Comments on the Project Description for the Nuclear Power Demonstration Closure Project

(CEAA Reference number 80121)

Submitted by Michael Stephens, concerned Deep River resident

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General Comments

It is surprising that the proponent is proposing to entomb the NPD reactor, which was successfully operated for 25 years and underwent a planned permanent shutdown in 1987. The proponent must surely be aware that entombment is not an accepted practice in the world's nuclear community in such a situation. Part 6 of the IAEA General Safety Requirements, Decommissioning of Facilities (GSR Part 6, July 2014, pp 2-3, http://www-pub.iaea.org/MTCD/publications/PDF/Pub1652web-83896570.pdf) states that (Note: my highlighting):

> *1.9. Strategies for decommissioning that have been adopted or are being considered by States include immediate dismantling and deferred dismantling. In principle, these two possible decommissioning strategies are applicable for all facilities.*
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> *——Immediate dismantling: In this case, decommissioning actions begin shortly after the permanent shutdown. Equipment and structures, systems and components of a facility containing radioactive material are removed and/or decontaminated to a level that permits the facility to be released from regulatory control for unrestricted use, or released with restrictions on its future use.*
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> *——Deferred dismantling: In this case, after removal of the nuclear fuel from the facility (for nuclear installations), all or part of a facility containing radioactive material is either processed or placed in such a condition that it can be put in safe storage and the facility maintained until it is subsequently decontaminated and/or dismantled. Deferred dismantling may involve early dismantling of some parts of the facility and early processing of some radioactive material and its removal from the facility, as preparatory steps for the safe storage of the remaining parts of the facility.*
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> *1.10. A combination of these two strategies may be considered practicable on the basis of safety requirements or environmental requirements, technical considerations and local conditions, such as the intended future use of the site, or financial considerations. Entombment, in which all or part of the facility is encased in a structurally long lived material, is not considered a decommissioning strategy and is not an option in the case of planned permanent shutdown. It may be considered a solution only under exceptional circumstances (e.g. following a severe accident).*

If, counter to this clearly stated position of the world's nuclear community, the proponent is permitted to implement this project, then the following comments apply.

The project involves more than completing the decommissioning of a reactor that is now maintained in a safe state, and leaving a site that can be immediately released from regulatory control. As acknowledged by the proponent, the project also entails the creation of a near-surface radioactive waste disposal repository. The accompanying requirements for ensuring the safety of humans and the environment must also be satisfied before the project is allowed to be implemented.

To my knowledge, the proponent has not proactively sought two-way direct interactions with members of the public. The proponent should begin such activities as soon as possible to avoid the appearance of having adopted a "Decide-Announce-Defend" approach to public engagement.

How the project will ensure a, "prompt reduction of Canadian legacy long-term liabilities," is not clear. The project could increase the liabilities.

Detailed Comments

Section 1 – The proponent describes the project as "in-situ decommissioning" of the partly decommissioned NPD reactor. Contaminated materials would be left permanently in a below grade structure. Therefore the project also creates a near-surface radioactive waste disposal repository. Thus the potential long-term impacts on human health and the environment must be assessed and shown to be acceptable before the project proceeds.

Section 2 – The reactor is a Class 1 nuclear facility that is presently in the Storage with Surveillance (SWS) phase of decommissioning and has a Decommissioning Waste Facility license [sic].

Section 2.3 – It is indicated that during 2015 September to December, communication activities by CNL have provided "a brief overview of the proposed NPD in-situ decommissioning approach" "within the context of a larger vision of the company" to (amongst other stakeholders) "Local residents (Rolphton, Rapides-des-Joachims, the United Townships of Head, Clara, and Maria, Deep River and Chalk River area)".

I am not surprised that, "the results from these preliminary consultations indicate no immediate concerns with the proposed decommissioning approach". What form did the direct communications with members of the public take? As a resident of Deep River, I do not recall any previous proactive substantive notification and information provided by the proponent, nor any invitation to comment on the proposed approach, the alternatives to it, and the rationale for adopting the proposed approach. Will the proponent soon begin direct, open, detailed, two-way communications with members of the public? It is rather late in the process of defining the project, and the proponent risks being perceived as having adopted a "Decide-Announce-Defend" approach to public consultation.

Section 2.3.1 – The CNL public information program is described as having the overriding objective, "to build public awareness, understanding, and a supportive appreciation of the Laboratories' value and relevance to Canadians". There is no indication that CNL has sought to listen to the public and consider accommodating its concerns and preferences in its program. There are many well-informed local members of the public in the Upper Ottawa Valley who might lend their support to proposals if their views were sought and responded to before key decisions are made. The vital importance of direct early two-way engagement with the public was a lesson learned the hard way by the United States Department of Energy at similar sites in the US.

Section 2.4.1 – Several environmental studies have shown no adverse effects on the environmental from the decommissioning activities that have been conducted to date. This suggests that there must be reasons other than current environmental impacts for moving away from the current deferred decommissioning approach.

Section 3.1.1 – The total residual radioactivity has decreased significantly since the permanent shutdown because of the decay of the short-lived nuclides. The long-lived nuclides also present may not dominate now, but will in the long term.

The fact that "disposal options for nuclear waste within Canada are currently not available" is not a valid argument for advancing decommissioning. It is an argument for building appropriate repositories for the different classes of waste, rather than risk creating another problem. AECL has been a world leader in developing waste disposal technology for decades, but has not built or gained access to actual repositories for its wastes. Putting long-lived waste into an unsuitable near-surface condition could leave it in a difficult-to-retrieve state for eventual retrieval and proper disposition when an appropriate repository is available.

The IAEA document cited by the proponent (Safety Report Series #50, 2007) states, amongst many pertinent aspects, (Note: my highlighting):

> *2.4. ENTOMBMENT*
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> *Entombment is the strategy in which the radioactive contaminants are encased in a structurally long lasting material until the radioactivity decays to a level that permits release of the facility from regulatory control. The fact that radioactive material will remain on the site means that the facility will eventually become designated as a near surface waste disposal site and criteria for such a facility will need to be met*
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> *3.2.3. Entombment*
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> *Entombment is not relevant for a facility that contains long lived isotopes because these materials are not suitable for long term surface disposal. Consequently, reprocessing facilities, fuel fabrication facilities, enrichment facilities or facilities that use or process thorium or uranium would not be appropriate for entombment. However, entombment could be a viable option for other nuclear facilities containing only short lived or limited concentrations of long-lived radionuclides, i.e. in order to comply with the site release criteria.*
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> *3.3.3. Entombment*
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> *Since the end state of an entombed site is equivalent to a waste disposal site, the end state cannot satisfy unrestricted release conditions. An entombed site will need some measure of monitoring and control well into the future, which will be undertaken by either the operating organization or the regulatory body. Since the area required for an entombed facility is normally less than that of the original facility, the remaining area of the site could be used for other purposes, including industrial applications. This option may also be considered if a waste disposal site does not exist within a Member State; the waste disposal facility could be created at the facility site. Such a new waste disposal facility would be of the 'near surface disposal' type*

that could receive radioactive waste from other sites, but only waste containing short lived radionuclides.

3.4.3. Entombment

The entombment strategy has many similarities to the immediate dismantling strategy insofar as it affects the regulatory body. The regulatory staff will initially make the transition from operations to decommissioning. However, with this strategy, the regulatory staff will also have to be knowledgeable with regard to the requirements for near surface disposal facilities [4], since this is the end point of the decommissioning project. Once the decommissioning is completed, the staff will have a disposal site to regulate. There are limited international practice precedents for entombing facilities. The main difference in the regulatory requirements for entombment will be that in addition to the decommissioning regulations being necessary there will also need to be regulations for the near surface disposal of radioactive waste. Since it is unlikely that the site of the operating facility was evaluated to serve as a location for a near surface disposal site, such an evaluation may be conducted as part of the approval process for the entombment strategy.

3.9. SOCIAL AND ECONOMIC IMPACTS

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An entombment strategy may be difficult for the local population to accept because a structure containing radioactive waste is normally left after the decommissioning activities are completed. This structure is permanent and may be visible to the local population. Therefore, the potential selection of this strategy will need to take into account an extensive public information and feedback programme.

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Section 3.1.2 – The stated objective of the project is "to safely decommission NPDWF ensuring the prompt reduction of Canadian legacy long-term liabilities". If the facility is not licensable as a near-surface disposal facility because of the long-lived nuclides, then this project does not reduce the long-term liabilities - it increases them because it will be more difficult and expensive to retrieve them for disposal later. There is no discussion of the short-term and total cost implications of carrying out this project now (rather than, for example, simply maintaining the status quo until AECL has access to a geological repository for its long-lived waste). Storage With Surveillance for another 50 years would lead to a further great decrease in the inventories of the short-lived radionuclides.

Section 3.3.1.2.1 – It is stated that the majority of the radiological inventory within NPDWF is associated with reactor core components (calandria and pressure tubes), the biological shield, the hear transport system, and the moderator system. The (currently) dominant nuclides are said to be ^{55}Fe, ^{60}Co, ^{65}Zn, ^{14}C, ^{54}Mn, ^{63}Ni, and ^{3}H. These nuclides respectively have half-lives of: 2.7 a, 5.3 a, 244 d, 5700 a, 312 d, 100 a, and 12 a. ^{14}C and ^{63}Ni have half-lives longer than a few years. ^{14}C is a mobile species.

Other longer-lived nuclides are also likely present (e.g., nuclides trapped in the calandria pressure tubes and primary coolant circuit that were released from failed fuel during the operating period of the reactor). They may not dominate the total radionuclide inventory now, but will dominate in the longer term. What are the inventories of the long-lived radionuclides?

What are the estimated quantities of “Designated Substances”?

Section 3.5 – The proponent says that “the below grade sealed structures will contain any radiological sources within it for a period of institutional control”? What is expected to happen after that – or can the proponent show that the ensuing impact on human health and the environment is not of concern?

Section 3.5.2 – What assurance will there be that the grout seals to the walls of the subgrade structures, that it won’t expand and crack the structure, or shrink and leave fissures, or crack after curing? It is indicated that an “engineered barrier” will be installed, but no details are given. What is the purpose of the barrier? What will it consist of? How will its performance be assured? (Section 3.5.6 suggests that it may be subject to subsidence, erosion and animal or other intrusion.)

Section 5.6 – The proponent indicates that, “the project must assess the potential safety and risks to the environment and public…in accordance with applicable regulations including CNSC regulatory guidance” (i.e., including G-320). This assessment should be completed, show that no unacceptable risks will remain on the site, and be discussed with the public before this project is allowed to proceed.

Section 6.7 - Table 3-1 refers to the project including long-term care and maintenance activities starting in 2020 and continuing for an undetermined length of time. Some acceptable minimum time should be discussed with the public and agreed upon (as well as where the necessary resources will come from and how they will be funded) before this project is allowed to proceed.

Section 5.3 – Will a CNSC licence to “abandon” the site be necessary and sought at some point?

Section 6.1.2 – It is indicated that any groundwater leakage is currently into the facility. This will no longer necessarily be the case after the periodic sump pumping is stopped.

Section 6.1.4 – It is indicated that, “There is the potential for radionuclide releases to groundwater from the in-situ decommissioned reactor and radionuclide migration to the Ottawa River”. This in itself is sufficient reason to conduct an assessment of the long-term safety of the site to both the environment and humans who may be located along the migration path.