, as suggested above.

It is challenging to understand why, in 2017, Canadians should be comfortable with burying – close to the surface, and immediately adjacent to a river – materials whose characteristics we don't really understand.

Monitoring:

The proposal calls for the project to be turned over to institutional controls in 2024, "with active controls (e.g., ground water monitoring and site inspection) only required for the first 100 years". 1.2. Considering the load of radioactive materials and their rate of decay active groundwater monitoring and site inspection would need to continue for a much longer period, indeed, perhaps indefinitely.

"*In addition, Institutional Controls, including restrictions on land use, and a program for monitoring will be completed in the post-closure period to* ***demonstrate long-term safety of the public and the environment***". 2.5.4.3 (Emphasis added). This is a hugely optimistic and misleading statement in its use of the term "demonstrate long term safety", clearly designed to calm any public fears. Yet there is actually no way to demonstrate safety into the long term, especially if monitoring does not continue into the long term. In fact, "institutional controls" in this context really means no controls at all. (*The size of the workforce after 2021 is anticipated to* ***decrease to zero by 2024****. A large workforce is not required during Institutional Control –* ***3.5.5****).* (Emphasis added).

A commitment to Adaptive Management in 11.1 sounds great, however "*revised mitigation measures*" in the event that "*the adverse environmental effects are greater than predicted*" may not be possible owing to the grout penetration of the site.

Proven technology?

While ISD has not yet been completed in Canada, the U.S. Nuclear Regulatory Commission (NRC) has recognized entombment as a decommissioning option since the 1970s. 2.5.4.3

This statement does nothing to inspire confidence. Blasting nuclear waste into outer space was also considered an option in the early days of nuclear power.

And, as noted in numerous comments on the Project Description, "entombment" is not recognized by the International Atomic Energy Agency as best practice when dealing with long-lived radionuclides. The fact that it has been utilized in 3 instances in the US, does not make this a proven technology given the enormously long time periods of potential radioactive contamination. In 2 of those US instances, the major sources of contamination were actually removed prior to grouting and entombment.

This proposal seems to mirror the early prognostications of the nuclear industry which proceeded to build reactors and create nuclear waste without really knowing what the longer term implications of these activities would be. Should we make the same mistake again?

Grouting:

In particular, the EIS provides no clear information on the properties of the proposed grouting material. In fact, the only information given is as follows:

"*The grout* ***will be designed*** *to achieve the required physical properties to provide adequate resistance to damage, and release of contamination. The design* ***will take into account*** *the effects of using local fill materials (e.g., sand and gravel) and the materials the grout will interact within the WR-1 below grade structure (e.g., aluminium).* ***Multiple grout formulations may be necessary*** *to achieve complete filling of the below grade structure, but all formulations will adhere to the same minimum requirements to ensure the final end state performs as expected*". 3.5.1.2 (Emphasis added)

Again, this plan does not inspire confidence nor does it allow for any kind of analysis on whether the yet-to-be designed grout is adequate to the job it will be used for. If the "final end state" is thousands of years into the future, what are the "minimum requirements" that it should adhere to?

A quick internet search reveals in-depth documentation of the grout materials used in the Savannah River Reactor decommissioning example, including discussion of the specific reactivity between grouts and the particular components of those reactors. Such an analysis would be appropriate in the Whiteshell EIS. Climate, geological settings, groundwater characteristics and the characteristics of the reactor are all unique in each circumstance and this technology has not been used, let alone proven, under the circumstances at Whiteshell.

It is also important to note that one of the objectives in the Savannah River case was listed as follows:

"*Prevent to the extent practicable the migration of radioactive or hazardous contaminants from the closed facility to the groundwater so that* ***concentrations in the ground water do not exceed regulatory standards***". (Langton, Stefanko, Serrato, Blankenship, Griffin and Long, nd. (2010?). (2)

Such an objective would be appropriate in this case, as many of the radionuclides which are thought to exist in the reactor components to be encapsulated have very long half lives, far exceeding the institutional control period, and the EIS contemplates groundwater infiltration during the institutional control period.

Manitoba Context:

In the currently licensed decommissioning plan, Manitobans were led to believe that the nuclear facilities at Whiteshell, including contaminated reactor elements would be entirely removed from the site and that the site would be returned to natural conditions. This is consistent with the intent and purpose of Manitoba's High Level Radioactive Waste Act, (1987) which prohibits disposal of radioactive waste in Manitoba. While the constitutional realities of this provincial law, as it was written, can be debated, there is no doubt that the intent of the law was to protect the environment and public health from the dangers of radioactive waste disposal, in accordance with public opinion at that time. The current proposal violates the intent and spirit of the Manitoba law.

(1) Canadian Nuclear Laboratories, Technical Document CW 503-210 FM 357 Rev. 1

(2) C.A. Langton, D.B. Stefanko, M.G. Serrato, J.K. Blankenship; W.G. Griffen, J.T. Long (no date provided)

USE OF CEMENTITIOUS MATERIALS FOR SRS REACTOR FACILITY IN-SITU DECOMMISSIONING, http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/44/122/44122428.pdf