

Comments on the “Project Description – NPD Closure Project”
(Registry Number 80121)

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By W. Turner (Concerned Citizen)

General Comment

The IAEA identifies three decommissioning strategies for nuclear facilities. These are immediate dismantling, deferred dismantling and entombment. With respect to permanently shutdown reactors, the Agency does not recommend entombment. To quote the sections 1.9 and 1.10 from the IAEA publication, *Decommissioning of Facilities, General Safety Requirements Part 6*, IAEA, Vienna, 2014.

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.

— *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.*

— *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.*

*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). [emphasis added].*

This directly contradicts the statement in Section 3.1.1 Project Context, fourth paragraph;

“The IAEA considers the entombment strategy an acceptable approach for member states that do not [have] waste disposal options such as Canada.”

The reference given by the proponent for this statement is another IAEA document, *Decommissioning Strategies for Facilities Using Radioactive Material*. March 2007, International Atomic Energy Agency, Safety Report Series # 50.

The IAEA report, *Decommissioning of Facilities, General Safety Requirements Part 6*, provides more recent guidance (the publication dates 2014 versus 2007). Thus, in order to meet the more recent international guidance, this project should be withdrawn.

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If the proponent decides not to withdraw this project, then the proponent should respond to the comments below.

General Comments on the Project Description

(1) The proponent appears to advocate implementation of a short-term solution to a longer term problem. However, I cannot see that the proposed solution is justified since there is no clear definition of the problem. That said, let us look at some of the justifications presented.

Section 2.4.1 of the document states “*The results of those [Current or Past Environmental Studies] ... have not identified any adverse effects on the environment.*” If there are currently no effects, then there can be no environmental justification for the project. In fact, the removal of the above grade buildings, structures, etc, and the installation, operation and dismantling of the grouting system may result in additional adverse environmental effects, although they would be short term.

Since an evaluation of the costs associated with the current practice compared to those of the proposed undertaking is lacking, there is no evidence to support the contention that entombment will reduce the liability. Therefore, basing the decision on whether this undertaking will reduce the nuclear liability cannot be justified.

This leaves the radiological risk to workers, public and the environment. The evidence shows that the current institutional controls have provided adequate protection. Again, the short-term project activities could result in increased exposure to workers and the environment.

That said, the underlying assumption for the project appears to be that the radioactive contaminated components, etc. need to be managed appropriately, suggesting emplacement in some type of radioactive waste disposal facility. The proponent suggests that since there is no such facility currently in Canada, then entombment is the best option. However, “currently” does not mean “never”. Thus patience is the reasonable option and there is no immediate need to entomb.

From the above, I am at a complete loss as to the justification and rationale provided by the proponent for this undertaking. Further, I cannot evaluate the proposed undertaking since I am not clear as to the problem the proponent wants to address.

In order to properly evaluate the proposed undertaking, the proponent must provide a clear definition of the problem. This definition must be provide the evidence that there is actually a problem. Otherwise the proposed solution cannot be evaluated as to its suitability.

In summary, to quote H.L. Mencken – “*For every problem there is a solution which is simple, clean and wrong.*”

(2) Note that entombment is forever. In the IAEA document, *Decommissioning Strategies for Facilities Using Radioactive Material*. March 2007, entombment is essentially a near surface waste disposal site and the criteria for such a facility must be met. Thus, the proponent will need to demonstrate that the project meets the requirements of the CNSC Regulatory Guide, G-320, *Assessing the Long Term Safety of Radioactive Waste Management*.

(3) It is my understanding that under the Nuclear Safety and Control Act, there is no provision for a “disposal” licence. Under *Prohibitions*, Section 26 of the Act states:

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“Subject to the regulations, no person shall, except in accordance with a licence,

(a) possess, transfer, import, export, use or abandon a nuclear substance, prescribed equipment or prescribed information; ...

(e) prepare a site for, construct, operate, modify, decommission or abandon a nuclear facility; ...”

Under current legislation, the only licence that would be available at the end of the institutional control period (which is not really addressed in this project description document) is a licence to abandon. To comply with the regulatory guide G-320, *“the predicted impact on the health and safety of persons and the environment from the management of radioactive waste are no greater than the impacts that are permissible in Canada at the time of the regulatory decision”* (Section 7.4, Assessment Time Frames, CNSC Regulatory Guide, G-320, page 24). At the time of the application for a licence to abandon, the residual activity at the grouted site will have to meet radioactive clearance criteria. Although this is a CNSC licence, the regulatory concern does not end with this licence. Since the proposed undertaking will grout in place hazardous materials (see Section 7, second paragraph), the proponent will also need to demonstrate that the site will meet the requirements for the closure of a hazardous waste management facility under provincial regulations.

If the timeline is thousands of years into the future (which is likely given that radioactive nuclides present have half-lives that are in this range or greater), then the proposed undertaking is not appropriate since at some time in the near future (not thousands of years), according to the NWMO, there will be an operational nuclear waste disposal site in Canada.

Please provide an estimate of the timeline at which the radioactivity will meet the clearance levels required for abandonment.

(4) I note that in Figure 6-1 the NPD site is shown as just below the des Joachims Hydro Dam. Further in 6.1.2 it is stated that *“... most of the NPDWF containment area is located below grade, well into the bedrock.”* Please assess the likelihood of a catastrophic failure of the dam on the facility and the potential adverse effects from such a calamity. The proponent does not provide a time at which the “owner” can abandon the site. If one accepts the premise of the previous comment (which suggests this will be a very long time), there is no doubt that this failure will occur at some time during the lifetime of this project. What are the mitigation measures proposed to address this off-site accident?

(5) In Figure 6-2 most of the structure to be entombed is all below the water table. What assurance can the proponent provide that the grout will fill all the cavities and provide an adequate seal to the existing walls (and structures) such that water infiltration will not occur over the whole life of the project (including the Long-term Care and Maintenance phase)?

(6) This area of the province is known for its seismic activity. What assurance can the proponent provide that the grout will not develop cracks that will allow in infiltration of water over the life time of the project (including the Long-term Care and Maintenance phase)?

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Specific Comments

(1) Section 2.3 – Description of Consultation Activities

Please provide a copy of the “...a brief overview of the proposed NPD in-situ decommissioning approach.” Without the information it is not clear that the “overview” included a description of “...the risks to public health, safety and security, and the environment posed by the facility or activity ...” (RD/GD-99.3, *Public Information and Disclosure*, CNSC, March 2012, page 3.)

(2) Section 2.3.1 – Future Engagement Activities

This section does not meet the requirements of Section 2.2.2 *Target audience(s)* of the CNSC document, RD/GD-99.3, *Public Information and Disclosure*, March 2012. To quote the first sentence in that section, “*The public information program shall define the target audiences, and the rationale utilized for their inclusion.*”

For these future engagement activities, please identify the target audience and the rationale used to determine their inclusion.

(3) Section 2.4.1 - Current or Past Environmental Studies

Please provide references to the reports/studies listed.

I note that the studies listed are essentially historic. Since the proposed undertaking is considerably different from these historic activities, I cannot see the linkage that would lead to the conclusion, “*Based on the studies thus far, there are no adverse environmental effects expected as a result of decommissioning activities.*” Taking this conclusion at face value, it would appear that there is no need to conduct the EA.

However, since the project activities are not the same as those required to keep the facility in safe shutdown, the proponent’s conclusion is obviously erroneous. In fact, it is the Environmental Assessment itself that would provide the rationale for the conclusion that no significant adverse effects would be expected, not these historic studies.

Please revise.

(4) Section 3.1.1 - Project Context (Third Paragraph)

“In 1988, after the facility was shut down, total residual radioactivity in the NPD reactor system was estimated to be 2×10^{15} Bq. Since shut down, 29 years of radioactive decay have reduced radioactivity considerably. The total radiological inventory in 2012 was calculated to be 7.5×10^{13} Bq and by 2017 the total radiological inventory will have declined to 4.1×10^{13} Bq.”

Please provide an estimate of the time it will take for the radioactive decay to meet the criteria for a licence to abandon.

(5) Section 3.1.1 - Project Context (Fourth Paragraph)

“As disposal options for nuclear waste within Canada are currently not available, in-situ decommissioning can safely reduce Canada’s nuclear legacy liabilities at this property.”

As stated above, the proponent provides no cost comparisons between the current situation and the proposed entombment. Without the information to back up the assertion that the liabilities will be reduced, this statement is misleading.

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While it is true that there are no disposal options currently available, that does not mean that there will not be one at some future date. Unless it can be demonstrated that there will be no disposal option available within a reasonable timeframe (say 50 years) then the proponent has to provide a rationale as to why their recommended option has to occur by the year 2020 (four years from now). What is the rush? The inventory of radioactive substances will have had another 50 years to decay away.

(6) Section 3.1.1 - Project Context (Fourth Paragraph)

“The IAEA considers the entombment strategy an acceptable approach for member states that do not [have] waste disposal options such as Canada.”

Actually this statement is not true. To quote from paragraph 1.10 from the IAEA publication, *Decommissioning of Facilities, General Safety Requirements Part 6*, International Atomic Energy Agency, Vienna, 2014:

*“... **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).”* [emphasis added]

Please revise to address this IAEA guidance.

(7) Section 3.1.1 - Project Context (Fourth Paragraph)

Another statement from this paragraph (copied below) is misleading.

“Also the NPD proposed approach is consistent with the IAEA strategy as the dominate contribution to the source term involves short lived radioactive isotopes and the longer lived isotopes are principally activation products.”

If the dominant contribution to the source term is short lived radioactive isotopes, then the best strategy is to allow them to decay. There is no need to entomb them. As these isotopes decay away, the longer lived isotopes become the dominant contributor to the source term. Whether or not these are activation products is of no consequence to the argument. It is their half-life that is important. That said, for these longer lived isotopes, what is the timeline for their activity to be reduced to meet the criteria for the licence to abandon? Providing bulk estimates of activity as given in paragraph three (quoted above) is not useful in determining the ultimate timeline.

Please revise.

(8) Section 3.1.1 - Project Context (Top of Page 3-2)

To quote:

“Decommissioning options that have been considered for this project are:

- 1. In-situ decommissioning where the source term will be isolated inside the below grade structure and systems to allow for continued radioactive decay.*
- 2. Full dismantling and removal of all systems, structures and components for interim storage at an alternate CNL site until final disposal options are available.*
- 3. Partial removal of the source term (i.e., reactor systems and components) for interim storage at an alternate CNL site until final disposal options are available. The remaining facility systems, structures and components will remain in-situ.*
- 4. Continue with a deferred decommissioning approach which includes maintaining the NPDWF in the Storage with Surveillance phase to allow for further radioactive decay. “*

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The proponent then goes on to state: “*In-situ decommissioning* [Option 1] *has been selected as the preferred approach ...*”

This section does not meet the requirements of the CEEA (2012) where the factors to be considered (Section 19(1)) include:

“(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means”

Section 5 of CEEA (2012) lists the environmental effects to be considered in the evaluation of the alternatives. These effects include fish and fish habitat, aquatic species as defined in SARA, and migratory birds. None of the criteria given in this section address these effects.

Please include an evaluation of the environmental effects for each of the alternatives.

(9) Section 3.1.1 - Project Context (Top of Page 3-2)

The actual criteria given by the proponent in support of the selection of Option 1 are:

- Reduce risk to workers
- Reduce transport and waste handling risks
- Reduce nuclear liability
 - Please provide the cost estimates to back up this assertion.
- Eliminate risk associated with multiple handling
- Lowest cost option
 - **Note** This is not an environmental effect of the project. That said, the total cost of the project is nowhere given. What are the costs associated with the ongoing maintenance and monitoring required to demonstrate the long-term performance of the grouting? It appears from the disadvantage given by the proponent (see comment below) there will be an increase.
- Allows for early release of the lands

Now let us apply these criteria to evaluate Option 4, the deferred decommissioning approach. For example:

- The risk to workers is minimal at best, since the site already shut down and the number of workers on site is minimal.
- Currently there are no plans to transfer the wastes thus there is no risk from transport or waste handling activities.
- Without the cost estimates, a decision as to the better of Option 1 or 4 cannot be made.
- There is no risk from multiple handling, since there is no handling at all.
- Lowest cost option
 - Let us compare the costs for Option 1 and 4. There are significant initial costs to install, operate and dismantle the grouting facility in Option 1. There is no additional cost for Option 4.
 - Since the radioactive nuclides (the source term) for both Options 1 and 4 are the same, the time it will take for the radioactivity to decay such that it will be low enough to justify the application for a licence to abandon will also be the same.
 - In other words, there is no advantage to entombing the structure to save money.
- As to the release of the rest of the site, this can already be done given institutional controls currently in place at the site.

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I note that the disadvantage given is stated as: “*Additional long term monitoring of the impacted area*”. This suggests that the monitoring currently in place is not sufficient to address or demonstrate the integrity of the entombed structure. Thus there are additional costs. This contradicts the statement that Option 1 is the “*Lowest cost option for the Canadian tax payer.*”

Using the same criteria as was used by the proponent in selecting Option 1, I suggest that actually Option 4 is the best alternative.

(10) Section 3.1.2 – Project Objectives

The objective for the project is stated as:

The objective of the NPD Closure Project is to safely decommission NPDWF ensuring the prompt reduction of Canadian legacy long-term liabilities.

Please provide a description of the long-term liabilities that this project will reduce. Specifically, what are the costs for maintaining the site as is and the costs for this project over its entire lifetime?

(11) Section 3.1.2 – Project Objectives

I note that the list provided in this section are mostly project outcomes, and cannot be considered project objectives. The two items that appear to be objectives are:

- *Remaining land returned to AECL for unrestricted use.*
- *Shall be designed so that the dose to the public and to workers will be As Low As Reasonably Achievable (ALARA) with <0.25 mSv per year to the public as a dose constraint.*

I note that the land associated with the site is already owned by AECL. As such AECL can determine its use and impose any land-use restrictions it deems appropriate.

As to the second item, what is the current dose to the public from the site? If it is already below this threshold, I can see no purpose for this project. By the ALARA definition, the site is already at “as low as reasonably achievable”.

(12) Section 3.1.2 – Project Objectives

The last objective in the list is given as: “*Long-term care and maintenance activities will continue for an agreed performance period.*”

What is the “agreed performance period”? What criteria will be used to determine this period? Who will be involved in the “agreeing” to this period? What will the agreement look like? Will it be a contract among the parties, or will it be a licence condition? Please confirm that the target audience for this agreement will meet the requirements of the CNSC document RD/GD-99.3, *Public Information and Disclosure*, March 2012.

(13) Section 3.1.2 – Project Objectives

Please revise the list to address the actual objectives of the project. In other words, please answer the question, what is the problem this project will be designed to solve?

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(14) Section 3.3.1 - Current Status of NPDWF

Under this section it is noted that there are two landfills on site, one of which has a MOE Certificate of Approval (CoA) for its closure. What is the status of the other landfill? Is it officially closed? If so, why does it not have its own CoA?

It is not clear from the description of the project what will happen to these landfills. If they are officially closed, then there are land-use restrictions in place. This puts in doubt the objective given in Section 3.1.2, “Remaining land returned to AECL for unrestricted use.”

Please clarify.

(15) Section 3.3.1.2.1 - Radiological Inventory

I note that the radioactive inventories are given as total activity, whereas a list of “dominant radionuclides” is provided.

What is the inventory of each of the dominant nuclides? What is their projected timeline such that they will decay to a level below the criteria for abandonment?

Since the list of dominant nuclides includes ones with short half-lives, they will no longer be dominant in a relatively short time. Please provide a list of the nuclides that have longer half-lives that will dominate in the future. Again provide an estimate as to when these will decay to the level below the criteria for abandonment.

(16) Section 3.3.1.2.2 - Designated Substances

What does the proponent propose to do to address these contaminants? In the summary (Section 7) it is stated that they will grouted in-situ. This is not an appropriate disposition for these substances unless they are radioactively contaminated (i.e. mixed waste).

Note, once the radioactive components in the waste decay to below the criteria for abandonment, these substances will remain. At that time, the CNSC may have no interest in the site. However, this does not mean that all regulatory interest in the site will also cease. Essentially the site becomes a hazardous waste site, which will then the fall within provincial jurisdiction.

(17) Section 3.5.6 - Long-term Care and Maintenance

I note that the current footprint of the reactor site is already fenced (See Figure 3-1). Site surveillance also is in place, although it would likely change since the “facility” itself would change if the project is approved. Since the facility would change, then the ongoing site monitoring would need to be modified to address the new circumstances.

However, the proponent provides no estimate as to the timelines involved. Since the proposal is to “dispose” of the reactor components in-situ (i.e., with no intent to retrieve them), the implication is that these long-term care and maintenance activities will have to continue in perpetuity (i.e. never cease). On the face of it, this is totally impractical.

Please provide appropriate timelines for these long-term activities. In this evaluation, please include an estimated time at which these activities can cease.

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(18) Section 3.7 - Project Phases and Schedule

Please clarify what is meant by the sentence “Any preparation activities will be performed under Environmental Effects Reviews executed by the proponent (Section 67 of CEEA 2012 [1])”. This section of the Act does not use the term “Environmental Effects Review”.

(19) Table 3-1 - Project Phases and Schedule

Please complete the table by providing an estimate of the “TBD” date.

(20) Section 4.6 - Proximity to Federal Lands

Note that CRL is not “another CNL property”. The laboratory site remains the property of AECL. CNL is only the contractor that manages the site on behalf of the owner, AECL.

Please correct.

(21) Section 6.2.1 - Fish and Fish Habitat (Second Paragraph)

“There is the potential for radionuclide releases to groundwater from the in-situ decommissioned reactor and radionuclide migration to the Ottawa River.”

This statement appears to indicate that there is no advantage to the environment from implementing this project.

Please clarify.

(22) Section 7 - SUMMARY OF THE PROJECT DESCRIPTION

“As disposal options for nuclear waste within Canada do not currently exist, in-situ decommissioning can quickly and safely reduce the remainder of Canada’s nuclear legacy liabilities at this property. In-situ decommissioning results in a concrete monolith which provides a robust and durable containment to allow for continued radioactive decay. The closure of the NPD site will entomb the remaining radiological inventory and designated substances, leave no structures aboveground, meet public dose restrictions, and support ongoing use of the site as a wildlife habitat.”

With respect to this paragraph,

- As stated several times above, the proponent does not provide the evidence to support the claim that entombment will reduce the legacy.
- Because there is no disposal facility currently available in Canada does not mean there will never be one.
- The current status of the facility (storage with surveillance) already allows for radioactive decay.
- I would question the entombing of designated substances. From Section 3.3.1.2.2, except for the asbestos materials, and possibly the lead (which may be radioactively contaminated) the inventory of the other substances (e.g., PCBs, mercury) is likely small and a concerted effort to deal with these will rectify the situation at minimal cost.
- As far as I am aware (given this project description) the hazards associated with the above ground structures are not significant enough that they would need to be removed “immediately”. In fact, the reactor building likely provides some protection to the underground structures from the environment, reducing the potential for radioactive contaminant migration.

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- As to meeting public dose restrictions, and supporting the ongoing use of the site as a wildlife habitat, the proposed undertaking will not change anything. The public dose restrictions are already met, and the site is already a wildlife habitat.

In conclusion, this paragraph is a good summary of the potential benefits of the chosen option identified by the proponent. However, these benefits cannot withstand a close examination since the project will not result in any improvement. In other words, there is no net value to completing the project.