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Oral Presentation

Submission from Northwatch

Exposé oral

Mémoire de Northwatch

In the Matter of the

À l'égard de

Whiteshell Laboratories

Laboratoires de Whiteshell

Application to renew the Nuclear Research and Test Establishment Decommissioning Licence for the Whiteshell Laboratories site for a period of ten years

Demande pour le renouvellement, pour une période de dix ans, du permis de déclassement d'un établissement de recherche et d'essais nucléaires pour les Laboratoires de Whiteshell

Commission Public Hearing

Audience publique de la Commission

October 2-3, 2019

Les 2 et 3 octobre 2019

Canada

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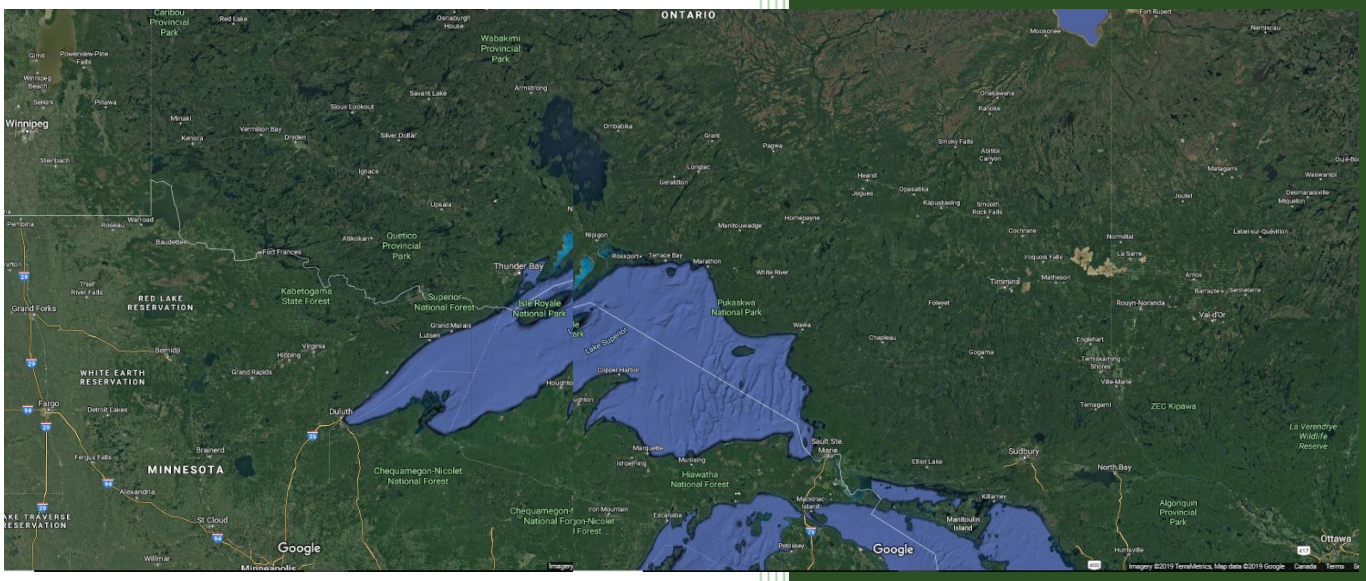
Comment on an Application from Canadian Nuclear Laboratories Ltd. to renew its Nuclear Research and Test Establishment Decommissioning Licence for the Whiteshell Laboratories



Ref. 2019-H-03

Submitted to the Canadian Nuclear Safety Commission by

Northwatch

9/6/2019

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1. PROJECT SUMMARY

On February 18, 2019 the Canadian Nuclear Safety Commission (CNSC) issued a public notice (Ref. 2019-H-03) that it will hold a public hearing on October 2 and 3, 2019, to consider an application from Canadian Nuclear Laboratories Ltd. (CNL) to renew its Nuclear Research and Test Establishment Decommissioning Licence (NRTEDL) for the Whiteshell Laboratories (WL) site for a period of ten years.

The notice described the Whiteshell site as being located near Pinawa, Manitoba, approximately 100 km northeast of Winnipeg. The current licence, which expires on December 31, 2019, authorizes CNL to conduct decommissioning activities at WL site facilities, including the WR-1 reactor, waste management areas, storage facilities and other nuclear and non-nuclear buildings.[1] Under its current licence, CNL is authorized to decommission the Whiteshell Laboratories (WL), comprising both nuclear and non-nuclear facilities under a CNSC issued Nuclear Research and Test Establishment Decommissioning Licence NRTEDL-08.05/2019.[2]

The current license was issued by a one-person panel of the CNSC with written submissions only. The proposed licence renewal would allow CNL to continue conducting previously-approved decommissioning activities at the WL site.

The notice also indicated that its CNL is proposing a deviation from the previously approved decommissioning approach[3] for the WR-1 reactor to something CNL describes as "*in situ* disposal" and that a proposal for that amendment to the previously approved approach is the subject of an environmental assessment (EA) under the *Canadian Environmental Assessment*

[1] Notice

[2] 19-H4 page 3

[3] Add reference forapproved decomm approach

Act, 2012 which is currently underway and that the Commission will not, in this hearing, consider submissions related to CNL's proposed *in situ* decommissioning of the WR-1.

As summarized in the executive summary of their Commission Member Document, CNL summarizes their intentions for the next licence period – the subject of their application – as including the following

- all of WL will have been decommissioned to its final end-state, including the final decommissioning of the WR-1 reactor and the proposed in situ decommissioning (ISD) of certain Low-Level Waste (LLW) trenches in theWaste Management Area (WMA)
- All other LLW, all Intermediate Level Waste (ILW), and all High Level Waste (HLW), will be retrieved,characterized, and (re-)packaged (as necessary) for shipment off-site, either to Chalk River to an unnamed site
- CNL's strategic plan, as stated in the preceding paragraph, is to relocate most (if not all) of WL's radioactive wastes, except for certain trench wastes, to CRL within the next licence period, as one part of the CNL plan to complete the cleanup and closure of Whiteshell Laboratories[4]

The CNL CMD also discloses that "starting in 2017, CNL commenced the relocation of Whiteshell Laboratories radioactive wastes to CRL. As of 15 July 2019, 3,557 $m^3$of LLW and 18 m^3 of ILW have been safely transported to CRL in 175 shipments. These shipments have covered 335,000 km of roads, with zero incidents/accidents and zero non-conformances. CNL anticipates that a total of approximately 1500 shipments of Low-Level Waste, 500 shipments of Intermediate-Level Wastes and 46 shipments of High-Level Waste (the baskets of irradiated reactor fuel from the Concrete Canister Storage Facility) will be transferred to Chalk River during the completion of the Whiteshell Labs Closure Project."[5]

[4] CMD 19-H4.1 Page ii-iii

[5] CMD 19-H4.1 Page iii

2. NORTHWATCH'S INTEREST

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, we have 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. These nuclear waste related proposals and activities include various efforts to relocate into northern Ontario radioactive wastes that have been generated elsewhere and the transportation of radioactive materials – primarily waste, but also uranium in various stages of processing – through the region.

The decommissioning of the operations at the Whiteshell Laboratory, including decommissioning activities, are outside Northwatch's geographic area, which is comprised of the six federal districts of northeastern Ontario, however the project and its approach – if approved by the CNSC – has the potential to impact Northwatch and Northwatch's interest in at least two respects, as set out below.

TRANSPORT OF RADIOATIVE WASTES THROUGH NORTHERN ONTARIO

At least three (and potentially five) of the six districts in northeastern Ontario will be directly affected by CNL's intended transportation of radioactive wastes from Whiteshell to Chalk River. The application identifies Chalk River Laboratory as the destination for low, intermediate and high level radioactive wastes, meaning the transportation routes will transverse northern Ontario, directly affecting our region and members.

SETTING OF PRECEDENTS

The project has the potential to be precedent-setting, particularly in the realm of federal decision-making with respect to decommissioning of nuclear facilities in Canada (including, potentially, facilities in northeastern Ontario). CNSC decisions on many of the issues associated with CNL's proposed decommissioning approach project have potential implications for northern Ontario in the event that practices, policies and / or regulatory decision-making with respect to the management of radioactive wastes become precedent-setting or normative in Canada.

3. RADIOACTIVE WASTE MANAGEMENT AND DISPOSITIONING

As is discussed in this submission in Section 5, and has been the case in previous CNL license applications,[6] the CNL application[7] sets out only very limited information about the volume and characterization of radioactive wastes which are on-site at Whiteshell and which are to be managed during the decommissioning process. While the CNL CMD does provide some additional information, it is also incomplete (particularly in terms of characterization, and specifically in characterizing the wastes relative to their proposed transportation package) but providing some additional information in a supporting document does not negate the requirement to provide this information in the license renewal application.

CNL'S PROPOSED APPROACH TO RADIOACTIVE WASTE MANAGEMENT DURING DECOMMISSIONING

Perhaps the largest single issue is the emergency of CNL's "strategic vision" which entails accelerating the decommissioning process, which results in handling and transporting wastes while their levels of radioactivity are higher than in the 2003 approved decommissioning approach, and most probably in handling the waste twice – once to move it to Chalk River, and again to move it into a permanent location. These issues are detailed in the report by Dr. Hartmut Kruggman, commissioned by the Concerned Citizens of Renfrew County and Area and Northwatch and attached to this report as Appendix A. We rely on Dr. Krugman's report in the setting out of these issues.

Northwatch's review of CNL's documents raised numerous questions and concerns about their approach and competency. Examples from CMD 19-H4.1 include:

[6] See Northwatch Submission CMD 18-H2.46 and transcript for 25 January 2018 at https://nuclearsafety.gc.ca/eng/the-commission/pdf/CNLHearing-January25-2018-e.pdf

[7] WLD-CNNO-18-0033-L dated 15 November 2018 from Daniel Coyne, CNL to Marc Leblanc, CNSC

- CNL reports on the Final decommissioning of the SLOWPOKE Demonstration Reactor (SDR) having been completed as one of its achievements, but we find no additional mention of the SLOWPOKE's decommissioning wastes, how they were characterized, where and how they are being stored, and what is CNL's intended dispositioning of these wastes (page 5)
- CNL makes several references to end-state criteria, but we found location where the end-state criteria were defined or described in detail (eg. page 10)
- CNL describes various decommissioning activities that they have undertaken and completed which include various wastes, but they persistently fail to describe the wastes in any more than the most general of terms
- In numerous points throughout CNL's CMD we are reminded that CNL intends to complete all decommissioning work within the proposed ten year licence period, but at the same time the document reveals how incomplete CNL's planning is and how many approvals are still required. this is certainly the case with the WR1 proposed in situ decommissioning, but is also evident in many other areas; for example, not all Detailed Decommissioning Plans (of twelve) have been written (page 19) and safety assessments have not yet been undertaken of the LLW trenches (page 34)
- CNL claims that their shift to an accelerated decommissioning approach fifteen years after the decommissioning plan was approved is "in keeping with the evolution of international best practices"; we would note that IAEA standards have not changed significantly in recent years – certainly not in the time since CNL took over management of Whiteshell – and CNL provides no reference or evidence in support of this claim of "international best practice" as a rationale for the about-turn in decommissioning approaches
- If CNL's approach is, as they claim, "recognizing the Canadian Government's expectations to minimize its liability for legacy nuclear wastes at all CNL sites" CNL must recognizing that their proposal for accelerated decommissioning does not reduce hazards at all CNL sites, it simply transfers them from one site to another, generating costs and risks in the process (Page 20)

- CNL's CMD is inconsistent in its provision of information or detail; for example, it details the construction and use of the Concrete Canister Storage Facility (CCSF) but provides no performance assessment or indication as to whether poor performance was the reason for transferring fuel out of the demonstatraion containers; this is a matter of public interest (page 20)
- In several locations throughout their CMD, CNL makes statement that the wastes will be relocated to CRL "or to other licensed waste storage/disposal sites", but do not clarify if these "other" sites are for radioactive wastes or other wastes (page 26) in some instances, while in others it makes a similar statement that is inclusive of radioactive wastes (page
- CNL describes their "decision to transport the majority of WL's current and decommissioning-generated radioactive wastes to either CRL or other authorized storage/disposal facilities for storage and/or disposal" as "strategic"; this "strategy" should be detailed (Page 44)
- The upward trend in doses in 2017 and 2018 reinforce concerns about CNL's decision to accelerate the decommissioning program, and raise concerns about the potential for exposure during transportation, particularly of Emergency Responders, other highway users, and bystanders (Page 89)

Additional concerns are raised in other sections of this submission.

4. RADIOACTIVE WASTE TRANSPORT

As set out in their application[8], the transportation of radioactive wastes forms a very large part of CNLs proposed activities during the next licence period:

> *CNL has made a strategic decision to transport the majority of WL's current and ecommissioning generated radioactive wastes to either CRL or other authorized storage/disposal facilities for long-term storage and/or disposal. Certain wastes may be sent to licensed waste processing facilities (e.g., liquid waste processing facilities or metal-melt facilities) as appropriate.*
>
> *The Transportation of Dangerous Goods (TDG) Program will provide program management and administrative services to enable the safe and efficient shipment of radioactive waste and materials from WL, supporting the closure mission of WL. The TDG Program responsibilities, in coordination with the CNL Waste Management Program, includes the procurement and distribution of reusable waste containers for LLW and ILW (e.g., intermodal containers and shielded over-packs), and the leasing (or other similar arrangements) of an appropriate, certified spent-fuel transportation flask for HLW. The TDG Program will also manage the logistical aspects of the transportation, for example, the establishment of transportation corridors, the establishment of contracts with licensed waste shipping companies, and the provision of all required Radioactive Material Shipping/Transport of Dangerous Goods documentation, including any CNSC approvals.*
>
> *CNL has determined that approximately 25,500 m3 of LLW, 1560 m3 of ILW, and 92 baskets of irradiated fuel material exist, or will be created during future decommissioning work. This translates into approximately 1500 shipments of LLW from WL. It is anticipated that the inventory of ILW will be shipped from WL in either Type A containers or a Type B cask, depending on the nature and radioactivity level of the waste. An estimated 500 shipments of ILW is expected. Present plans for the shipment of the HLW from WL are that 2 fuel baskets will be accommodated within the certified shipping flask, resulting in a total of 46 shipments of HLW. Additionally, the remediation of the Standpipes may generate additional FM or HLW totaling a volume equal to approximately 2-4 baskets. This will require an additional 1-4 shipments of HLW.*
>
> *Further, during the next licensing period, there may be a need to transport intermediate level liquid waste (ILLW) not processed on-site and/or the residual solid waste from on-site ILLW processing, as well as an estimated 500 m3 of hazardous and mixed wastes, to be shipped off-site to licensed waste receivers for treatment and/or disposition.*

The information provided by CNL in their application, Commission Member Documents, and various supporting documents that were available to public interveners is inadequate. We have seen references to an Integrated Waste Transportation Strategy but that document has not been made available to Northwatch; Northwatch requested a copy of the Waste Management Program,

[8] Attachment D "Plans for the Proposed Ten Year Period of the Renewed Licence", CNL Application dated 15 November 2018, page 43

an associated document, and were denied by CNL arguing that "the release of which would compromise the operational and commercial interest of Canadian Nuclear Laboratories."[9]

Based on Northwatch's review of the available documents, we make the following observations with respect to the proposed transportation of radioactive wastes:

- There appears to have been no risk assessment undertaken with respect to the transportation of radioactive wastes
- The documents assume that the transportation of radioactive materials is straightforward and does not deserve a high degree of focused attention.
- The documents do not provide specifics regarding routes, unique local conditions, response preparation, or coordination with local communities.
- The documents provide inadequate descriptions of the waste types, volumes and characteristics, and of the transportation packaging and overall transportation systems
- The documents provide only very generalized estimates of the shipment numbers and types and no timetable or seasonal estimates of the shipments
- The documents do not provide specific descriptions of the radiological hazards associated with each waste type, the basis for container selection, the shielding the selected container will provide, or the estimated dose – including to transportation workers and bystanders – of the wastes as packaged for transportation
- There is no discussion of the uncertainties associated with the thousands of shipments of radioactive wastes envisioned by CNL, including uncertainties associated with failures in packaging, or with road conditions, weather, driver error, vehicle failure or *en route* delays
- There is no comparison of the transportation impacts (including and particularly dose for workers, drivers and bystanders) of transporting the waste within the next decade as compared to transportation at a later time; this absence is particularly notable with respect to intermediate and high level wastes, and when considering the differences in time of transfer

[9] See Section 5 of this submission for additional discussion

between the approved decommissioning plan approach of deferred decommissonining (2002) and CNL's "strategic vision" of accelerated decommissioning (2018)

In the CNSC staff CMD, the transportation of radioactive wastes is characterized as a "routine" activity:

The transportation of nuclear substances has been a frequent and routine activity at the WL site during the current licence period. In 2018 alone, 303 radioactive transport packages were safely sent offsite [43]. This included the transportation of 1,333.8 m³ of low-level waste and 7.9 m³ intermediate-level waste to CRL.[10]

As noted in a report[11] by Dr. Fred Dilger commissioned by Northwatch in 2017

> *"It is important to recognize that millions of shipments of radioactive materials are shipped around the world. These shipments are made in robust containers that prevent release of the materials. It is equally important to recognize that each shipping program, each shipment is unique. The record of successful shipment is only possible due to extensive, sustained effort. Only constant vigilance enables radioactive materials shipments to be successful and there is no guarantee for future performance."*

In their brief address of transportation concerns, CNSC generically describes regulatory controls that contribute to transportation safety, but neither CNSC or CNL provide this information in a detailed and organized fashion specific to the thousands of shipments CNL envisions undertaking during the next licence period:

[10] CMD 19-H4 page 52

[11] CEAR Reference , "Review of Ontario Power Generation's "Additional Information" in Support of their Proposed Deep Geologic Repository for Low & Intermediate Level Nuclear Wastes, Appendix 2, "Review of Ontario Power Generation's Report: Cost and Risk Estimate for Packaging and Transporting Waste to Alternate Locations" by Dr. Fred Dilger, as posted at https://registrydocumentsprd.blob.core.windows.net/commentsblob/project-17520/comment-2525/118324E.pdf

Package designs are combined with additional regulatory controls, including labelling, placarding, quality assurance and maintenance records, allowing nuclear substances to be carried safely in all modes of transport such as road, rail, air and sea transportation. This philosophy is universally accepted for transport and has guided the development of the International Atomic Energy Agency (IAEA) and Canadian Nuclear Safety Commission (CNSC) regulations on the packaging and transport of nuclear substances. All nuclear substances are transported in packages that are selected based on the nature, form and quantity or activity of the nuclear substance. There are general design requirements that apply to all package types to ensure that they can be handled safely and easily, secured properly and are able to withstand routine conditions of transport.[12]

While the CNL documents provide a very general assignment of waste types to package type, we were unable to locate in the available documents an actual inventory of the wastes per package or container type or an explaination as to the suitability of the container or the selection criteria, other than in very broad terms.

At minimum, we would have expected CNL to provide at least a generic transportation specific risk assessment which included upper and lower boundaries of radiological impact, under both normal and upset conditions.

Notable in their absence from the CNL documents were the following areas of assessment:

- We found no discussion of the potential releases from a severe accident, a failed container, or a transportation vehicle that is stopped for an extended time (for example, due to road closures as a result of weather, forest fires, highway accident, road construction, etc.)
- We found no indication that CNL had assessed the effect to a Maximally Exposed Individual under normal or upset conditions
- We found no indication that a risk assessment had been undertaken, and in particular there was no indication that CNL had undertaken a risk assessment specific to the various waste shipments they propose to undertake, incuding the specific wastes, specific containers, specific routes, and estimated travel conditions

[12] CMD 19-H4 page 60-61

Such an assessment is essential to the responsible consideration of a radioactive waste transportation. We would expect such an assessment to be undertaken, and to address the following questions:

- What are the specific radiological characteristics of all of the waste forms proposed for transportation?
- What will be the effects along the routes?
- What are the potential routes, including potential congestion points?
- What are the estimated routine doses and occupational doses?
- What are the consequences of the worst foreseeable accident?
- Given current heavy truck accident rates, how many CNL shipments will be in accidents?
- Who is affected by the shipments?
- What will it cost to recover from a severe accident or sabotage?
- What unique local conditions effect risk?

Specific to the review of CNL's application to renew their decommissioning license for a ten year period, Concerned Citizens of Renfrew County and Area and Northwatch jointly retained Dr. Hartmut Krugman to undertake a review of the CNL application with a specific focus on radioactive wastes and the transportation of radioactive wastes. The report in its entirety can be found in Appendix A; the following section summarizes key findings with respect to transportation of radioactive wastes from Whiteshell to Chalk River:

Dr. Krugman notes that the accelerated decommissioning timeline - a core elements of CNL's strategic plan – will significantly increase health and safety risks, including waste transportation risks. These increases risks are both immediate, as a result of higher levels of radioactivity at the time of handling and transportation, and in the longer term, as a result of double-handling the waste, including shipping the waste twice (first from Whiteshell to Chalk River, and then from Chalk River to some other unknown destination, given that Chalk River is not a suitable location for the long term management of these waste volumes).

In particular, Dr. Krugman points to that CNL's new strategic decommissioning plan enhances risks when compared to AECL's original decommissioning strategy, both in terms of occupational risks (increased radiation doses to waste operators) and in terms of public risks (increased radiation doses to members of the public), because of double-handling/transporting of waste and the shorter decommissioning deferment period and hence higher radiation levels and larger radiation exposures during waste handling. Public risks are enhanced, in particular, due to the ongoing and planned waste transports of WL waste to CRL, given that accidents cannot be ruled out.

CNL's reporting that it has maintained in its annual compliance/safety reports to CNSC, has complied with all relevant CNSC, Transport Canada, and IAEA regulations and standards and has worked closely with WL and CNSC in handling, packaging, and shipping special types of nuclear waste is not in dispute.

What is in dispute is whether:

- CNL has undertaken – and CNSC has required – adequate examination of risks associated with the transportation of radioactive wastes
- There has been adequate disclosure of the basis for CNL's transportation program, including selection of containers, routes, carriers, etc.
- There has been adequate notice to potentially affected communities – including First Nations – along the transportation route

By Northwatch's assessment, CNL's attention to these areas has been inadequate. By Dr. Krugman's assessment, the risks of radioactive waste transportation would be significantly increased should CNL's accelerated decommissioning approach be approved:

> *The possibility of an accident resulting in radioactive waste spillage, land and water contamination, and possible adverse occupational and public health impacts, can never be discounted when nuclear waste is shipped across long distances. In comparison with AECL's original WL decommissioning strategy, CNL's new strategic plan significantly increases this risk by involving double-handling/transporting waste at higher waste radioactivity levels.*

TRANSPORTATION SAFETY ISSUES

Despite the CNSC staff's characterization of the shipment of radioactive wastes as "routine", and taking into account CNL's assertion that their program of radioactive waste shipments from Whiteshell to Chalk Rivers is already underway and has been conducted without incident, there are several areas of concern related to this transportation program.

The first, of course, is the lack of a thorough examination of risks associated with this program, as has been discussed above, and the lack of appropriate notification measures and potentially the absence of emergency response capabilities, as is discussed below. In addition, two areas of specific concern are vehicle safety and maintenance and the transportation accidents.

During the environmental assessment hearings of Ontario Power Generation's proposed Deep Geological Repository for Low and Intermediate Level Radioactive wastes, the Ontario Ministry of Transportation presented information about routine safety inspections of vehicles transporting Class 7 Dangerous Goods (Radioactive Material), and the disturbing statistics from three years of inspection data. The data showed that 25% of the vehicles inspected were placed out-of-service and / or enforcement action was taken against the operator of the vehicle for various reasons, including:

- Hours Of Service exceeded
- Brake or signal lights inoperative
- Missing Placards
- False Log
- Load Security
- Exceeding Weight, height and/or length limits
- Faulty Speed Limiter
- Faulty Brakes
- Inadequate Vehicle Maintenance
- Inoperative Turn Signal
- Flat Tires
- Vehicle Registration /Insurance

More recently, the Ontario Provincial Police have released statistics on the involvement of transport trucks in highway traffic accidents. Reportedly, during the first half of 2018 the OPP

has investigated more than 3,600 transport truck-related collisions, which represent 11 per cent of the total number of collisions **(**34,461**)** and in the course of those investigations the OPP has laid more than 1,615 speeding charges, 354 distracted driving charges and 963 defective equipment-related charges against transport truck drivers.[13]

Statistics for the entire year of 2018 are equally sobering. OPP statistics show that among the thousands of crashes in 2018 involving transport trucks, almost half – 40 per cent – involved a truck that was either following too closely or had made an improper lane change. The OPP said it responded to 7,674 transport truck collisions last year. These crashes claimed 63 lives and caused 1,142 injuries. Close to 80 per cent of last year's transport truck-related collisions were multi-vehicle crashes, making this a significant road safety issue, OPP said.[14] Northeastern Ontario is reported as seeing the largest increase, with an 800% increase in fatalities and 3,600 transportation accidents involving transport trucks (approximately half of the provincial total. Accidents were largely attributed to driver distraction and faulty equipment.[15]

With the data available, Northwatch was not able to determine the frequency of vehicles transporting Class 7 Dangerous Goods (Radioactive Material) being represented in the 2018 statistics of accidents involving transport trucks, but there is presumably a correction between the MOT statistics from 2013 which showed a 25% incidence of faulty maintenance and the OPP observations in 2018 that accidents were largely attributed to driver distraction and faulty equipment.

In the absence of detailed information being available from CNL or through the CNSC about the transportation program, these transportation safety issues will remain a significant concern, not only because 2000 additional shipments mean an increase in transport truck traffic in northern

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[13] OPP FATAL TRANSPORT TRUCK COLLISIONS UP 38 PER CENT, 2018-7-12, www.opp.ca/index.php?lng=en&id=115&entryid=5b4887f9af4f935dc5554413

[14] Transport truck crashes claimed 63 lives in 2018, OPP says, https://www.northernontariobusiness.com/industry-news/transportation/transport-truck-crashes-claimed-63-lives-in-2018-opp-says-1504688

[15] https://northernontario.ctvnews.ca/video?clipId=1438878

Ontario, but because of the potential for radiological exposure of other highway users, First Responders, and area residents as a result of a truck carrying radioactive wastes being involved in one of these high-frequency highway traffic accidents.

FIRST RESPONDERS AND RADIOLOGICAL EMERGENCIES

With the support of the Ontario Law Foundation, Northwatch conducted an investigation during 2017 and 2018 of the information needs of small municipalities, volunteer fire fighters and First Responders around emergency response / right to know issues in the case of accidents and unintended releases related to the transportation of hazardous goods more generally and with respect to the transportation of radioactive materials and response to accidents and accidental releases in particular.

The following observations are a summary of responses from front line responders:

- The range of experiences and outlooks varies greatly among firefighters, both within a particular service, but even more so between the professional forces and the volunteer forces; further differences are in evidence between volunteer fire services in organized municipalities versus unorganized townships (with Local Service Boards)

- Volunteer forces generally appear to rely more on in-house training and passing expertise from senior more experienced members to younger members, while municipal forces appeared to rely more on formal training; that taken into account, respondents from both types of forces described some members as being more specialized, including in the area of responding to situations involving hazardous materials

- Particularly for volunteer forces, time constraints were noted as the key challenge in expanding training; force members regularly do three hours a week of training and equipment maintenance, outside of response to fire calls

- First responders consistently identified the Emergency Reference Guide 2018 as their primary information source for identifying hazards and developing appropriate responses

- There is a specific training module related to transportation, and most on the force would have Level 1 of this training which addresses how to read the truck placard and response accordingly; in situations where hazards are unknown, likely approach for volunteer forces would be to secure the site and invoke the Mutual Aid Agreement to bring in support from a larger community with more specialized expertise, or from professional hazmat team

- Respondents indicated that there is no training provided specific to radiological events, with the exception of several pages in the Emergency Reference Guide

The Office of the Fire Marshall and Emergency Management Ontario were consistent both across agencies and internally in terms of the chain of command in emergency response and training and information transfer. Both agencies were also consistent in being largely silent on the training and tools being provided to fire fighters to respond to transportation accidents involving hazardous materials, and even more so with respect to radiological events.

Available trainings and training materials were also consistent with this, generally providing minimal attention to these risk areas. In particular, these gaps were evident in the Incident Management and the Basic Emergency Management trainings. While several references were made during interviews to the 2018 Emergency Response Guidebook[16] as the go-to resource when responding to a hazardous materials event, the 400 page guide is largely a listing of materials with relatively general instructions in how to respond in a fire situation. Eleven pages deal with six different groupings of radioactive materials, ranging from low level to high level (in terms or radioactivity) and including wastes, fissile material, and uranium hexafluoride. Disconcertingly, each of the six sections begins with the statement "Radiation presents minimal risk to transport workers, emergency response personnel and the public during transportation accidents. Packaging durability increases as potential hazard of radioactive content increases."

[16] "Emergency Reference Guide 2018", as found at https://www.tc.gc.ca/media/documents/tdg-eng/EnglishERGPDF.pdf

In the absence of the Radioactive Waste Transportation Plan being available to Northwatch as part of this review, we have been unable to determine the degree to which CNL's program may – or may not – address Northwatch's concern about the vulnerability of First Responders, emergency workers, and northern Ontario residents more generally to radiological exposures in the invent of an accident resulting in a radioactive release.

CNL'S PROPOSED USE OF NWMO USED FUEL TRANSPORTATION PACKAGE

We noted with interest CNL's stated intentions to use the Nuclear Waste Management Organization's (NWMO) Used Fuel Transportation Package (UFTP):

> *The fuel baskets will be retrieved from the canisters (see Figure 3-3) and transferred to the Used Fuel Transportation Package (UFTP) (see Figure 3-4 and Figure 3-5), for transport to and storage at CRL. The UFTP is a CNSC-certified Type B(U) Transportation Package, leased by CNL from its owner, the Nuclear Waste Management Organization (NWMO), for transporting CNL fuels, including the WL fuel materials. The UFTP is undergoing a comprehensive licensing process for CNL-specific fuels and configurations. Concrete canisters to contain the WL spent fuel baskets are being constructed at CRL. CNL will remain in communication with CNSC staff at all stages of this process, and regulatory oversight by CNSC staff will remain in effect*.[17]

As described in CNL's CMD, nuclear fuel currently on site at Whiteshell – which CNL intends to transport using the NWMO's UFTP, includes both intact, irradiated fuel bundles and sealed storage cans of defective fuel and fuel fragments.[18]

The NWMO's Used Fuel Transportation package was developed by the NWMO as a reference transportation package, and used by the NWMO for such purposes as conducting "generic" assessments of radiation dose for use in report being produced as part of their "Adaptive Phased Management" program.[19]

[17] CMD 19-H4.1 Page 21
[18] CMD 19-H4.1 Page 20
[19] NWMO TR-2014-17 December 2014, Generic Transportation Worker Dose Assessment

The UFTP was first certified in the 1980's as a contribution by Ontario Power Generation (then Ontario Hydro) to Atomic Energy of Canada Limited Geological Disposal Concept. In 2013, the UFTP was recertified by the Canadian Nuclear Safety Commission staff, without public review.

When the CNSC issues a certificate for the package design, the certificate specifies procedures for the manufacture, operation and maintenance of the transportation package. It also defines the authorized contents that may be carried in the package. The certificate is valid for five years. [20] As set out in the certificate issued by the CNSC in 2013, the UTFP is designed for intact fuel bundles.[21] The UTFP was recertified in 2018.

This intended use of the NWMO's UTFP by CNL raises two questions immediately:

1. Given that the UFTP has been certified for intact fuel bundles and the CNL high level radioactive wastes which they have indicated they intend to ship to Chalk River includes fuel waste which is defective and /or is fuel fragments, what is the basis for selecting this UTFP?
2. CNL states that the "UFTP is undergoing a comprehensive licensing process for CNL-specific fuels and configurations': what is the nature of that comprehensive licencing process, and what oversight is being provided by the Commission and what are the opportunities for review by the interested and potentially impacted public, First Nations, and en route communities?

Northwatch would note that this appears to be another instance of mission creep on the part of the NWMO, although in the absence of full disclosure of related information, it is difficult to ascertain the degree or implications of this.

On a somewhat more humorous note, we appreciated CNL's selection of a photo of NWMO's mock-up of their Used Transportation Fuel Package, perhaps as in indication of their degree of being "road ready".[22] The selected photo is of a transportation exhibit[23] used for promotional

[20] Safe and Secure Transportation of Canada's Used Nuclear Fuel MAY 2015 NWMO, page 14
[21] Canadian Nuclear Safety Commission (CNSC). 2013. Certificate for Transport Package Design. CDN/2052/B(U)-96 (Rev. 7). CNSC File 30-H1-118-0. July 29, 2013.
[22] CMD 19-H4.1 Page 23, "Figure 3-5: Used Fuel Transportation Package for the removal of CCSF fuel to CRL"

purposes by the NWMO when visiting municipalities who have encouraged the NWMO to study areas in their vicinity as potential burial sites for all of Canada's high level nuclear fuel waste.

REQUEST: that the Commission should engage directly communities - including residents, municipal councils and First Responders - along the transportation route, inviting their participation in a hold-point hearing specific to the certification of the modified UFTP and a risk assessment of the radioactive waste transportation

[23] See, for example, https://www.nwmo.ca/en/More-information/News-and-Activities/2017/10/06/15/25/Transportation-Exhibit-Attracts-Hornepayne-Students or https://www.nwmo.ca/en/More-information/News-and-Activities/2016/10/04/12/54/Used-Fuel-Transportation-Package-on-Display-at-Lucknow-Fall-Fair or https://clcinfo.ca/hornepayne/files/2013/06/Jackfish-Journal-NWMO-Transportation-Exhibit-at-FONOM-Conference-May2013.pdf

5. ADDITIONAL ISSUES

The CNL license renewal application and proposed approach to decommissioning raise a number of issues of concern to Northwatch, although not specific to our interests in radioactive waste management and / or the transportation of radioactive wastes.

SCOPE OF LICENSED ACTIVITIES

The CNL license renewal application and their continued decommissioning activities rely on the 2003 licence approval, which was renewed in 2008 for a ten year period. As such, the approval they are operating under – and must comply with – is for the decommissioning approach as then proposed and approved.

In 2018, the Commission held a written only hearing with a one-person panel to consider - and subsequently approve – a one year extension to that 2008 licence. The Record of Proceedings for that license extension states that the purpose of the one year extension was to allow consideration of the in situ decommissioning – CNL's new and unapproved decommissioning approach – in the 2019 hearing.

For this 2019 hearing, that same in situ approach to decommissioning has been declared to be out of scope:

> *The matter before the Commission in this CMD does not include in situ decommissioning (ISD) of the WR-1 reactor. ISD of WR-1 is currently undergoing an environmental assessment under the Canadian Environmental Assessment Act (CEAA), 2012. This will be presented to the Commission at a separate public hearing. ISD of WR-1 is out of scope of this licence consideration*.[24]

As CNL explains in the cover letter to their Application:

> *The timing of this application is consistent with discussions held with CNSC staff. The forthcoming final submission of the EIS for the in situ decommissioning of the WR-1 reactor, and a licence amendment request, will provide further details on the proposed modifications for the decommissioning activities for WR-1 over the proposed ten year licence period*.[25]

It would appear that CNSC staff and CNL have a game plan, but it is not necessarily one that supports the Commission in carrying out their regulatory responsibilities or the interested public in engaging in review processes – either the license renewal process for the Whiteshell site or the

[24] CMD: 19-H4, page 1
[25] CNL Application Cover letter page 1

EA for the proposed in situ decommissioning of the WR-1 – in an orderly, informed and meaningful way.

REQUEST: The Commission renew the decommssioining license for a two year period, based on the 2003 approved decommissioning plan, and insert hold points for each major decision point within the next two years, including: licensing of a modified UFTP, completion of the remaining Detailed Decommisisoning Package, and any outstanding risk assessments.

CNL APPLICATION CONTENT

CNL application contained minimal information; more substantive filing was CMD, provided only 30 days before submission deadline; inadequate, and does not support the best advice from intervenors or consideration by the commission

CNL identifies the following as a requirement of the license application is that the application provides the following information in addition to the information:

> *7 (i) the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including an emergency response plan;*

In response, the applicant provided a number of references, including to documents that are not

This was also a matter of dispute between Northwatch and CNL in the 2018 license review for the Chalk River laboratory. As in that previous instance, Northwatch submitted to the Commission that the licence applicant was required to provide - as part of their license application – the required information, rather than a reference to information sources which may include the information, but which in many cases are not available to the public.

The regulatory requirement is <u>not</u> to provide a list of documents that <u>may</u> include that information and which the proponent has or will provide to the CNSC; the requirement is to provide the information in the license application itself.

We hold the same to be true in this case.

In addition, we are concerned with consistency of information across licensing applications. In contrast to the requirements cited in the CNL decommissioning license, the application for a decommissioning license for SRC's SLOWPOKE-2 reactor required the following:

> (*k*) the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons and the maintenance of national security, including measures to
> (i) assist off-site authorities in planning and preparing to limit the effects of an accidental release,
> (ii) notify off-site authorities of an accidental release or the imminence of an accidental release,
> (iii) report information to off-site authorities during and after an accidental release,
> (iv) assist off-site authorities in dealing with the effects of an accidental release, and
> (v) test the implementation of the measures to prevent or mitigate the effects of an accidental release;

REQUEST: The CNSC should require CNL to provide information which at minimum summarizes the volume, origin, form, quantity and name of any radioactive waste or hazardous waste that may result from the licensed activities; the proposed method for managing and disposing of that waste must be included, as per the regulatory requirements. In addition, the CNSC should ensure that CNL provides information at least equivalent to that required of SRC.

ACCESSING INFORMATION RELATED TO REVIEW

While the short timeline make the process of requesting and then subsequently reviewing documents challenging, Northwatch did request a suite of documents based on our review of the initially available documents (CNL application and CNL and CNSC staff CMDs) , and made some supplementary requests. CNSC staff were accommodating of these requests, and provided Northwatch with the documents as they became available.

We were disappointed, however, by CNLs refusal to provided documents we had requested and considered key to our review.

For example, Northwatch requested a copy of CNL's Waste Management Program, which is required by Condition 13.1 of the current licence. More than two weeks after our request, CNL responded that they were refusing the request, purporting that "*The information in its entirety is*

considered to be protected in nature, the release of which would compromise the operational and commercial interest of Canadian Nuclear Laboratories so CNL requests not to release it to the intervenor or any member of the public."

CNL also revised Northwatch's request for a copy of a letter from CNSC to the Canadian Nuclear Laboratories, responding to the CNSC's staff request For Information To Support CNSC Environmental Review For WL Licensing. Again, purporting that "*the information in its entirety is considered to be protected in nature, the release of which would compromise the operational and commercial interest of Canadian Nuclear Laboratories so CNL requests not to release it to the intervenor or any member of the public" although they also noted "That said, much of the information in the letter is included in Section 9 of "Environmental Monitoring in 2018 at Whiteshell Laboratories", WL-509243-ACMR-2018 and in Table 6 of "2018 Progress Report on the Environmental Assessment Follow-Up Program for Whiteshell Laboratories", WL-509246-ACMR-2018*."

Similarly, CNL refused to provide a copy of the "Operating Procedure, Whiteshell Laboratories Radiological Environmental Monitoring, WL-509200-OP-003, Revision 2, February 2017" which Northwatch had requested, again claiming "*The information in its entirety is considered to be protected in nature, the release of which would compromise the operational and commercial interest of Canadian Nuclear Laboratories so CNL requests not to release it to the intervenor or any member of the public*."

These refusals are unacceptable. Not only is this information which is in the public interest and is directly related to subjects which are of major public concern, but it is information that other licensees provide. In the rare and occasional interest where the requested information may disclose security or commercial information that would not be deemed by the Commission to be in the public interest to release, those sections can be redacted, while the document itself is made available.

REQUEST: The Commission should provide clear guidlelines to all licensees that information related to the public interest is to be publicly available.

DUTY TO CONSULT

As set out in the CNSC Staff CMD, CNSC staff describe the CNSC's duty to consult with Indigenous peoples:

> *The common law duty to consult with Indigenous groups applies when the Crown contemplates actions that may adversely impact potential or established Indigenous and/or treaty rights. The CNSC ensures that all of its licensing decisions under the NSCA [7] uphold the honour of the Crown and consider Indigenous peoples' potential or established Indigenous and/or treaty rights*

CNSC staff also describe a number of First Nation and Métis groups they identified who they determined may have an interest in the proposed relicensing of CNL's decommissioning activities at Whiteshell Laboratories in Pinawa, Manitoba, stating that "these groups were identified due to the proximity of their communities, treaty areas and/or traditional territories to the WL site, or due to previously expressed interest in being kept informed of CNSC licensed activities occurring in or proximal to their traditional territories."

The CNSC staff then made a determination that the decision on the licence renewal for CNL's WL decommissioning activities does not raise the duty to consult, based on the following:

> *Based on the information received and reviewed, CNSC staff determined that CNL's continuation of decommissioning operations at the WL site will not result in novel impacts. All proposed decommissioning activities under this license will occur in the existing project footprint and there is a low probability of emissions or waste being produced that could adversely impact the surrounding environment. This licence renewal application is not anticipated to result in adverse impacts on any potential or established Indigenous and/or treaty rights*.

We disagree.

More than two thousand shipments of radioactive wastes through the territories of Treaty 3, Treaty 9, Robinson Superior and/or Robinson Huron Treaties, and the Algonquin Territorires of the Ottawa Valley which are currently the subject of treaty negotiation is a "novel" activity.

Specific to the transportation of radioactive wastes, the potential to adversely affect Aboriginal and treaty rights has been repeatedly identified, including by Indigenous peoples who have intervened in previous CNSC proceedings.

These shipments of highly radioactive waste through Treaty territories poses a risk to these territories, and to the people, land and waters of these territories. These radioactive shipments are included in the decommissioning "activities", and subsequently the Canadian Nuclear Safety Commission had a duty to consult the First Nations on the route, and to accommodate their interests and concerns.

The political leadership of the Anishnabek Nation - which includes the Robinson-Huron , Robinson-Superior and other Treaty areas – have recently and clearly gone on record as having a concern and interest with respect to the transportation of radioactive materials across their territories.[26]

REQUEST: that the Commission should engage directly with Indigenous peoples along the transportation route, inviting their participation in a hold-point hearing specific to the certification of the modified UFTP and a risk assessment of the radioactive waste transportation.

[26] See, for example, the intervention of Chief Glen Hare at the licensing hearing for the Chalk River Nuclear Laboratory in January 2018. Reference # 2018-H-01

6. CONCLUSIONS

As set out in this submission, Northwatch has numerous concerns with the application as prepared and submitted by the Canadian Nuclear Laboratories.

Given that management of the site must be continued and some decommissioning activities should be continued, refusal of the license is not an option. However, as requested earlier in this submission, a licence should be limited to not more than two years, and should be conditional on CNL meeting a number of requirements.

All of which is respectfully submitted on behalf of Northwatch.

September 6th, 2019

Managing Hazards Associated with Whiteshell Laboratories Decommissioning Wastes:

The Wisdom of Making a Strategic U-Turn back to a more Gradual and Phased Decommissioning Approach

A report summarising
comments on CNL's Licence Renewal Application
submitted to the

Canadian Nuclear Safety Commission

On behalf of

Concerned Citizens of Renfrew County and Area
Northwatch

Prepared by Hartmut Krugmann PhD

September 6, 2019

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ExecutiveSummary

In pushing for a much accelerated decommissioning pace for the Whiteshell Laboratories (WL) site, with the end-state envisioned for as early as 2029 (the end of Canadian National Laboratories' (CNL)'s proposed licencing renewal period) or even earlier (around the end of CNL's contract under the GoCo arrangement in 2026), CNL's new strategic decommissioning plan for WL not only envisages double-handling/transporting of waste at higher radioactivity levels, implying higher waste management costs and increased health & safety risks (both to waste handlers/operators and to the public), but also waste consolidation for interim storage (or perhaps even disposal) at a place – Chalk River Laboratories (CRL) – clearly not suited for that purpose. At the same time, with the new urgency to get WL decommissioned as soon as possible, the urgency of finding and developing a still much needed facility for final waste disposal seems to be getting entirely lost.

1 Introduction

On 15 November 2018, Canadian Nuclear Laboratories (CNL) submitted an applicationfor Renewal of the Nuclear Research and Test Establishment Decommissioning Licence for Whiteshell laboratories (WL) to the Canadian Nuclear Safety Commission (CNSC).

CNSChas scheduled public hearings for 2-3 October 2019 in Pinawa, Manitoba, to discuss CNL's licence renewal application, providing indigenous peoples, non-governmental organizations and members of the public with an opportunity to inform and influence the decision-making process by preparing and presenting written comments on CNL's licence renewal application and related documentation, for consideration by the Commission in reaching a final decision on the application.

The Concerned Citizens of Renfrew Country and Area (CCRCA) and Northwatch, two non-governmental organizations (NGOs) of citizens living near Chalk River Laboratories (CRL) or on the transportation route between Whiteshell and Chalk River and dedicated to a clean and healthy environment in the Ottawa Valleyand northern Ontario that is free of pollution from the nuclear industry, applied for and were granted financial assistance under the Commission's Participant Funding Program (PFP) in support of their participation in the licence renewal application review and Commission hearing process.

CCRCA'sproposed review was to focus on the characteristics and hazards of WLdecommissioning wastes and ways and means to manage these wastes, while Northwatch's review was to examine issues and risks associated with the transportation of WL radioactive wastes, in view of CNL's plan to relocate virtually all WL's radioactive wastes to CRL, as part of CNL's plan to complete the clean-up and closure of Whiteshell Laboratories within the next licence period. In view of the highly complementary objectives and thematic foci of the two reviews, CCRCA and Northwatch have agreed to join forces and pool resources to undertake one integrated review, rather than two separate overlapping and potentially partially duplicative reviews. The present report summarises the comments relating to the licence renewal application that have arisen from this broader integrated review.

2 Background and context

Whiteshell Laboratories (WL) was established in the early 1960s to carry out nuclear research and development activities for higher temperature versions of the CANDU (CANada Deuterium Uranium) reactor. The initial focus of research was the Whiteshell Reactor-1 (WR-1) and the Organic Cooled Reactor (OCR) concept, which began operation in 1965. The OCR program was discontinued in the early 1970s in favour of the heavy-water-cooled CANDU system. WR-1 continued to operate in support of AECL research programs, until it was shut down in 1985.

The WL site is located approximately 100 km northeast of Winnipeg, Manitoba, near Pinawa, Manitoba. The site includes lands on both the east and west side of the Winnipeg River. The property covers 4375 hectares (ha), although the majority of the WL facilities fall within a 40 ha area, adjacent to the east shore of the Winnipeg River. TheWaste Management Area (WMA), the Concrete Canister Storage Facility (CCSF) and otherfacilities are located approximately 2 to 3 km north-east of the main site campus.

As result of the financial impact of the federal government's program review process, AECLmade a business decision in 1997 to discontinue research programs and operations at WL.Subsequently, AECL received government concurrence in 1998 to proceed with actions tocommence closure of WL via decommissioning **[1].**

In 1999, AECL began to prepare plans for the safeand effective decommissioning of the Whiteshell Laboratories that would meet the regulatoryrequirements. Pursuant to the then Canadian Environmental Assessment Act, an environmental assessment of the envisaged decommissioning project was undertaken. As a first step, a document outlining the scope of the project and assessment was issued in December 1999 following consultations with the public and other federal and provincial government departments. A draft (Rev.1) of what is referred to as Comprehensive Study Report (CSR) was submitted to CNSC in April 2000. A revised CSR (Rev.2) was submitted in March 2001, incorporating comments from members of the public, non-government stakeholders as well as federal and provincial government departments, and taking into account the results of additional studies in the Winnipeg River and in the WasteManagement Area (WMA) to confirm the appropriateness of the decommissioning proposals forthose areas**[2].** The final CSR was published in 2002.

Based on the results of the environmental assessment, as documented in the CSR, AECL began to develop detailed decommissioning plans (DDP) for the Whiteshell Laboratories (WL) to be organized in 12volumes,with a view to securing the necessary regulatory approval for the envisaged WL decommissioning effort. Because of the staged manner of the WL decommissioning process, DDP volumes have been developed sequentially, as and when needed to secure formal approval from CNSC as a licence condition for particular decommissioning activities to be initiated, and CNSC has used the DDP volumes as a reference to verify compliance with this licence condition, as laid down in CNSC's Licence Condition Handbook **[3]**.[1]

The overall decommissioning approach and strategy for the WL complex is set out in Volume 1 (DDP 1) under the heading "Program Overview", with detailed decommissioning plans for individual WL nuclear facilities (to be) covered in Volumes 2 through 12. The latest CNSC-approved version of DDP 1 ("Program Overview"), Rev.4, dates back to January 2002**[4]**. DDP 1 is in the process of being revised to reflect changes in the WL decommissioning strategy that are being proposed by CNL under their present licence renewal application for the period 2020 – 2029 (see section 4 below for a summary of those changes).

The initial decommissioning licence for WL was issued in 2003 and ran up to 2008, followed by a 10-year decommissioning licence for the period 2009 – 2018, which was extended by one year, to 2019. The licence renewal CNL is currently seeking is for the period 2020 – 2029.

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[1] As of today, two of the 12 DDP volumes (or parts of volumes) still need to be developed:

a) Volume 8, Part 1 and 2 (for the decommissioning of the HLW Standpipes and the ILW Bunkers, B417, Amine Tanks, respectively, both located in the Waste Management Area (WMA); and
b) Volume 11 (for the decommissioning of Building 402).

The following DDP volumes represent decommissioning activities that have already been completed:

- Volume 3 (Van der Graaff Accelerator)
- Volume 4 (Neutron Generator)

3 The original decommissioning strategy

3.1 The 'preferred alternative' identified by the initial environmental assessment

The comprehensive study report (CSR) presenting the results of the initial environmental assessment up-front highlights **the availability of a national facility for the final disposal of nuclear waste as essential to completing the decommissioning of the WL site**: (emphasis is the author's).The basic rationale for decommissioning the WL complex was to move site waste off-site only whenoff-site disposal would be available or when the safety of managing wastes in existing facilities would be compromised. Noting that "the long-term management of nuclear waste is contingent upon finding a nationally acceptablesolution consistent with federal policy on waste management", the CSR points out that "no options or sites have been defined or approved that will provide such a solution".The CSR goes on to note:

- Provision of national waste disposal facilities is not within the Whiteshell Laboratories Decommissioning Project scope;
- Until a national facility is available, the wastes arising from thedecommissioning project will [have to] remain in other secure interim waste management facilities licensed bythe CNSC."

In considering environmentally acceptable alternatives for achieving the WL decommissioning program, the CSR starts from the premise, suggested by an early version of DDP 1 **[4]**that the main difference between alternatives would be the time required to complete the program, as the same decommissioning steps and activities would be involved to get the job done, whatever the time frame within which the decommissioning program might be completed.

The CSR assessed three decommissioning alternativeswhich had been provided by AECL as an input into the environmental assessment process, as mentioned in DDP 1**[4]**:

- Alternative 1: end-state to be reached in 20 years (shortest possible period to deliver the program);
- Alternative 2: end state to be reached in 100 years (longest conceivable period to complete the program);
- Alternative 3: end state to be reached in 60 years (intermediate time frame over which to deliver the program).

Based on the feedback received during public consultations, Alternative 1 was understood to be the public's preference. But such a short time frame was felt to have two significant drawbacks: a) greater occupational health and safety risks and higher operational costs associated with the handling of radioactive waste, in particular high-level waste (HLW) in the form of irradiated fuel from WR-1, given that earlier waste handling would result in higher occupational radiation doses and requiremore extensive and hence expensive shielding and the use of more costly automated remote-control waste handling equipment; and b) the high likelihood that an off-site waste disposal facility would not be available within 20 years, thus making it necessary to transfer radioactive wastes (HLW, ILW, and some of the LLW) to off-site interim storage facilities before they could be sent to the national disposal facility,

which in turn would imply double-handling of waste, higher health & safety risks to workers and increased waste management (transport and storage) costs.

These downsides of Alternative 1 would matter less for Alternative 2 (which was based on the assumption that it would take at most 100 years to implement a national disposal policy and bring on-stream one or more national waste repositories) and Alternative 3 (which was seen as a way to optimizeoccupational health &safety levels and operational costs). For both alternatives, deferred dismantling of nuclear facilities and decommissioning buildings as they come to the end of their economic and structural life (and not before) would imply lower radioactivity levels, reduced occupational radiation doses and operational costs, as well as make it more likely that one or more national waste disposal facilities would be available by 2050 is much increased.

Alternative 3 was considered superior to Alternative 2 (provided that a waste disposal facility would become available by 2050) in that a) decreases of radioactivity levels and workers' health & safety risks were found to be relatively insignificant beyond the time horizon of Alternative 3, b) potentially costly maintenance or replacement of WL facilities would be less of a problem for shorter time horizons (before 2050) than for longer time horizons (after 2050) , and c) overall not quite as much waste would accumulate and require disposal if the decommissioning program did not stretch out beyond 2050.

Overall, based on technical, economic, public and environmentalconsiderations, Alternative 3 was identified as the preferred alternative. This alternative also was seen to have built-in flexibility in being able to adapt its decommissioning schedule to the time when off-site waste disposal capacity would actually turn out to become available, decommissioning (some of the) WL facilities, and moving waste off-site, earlier or later (even after 2050) in case waste disposal repositories would become available an earlier or later.

The CSR concluded that for Alternative 3 (the 'Preferred Alternative') the decommissioning of WLwas not likely to cause significant, adverse environmental effects, taking into account themitigation measures recommended in the report.

It is noteworthy that the choice of the decommissioning alternative ended up falling on Alternative 3 (intermediate time frame of 60 years) and not Alternative 2 (short time frame of 20 years), even though public preference was for getting the job done as quickly as possible so as to get rid of the radioactive waste sooner rather than later. Various government and non-government stakeholders intervened with written comments arguing in favour of the shortest possible decommissioning timelines on various grounds.

AECL responded to these comments by vigorously defending the rationale for more gradual WL decommissioning over a longer (intermediate) time horizon. Selected relevant written stakeholder comments and AECL's responses are found in the **Appendix A** to this paper. In line with the approach recommended by the CSR, AECL argued that awaiting the development and opening of one or more national facilities for final waste disposal and in the interim storing WL decommissioning wastes at the WL site as necessarywould make it possible to transfer all WL wastes directly to the final disposal site, thus avoiding double-handling and double-transporting of wasteand benefitting from lower operational health & safety risks and costs due to reduced waste transport needs and lower radiation levels.

3.2 Decommissioning options and scope of work under the 'preferred alternative'

The initial environmental assessment, as summarised in the CSR, came up with the following recommended decommissioning options **[2]**:

- Entire removal of facilities as a general strategy;
- In-situ disposal -- with some additional monitoring and analysis as well as a supplementary environmental assessment and safety analysis to support the final in-situ end state -- as the most environmentally sound and cost-effective solution for the following two project components:
  a) river sediments, on the grounds that even near the outfall to the Winnipeg River sediment surveys found no risk to human or ecological health (for details see Appendix B in [2]; and
  b) low-level waste (LLW) in the trenches located within the Waste Management Area (WMA), on the grounds that no significant transport of waste contaminants beyond the trench boundaries had been observed and it was very unlikely that contaminants could move beyond the boundaries of the WMA within the period of institutional control (estimated at 200 years) (for details see Appendix C in [2])[2];
- Decommissioning of the following facilities:

Nuclear Facilities	Radioisotope Facilities	General Infrastructure
• Shielded Facilities • Van de Graaf Accelerator • Neutron Generator • Active Liquid Waste Treatment Centre (ALWTC) • Whiteshell Reactor -1 (WR-1) • Concrete Canister Storage Facility (for HLW) • Waste Management Area (WMA)	• R&D Laboratory (Building 402) • Decontamination Centre (Building 418) • Active Waste Storage (Building 511)	• Non-nuclear buildings • Landfill • Sewage Lagoon • Buried Services • Contaminated Lands ("Affected Lands")

- A phased approach to implementing the WL decommissioning project, preceded by operational shut-down work, with activities proposed to be sequenced as follows:
  - ***Phase 1*** *(approximately 5 years)* –
    - Focus on placing nuclear and radioisotope buildings and facilities in a safe interim (monitoring & surveillance) state
    - Complete decommissioning of Van de Graaff Accelerator and the Neutron Generator.
  - ***Phase 2*** *(approximately 10 years)* –
    - Regular monitoring and surveillance of all buildings and facilities
    - Focus on placing the Waste Management Area in a passive operational state

[2] After further assessments, the recommended in-situ disposal of the LLW trenches in the WMA was qualified in the final CSR published in 2002, to the effect that most but not all LLW trenches, more specifically 21 out of the total of 25 trenches could be left in situ, pending a final safety assessment. A 2019 reassessment indicated that one of the 4 trenches to be remediated may also be a candidate to be left in situ, again pending a final safety assessment, thus suggesting that 21 or 22 of the LLW trenches may be left in situ **[1]**.

- Establishing interim processing, handling and storage facilities, required during monitoring & surveillance and decommissioning activities.

- ***Phase 3*** *(approximately 45 years) --*
  - Focus on bringing the site to a final end state that fulfils all pertinent regulatory and national policy requirements
  - Timing and sequence of decommissioning activities to be determined largely by the availability of waste disposal facilities and the age and structure of engineered structures and buildings
  - Part of the WL site, namely the Waste management Area (WMA), to be placed under institutional control after completion of all decommissioning activities and to remain under such control for an additional 200-year period.

3.3 Management of waste under the 'preferred alternative'

Noting that the WL decommissioning program essentially amounts to a process of managing the WL site waste (to be generated by the program as well as already existing and stored from past operation), the CSR provides the following estimate of the amounts of WL waste that would need to be managed, eventually to be transferred to off-site disposal facilities or (in the case of the river sediments and LLW trenches) to be disposed of in-situ.

	Low-level waste (LLW) (m^3)	**Intermediate-level waste (ILW)**(m^3)	**Irradiated reactor fuel (HLW)** (metric tonnes)	**'Deminimis' waste**[a](m^3)
Inventory of stored waste	21,000	1,400	28	
Additional waste to be generated by decommissioning program	12,000	1,400	--	50,000
Total	33,000	2,800	28	

[a]This is waste that is below regulatory concern

Note: Radioactive liquid waste stored at the site from the Thorium Fuel Reprocessing Experiment (TFRE) is to be processed into a solid waste form.

4 Recent WL decommissioning progress: a new pattern of quickening pace and waste transports to Chalk River

In its Commission Member Document (CMD) for the 2-3 October 2019 WL decommissioning licence renewal application hearings CNL points out that "much progress has been made on the decommissioning of the WL site over the 2008 – 2018 and 2018 – 2019 licence periods in terms of decommissioning of both nuclear and non-nuclear facilities has continued, construction of new facilities to enable further decommissioning activities, and improvements to general site services" and provides a brief overview of decommissioning accomplishments so far **[1]**. The following selected activities and results are illustrative, not only of decommissioning progress so far but also of apparent changes in the overall decommissioning strategy:

- Decommissioning/demolition of further component parts of the 'Shielded Facilities', namely the "Warm Cells" 14-18" and Thorium Fuel Reprocessing Experiment (TFRE) tanks and piping (following the interim decommissioning of Hot Cells 6-12 and the Storage Blocks during the first decommissioning licence period 2003 – 2008);
- Final decommissioning of the SLOWPOKE Demonstration Reactor (SDR);
- Cementation of Active Liquid Wastes from historical fuel reprocessing experiments, for storage in the WMA;
- The remaining quantity of unirradiated WR-1 fuel material was removed from WL;
- The WL Shielded Modular Above Ground Storage (SMAGS) building was constructed and was partially filled with containers of radioactive waste. **The waste is being removed and shipped to CRL** (author's emphasis) in preparation for the re-purposing of SMAGS as a Cask Loading Facility (CLF) for intermediate-level wastes;
- A Soil Storage Compound (SSC) for storing radioactively contaminated soils was constructed in the Waste Management Area (WMA) and is operational;
- A Waste Clearance Facility and a Waste Handling Area were constructed on the main WL campus;
- The Cesium Pond experimental area was remediated and decommissioned – the **contaminated soils from the Cesium Pond were characterized, sorted by radioactive contamination levels, stored in the WMA,and subsequently transferred to CRL** (author's emphasis);
- More than 25 smaller, redundant, non-nuclear and nuclear-related auxiliary buildings (totalling approximately 2700 m2) were shut down and demolished;
- Pre-project work on WMA Standpipes was performed, and a contract for a design/build for remediation facilities for the Standpipes and Intermediate Level Waste Bunkers wasissued to a qualified contractor having relevant decommissioning experience (design isnearing completion);
- The decommissioning of the Field Irradiation Gamma (FIG) and the ZoologicalEnvironment Under Stress (ZEUS) experimental areas was completed;
- A new Modular Office Complex (9 modular trailers) was constructed at the WMA **inpreparation for increased work load and decommissioning activity in and around theWMA**(author's emphasis), and a new WMA Access/ByPass road and an expanded WMA Protected Area (PA)was also constructed **in preparation to enable the use of additional equipment for the remediation of standpipes and ILW bunkers**(author's emphasis)(author's emphasis);
- The collection and processing of Intermediate-Level Liquid Waste (ILLW) via the Active Liquid Waste Treatment Centre (ALWTC) (B200) was terminated, and much of the existing inventory was shipped off-site for processing;
- Two Low-Level Liquid Waste (LLLW) collection systems were constructed in BuildingsB100 and B300, and the ALWTC facility was shut down, allowing for operational clean upand decommissioning;

The above list signals CNL's apparent intention to take the decommissioning of the WL complex in a new direction, away from the original decommissioning strategy, in that: a) the pace of decommissioning activity and associated work load appears to have been increasing and b)some of the waste resulting from ongoing decommissioning and demolition activities is being transferred to CRL (rather than being stored at WL).

The latter issue (waste transports from WL to CRL) had already come into sharper focus earlier this year (2019) as a result of information provided by Atomic Energy Canada Limited (AECL) in response to a request,dated 03 February 2019, for information on shipments of radioactive wastes to Chalk River[3]from the Concerned Citizens of Renfrew County and Area (CCRCA) under the Access to Information and Privacy (ATIP) Act request**[5]**. AECL's "First Release Package" showed tangible evidence of a clear pattern of radioactive waste shipments to Chalk River, starting in January 2015, from five federal nuclear sites including Whiteshell (as well as from various other public-sector and private-sector organizations).

For Whiteshell, radioactive waste shipments to CRL commenced in October 2017 and up to the end of January 2019, resulted in the transfer to CRL of approximately 3000 metric tonnes (about 3500 m2 in volume) of packaged radioactive wastes, more than 90% (in weight and volume) of the total of radioactive wastes transferred to CRL from all five federal nuclear sites.More details are found in **Appendix B**.

This brings us to CNL's strategic decommissioning plan for the upcoming 10-year licencing period (2020 – 2029), which is examined in the next section.

5 The new strategic decommissioning plan for Whiteshell

Up-front in the executive summary of its CMD for the WL decommissioning licence renewal application hearings, CNL spells out its strategic plan for decommissioning the WL nuclear site in a nutshell [1]:

- ➔ "At the end of the proposed ten year licensing period [in 2029], the CNL plan is that all of WL will have beendecommissioned to its final end-state, including the final decommissioning of the WR-1 reactorand the proposed in situ decommissioning (ISD) of certain Low-Level Waste (LLW) trenches in theWaste Management Area (WMA) (see previous paragraph), and the implementation of postclosureinstitutional controls. **All other LLW, all Intermediate Level Waste (ILW), and all High Level Waste (HLW), will be retrieved,characterized, and (re-)packaged (as necessary) for shipment to either Chalk River Laboratories(CRL)** (emphasis is the author's)or another suitable, licensed storage/disposal facility;"
- ➔ "It is anticipated that the physical **decommissioning activities at WL will be completed on, or before 2026**(emphasis is the author's); final documentation may take additional time;" and
- ➔ "CNL's strategic plan, as stated in the preceding paragraph, is to **relocate most (if not all) of WL's radioactive wastes, except for certain trench wastes, to CRL within the next licence**

[3] CCRCA's access to information request was formulated as follows: "*Clarification Feb 3, 2019 – For the period of January 1, 2014 to January 31, 2019, what type(s) (including radioisotope composition) and amounts (in Bq and kg) of radioactive wastes have been sent to CRL, and from which organizations and on what dates*."

period, as one part of the CNL plan to complete the cleanup and closure of Whiteshell Laboratories(emphasis is the author's)**."**

The CNL CMD adds: "starting in 2017, CNL commenced the relocation of Whiteshell Laboratories radioactive wastes to CRL. As of 15 July 2019, 3,557 $m^3$of LLW and 18 m^3 of ILW have been safely transported to CRL in 175 shipments.[4] These shipments have covered 335,000 km of roads, with zero incidents/accidents and zero non-conformances. CNL anticipates that a total of approximately 1500 shipments of Low-Level Waste, 500 shipments of Intermediate-Level Wastes and 46 shipments of High-Level Waste (the baskets of irradiated reactor fuel from the Concrete Canister Storage Facility)[5] will be transferred to Chalk River during the completion of the Whiteshell Labs Closure Project."

It is clear from this summary statement that CNL has been following a new strategic approach to decommissioning Whiteshell Laboratories that amounts to moving away from the original approach, virtually into the opposite direction. The apparent intention is to greatly accelerate the pace of WL decommissioning and complete the WL decommissioning job as fast as possible, in just a few years – essentially a shift from the 'preferred alternative' of the CSR to alternative 1 (complete decommissioning as fast as possible, within 20 years).

The intention is, further, to immediately ship the vast majority of the decommissioning waste and other waste off-site to CRL for storage, rather than storing the waste at the WL site, so as to achieve the envisaged WL end state and site closureby the end of the of the next licence period (2029), with physical decommissioning operations to be completed by 2026 (i.e. about the end of CNL's current 10-year contract (2015-2025) with the multinational consortium). Waste shipments from the WL site to CRL started in October 2017 (see Section 5 and Appendix 2). Nearly 10% of the estimated total required number of 2050 shipments have already taken place, and somewhat more than 10% of the estimated total volume of waste has been already been shipped. (See **Appendix C** for more details.) Waste shipments are envisaged to continue until the end-state is reached for the WL site.

6 Implications of the new WL strategic decommissioning plan

CNL's new strategic plan for the decommissioning of the WL complex has various implications that are briefly analyzed in this section.

6.1 Longer-term storage of WL decommissioning waste at CRL

CNL's new strategy of transferring WL decommissioning wastes to Chalk River Labs (CRL), rather than storing them at the WL site, does nothing toaddress the issue of its final disposal. CRL is located on a geological fault line, within a seismically active area, right next to a major water body, the Ottawa River, which is the source of drinking water for millions of people downstream. Thus, the site's hydrogeological

[4] These figures of WL waste volumes shipped to CRL as of 15 July 2019 are reasonably consistent with our own estimate (of volumes shipped as of 31 January 2019) based on information in the AECL "First Release Package" (see Section 4 and Appendix 2).

[5] Additional irradiated fuel is being stored in a total of 171 concrete standpipes, which will add an estimated 1-4 HLW shipments to the 46 shipments of HLW (irradiated fuel) from the CCSF **[6]**.

and biophysical conditions are such that it does not meet the criteria for hosting a facility for final waste disposal: relative isolation from the biosphere and sufficient containment of waste through natural barriers. This leaves longer-term interim storage at CRL (for eventual disposal elsewhere) as the only viable management option for any radioactive waste shipped to CRL (HLW, ILW, LLW containing significant amounts of long-lived radioisotopes as well as hazardous chemical waste and mixes of such waste), the only exception being very low-level radioactive waste which, however, did not need to be shipped to CRL, as it could be disposed of at the WL site.

In other words, the main difference that transferring WL waste to CRL makes is that the waste is stored at CRL rather than at the WL site. Either way, a waste disposal facility would still have to be found.

However, while AECL's original WL decommissioning strategy highlights the availability of a final repository, or lack thereof, as a major constraint to rapid WL decommissioning (within a time frame of around 20 years) and therefore opts for a substantially longer decommissioning time frame (around 60 years), CNL's new strategy plan pushes for rapid WL decommissioning (coupled with waste transfer to CRL) while being silent on the need for a facility for eventual waste disposal.

While CNL's new strategic plan implies significant disadvantages in terms of increased waste management costs and risks, as discussed in sub-sections 6.2, 6.3, and 6.4, one wonders what, if anything, there is to be gained from adopting the new approach. Two things come to mind. For one, local residents in and around Pinawa and non-government organizations in Manitoba most of whom were in favour of a speedy decommissioning process and a rapid transition to an essentially waste-free end-state of the WL site, at the time the initial environmental assessment was undertaken, might now be pleased to see this happen, even if the WL radioactive waste legacy is merely shifted to another place (CRL) rather than removed all-together, simply leaving another local community, around CRL, up in arms. For another, it is not inconceivable that consolidating nuclear waste from the WL site at CRL might be seen by CNL as bringing about certain operational or administrative advantages. In any case, neither of these possible motivations should serve as an excuse to belittle or ignore the fundamental principle that existing nuclear waste legacies must be dealt with in such a way as avoid leaving an undue burden to future generations.

6.2 Double-handling and double-transporting of WL waste

Given that CRL is not a site suitable for final waste disposal, as argued in sub-section 6.1 above, CNL's new strategic plan entails double-handling and double-transporting WL nuclear waste. Following the transfer of WL waste to Chalk River, the waste would eventually have to be shipped off-site again for accommodation in a national facility for final waste disposal. Each transfer would involve a number of handling steps, starting with the recovery of the waste from where and how it is stored, to its re-packaging for transport, its transfer to the final disposal facility, and finally its unloading and emplacement in the disposal facility. Each step would entail additional costs, as well as additional occupational and public risks that could be avoided if WL waste were sent directly to a final waste disposal facility.

6.3 Higher radioactivity levels due to earlier decommissioning

By pushing for earlier and faster decommissioning of the WL site, CNL's strategic plan implies higher radioactivity levels and radiation fields around waste containers and waste packages during WL decommissioning and waste transfer to CRL. This, in turn, means that radiation doses received by operators handling the waste during decommissioning and transfer to CRL are correspondingly higher.

Longer decommissioning deferment periods such as the 60-year period envisaged under the original decommissioning strategy can make a significant difference to the intensity of radiation fields generated by nuclear waste. For illustration, radioactivity levels of structural reactor vault components for the Whiteshell Reactor-1 (WR-1) drop by more than a factor 1000 within 50 years after reactor shutdown (**[4]**, p.40).

In section 3 of CNL's CMD where decommissioning plans for the proposed 10-year licence renewal period are presented, CNL attempts to provide a justification for their new decommissioning strategy of moving towards reduced deferment periods, claiming that it is consistent with the evolution of international best practices and that their strategic decommissioning plan incorporates international standards and current best practices**[1]**. But the claim remains unsubstantiated. No details or references are provided in support of this claim.

6.4 Higher risks and costs, in particular waste transport risks and costs

The core elements of CNL's strategic plan – a much shorter decommissioning deferment period, WL waste transfer to CRL, and interim storage at WRL – all substantially add to the cost as well as health and safety risks, including waste transportation related costs and risks, associated with the decommissioning the WL site, when compared to AECL's original decommissioning strategy.

Costs

As far as costs are concerned, higher radioactivity levels in and around nuclear waste due to the shorter deferment period increase the extent to which costly shielding and remote handling equipment is required in waste handling operations, especially for HLW (irradiated fuel) and ILW. Packaging and transporting WL waste to CRL is a costly undertaking in itself, especially for HLW and ILW requiring special packages and transport containers. And new storage facilities may be needed at CRL to accommodate WL waste which in the case of HLW and ILW have greater shielding requirements and are therefore more costly.

AECL's Detailed Decommissioning Plan, Vol.1 – Program Overview (DDP 1), Rev.4, 2002, estimated the additional decommissioning and waste management cost associated with moving from a 60-year decommissioning time frame ('preferred alternative') to a 20-year time, broadly representative of CNL's new strategic plan, to be in the range of CAD 50 -130 million **[4]**. This range of incremental costs for the 20-year decommissioning time frame was also adopted in the CSR **[2]**. To these cost figures, the costs of transferring WL waste to CRL and the cost of storing it there as well as general cost escalation/inflation would have to be added to arrive at a more credible estimate for the (certainly much greater) additional WL decommissioning cost under CNL's decommissioning plan.

Risks

When it comes to health & safety risks, CNL's new strategic decommissioning plan enhances these risks when compared to AECL's original decommissioning strategy, both in terms of occupational risks (increased radiation doses to waste operators) and in terms of public risks (increased radiation doses to members of the public), because of double-handling/transporting of waste and the shorter decommissioning deferment period and hence higher radiation levels and larger radiation exposures during waste handling. Public risks are enhanced, in particular, due to the ongoing and planned waste transports of WL waste to CRL, given that accidents cannot be ruled out.

Transportation risks

Since nuclear waste transports became an integral part of CNL's decommissioning plans in 2016, with the development of a Decommissioning & Waste Management (D&WM) Integrated WasteTransportation Strategy for all CNL wastes and the establishment of a new WL Waste Certification and Transportation Branch within a newly established WL Waste Management Division, and since waste shipments from WL to CRL were initiated in 2017, CNL has maintained in its annual compliance/safety reports to CNSC **[7, [8], [9]** that it has complied with all relevant CNSC, Transport Canada, and IAEA regulations and standards **[10], [11], [12]**. CNL further reports having worked closely with WL and CNSC in handling, packaging, and shipping special types of nuclear waste, such as Uranium-Thorium Solution (UTS) waste drum, first reclassified and then repackaged into Type A drums for shipment to CRL in Dec 2017 for storage there as ILW, or WL irradiated fuel from to be accommodated in a Used Fuel Transportation Package (UFTP), leased from the Nuclear Waste Management Organization (NWMO) for shipment to CRL in a Type B transportation package, starting in 2020 **[8]**. CNL also prides itself on having maintained an immaculate safety record in its 175 shipments of WL waste from the WL site to CRL since 2017, with no accidents, incidents, and non-conformances (see Section 5 above and **[1]**).

While compliance with waste transport regulations, collaboration with CNSC on transporting special waste types, and an apparently good transport safety record so far is to be welcomed, it does not mean that there are no risks associated with transporting radioactive waste or accidents could not happen in future. For one, a small fraction (less than 10%) of the estimated total waste shipments currently anticipated have taken place so far, i.e. the vast majority of waste transfers are still to come. For another, accidents could be caused for reasons outside the control of nuclear waste truck drivers, such as negligent behaviour of other drivers. Imagine, for instance, a broadside collision with an 18-wheeler long-haul truck such as the one that flattened the bus carrying the Humboldt Broncos team and killed a number of team members, or imagine a collision with a train.

The possibility of an accident resulting in radioactive waste spillage, land and water contamination, and possible adverse occupational and public health impacts, can never be discounted when nuclear waste is shipped across long distances. In comparison with AECL's original WL decommissioning strategy, CNL's new strategic plan significantly increases this risk by involving double-handling/transporting waste at higher waste radioactivity levels.

7 Conclusion

CNL's intentions for how to decommission the WL site fly into the face of the original rationale for more gradual phased decommissioning, which AECL helped develop and vigorously defended via-à-vis critical stakeholders during the initial environmental assessment. The new intensions are entirely incompatible with the original decommissioning rationale in accepting, rather than avoiding, the prospect of double-handling/ transporting radioactive waste and associated cost increases and occupational/public health & safety risks -- and in ignoring, rather than embracing the cost savings and health & safety benefits from deferred decommissioning.

At the same time, the need for a final waste disposal facility no longer seems to figure as a significant factor in the new strategic decommissioning plan for the WL site. The new urgency of getting the WL site decommissioned as soon as possible appears to have eclipsed the continuing urgency of finding and developing facilities that are suitable for the disposal of long-lived nuclear waste.

8 Recommendations

The following recommendations are offered:

1) CNL's new strategic plan for the decommissioning of the WL, which marks a drastic departure from the AECL's original approach, should be revised with a view to moving back to a more gradual and phased decommissioning approach.

2) The pace at which the WL site is currently being decommissioned should be decelerated, decommissioning activities should be stretched over a longer time horizon, in moving back toward the original decommissioning approach to decommissioning the WL site.

3) Ongoing transfers of WL decommissioning waste to CRL should be halted and the WL waste should revert to being stored at WL.

4) Priority should be given to identifying and developing sites for national facilities for the final disposal of radioactive waste from federal sites.

5) CNL should be granted a temporary licence of 1 year duration only during which time they should be requested to come up with a revised WL decommissioning approach and strategy along the lines of the original strategy and approach reflected in PPD 1 **[4]**and the initial environmental assessment (CSR) **[2]**.

References

1. Canadian Nuclear Laboratories (CNL) Ltd., Commission Member Document (CMD) prepared for the Canadian Nuclear Safety Commission (CNSC) Public Hearing, October 2-3, 2019, in the matter of CNL's application to renew the Nuclear Research and Test Establishment Decommissioning Licence for the Whiteshell Laboratories site for a period of 10 years, 30 July 2019
2. Whiteshell Laboratories Decommissioning Project, Comprehensive Study Report (CSR), Rev.2, March 2001; Vol.1: Main Report, Vol.2: Appendices, Vol.3: Addendum, November 2001
3. Canadian Nuclear Safety Commission (CNSC), Licence Condition Handbook for Whiteshell Laboratories, Compliance Framework Document Associated with the Whiteshell Laboratories Decommissioning Licence, NRTEDL-W5-8.04/2018, Rev.0, 01 February 2016
4. The Whiteshell Laboratories Detailed Decommissioning Plan, Vol.1 – Program Overview, RC-2143-1, Rev.4, January 2002
5. Atomic Energy Canada Limited (AECL), "First Release Package" provided to the Concerned Citizens of Renfrew County and Area (CCRCA) in response to CCRCA's request for information, under the Access to Information and Privacy (ATIP) Act, on shipments of radioactive wastes to Chalk River, 03 February 2019
6. Whiteshell Laboratories Closure Project, Application for the Renewal of the Nuclear Research and Test Establishment Decommissioning Licence for the Whiteshell Laboratories, for the period January 2020 – December 2029), WLD-CNNO-18-0033-L, 15 November 2018
7. Canadian National Laboratories, Annual Compliance Monitoring Report, Whiteshell Laboratories Annual Compliance Monitoring Report for 2018, WL-00583-ACMR-2018, Revision 0
8. Canadian National Laboratories, Annual Safety Report, Whiteshell Laboratories Annual Safety Review for 2017, WL-00583-ASR-2017, Revision 0
9. Canadian National Laboratories, Annual Safety Report, Whiteshell Laboratories Annual Safety Review for 2016, WL-00583-ASR-2016
10. Canadian Nuclear Safety Commission (CNSC), Packaging and Transport of Nuclear Substances Regulations, 2015
11. Transport Canada, Transportation of Dangerous Goods Act, 1992
12. International Atomic Energy Agency (IAEA), Regulations for the Safe Transport of Radioactive Material, 2018 Edition, No. SSR-6 (Rev.1)

AppendixA: Selected comments and responses on draft Whiteshell Environmental Assessment, 2001

Source: Comprehensive Study Report (CSR), Rev.2, March 2001; Vol.3: Addendum, Appendix: "Responses to Public and Technical Review Comments, on the Draft Comprehensive Study Report (CSR) on the Whiteshell Laboratories Decommissioning Project, Rev.2, March 2001"**[2]**

Comment Number	Comments by	Comment (as summarized by CNSC)	Response (by AECL)
26	Concerned Citizens of Manitoba	We are opposed to the fact that AECL is notplanning to decommission the WL in the nearfuture. We believe that decommissioning should be commencing immediately	Decommissioning will commence following completion of the EAprocess and establishment of the regulatory/licensing structurerequired to implement the project.
93	Local Government District of Pinawa	There is no valid safety argument for deferringdecommissioning other than for the WR1 core.Even with WR1 the fuel channel assembliescould be easily removed and stored as is done inthe CANDU power reactors when they are retubed. There is a strong ethical and safety argument against committing thedecommissioning risks to future generations.These risks should be minimized by doing asmuch as possible now to put the wastes in a safe and easily retrievable state.	The rationale for deferment is detailed in Sec. 3.3. Although WR-1 isthe basis for the argument, there are significant quantities of WR-1waste already stored in the WMA facilities as a result of the WR-1operational program. **Since AECL will have a significant presence and will manage waste at WL for decades the optimized plan is based on transfer of decommissioning waste directly to disposal facilities.**
194	Pinawa Resident	If waste disposal facilities are not ready in time to complete the decommissioning of Whiteshellto complete the decommissioning of WhiteshellLabs in 20 years, the wastes at Whiteshell Labs should be moved out of Manitoba to ChalkRiver Labs or some other suitable radioactivewaste storage site.	The rationale for moving waste when disposal is available is given inSec. 3.3. **Moving waste initially to alternate storage and then to disposal incurs additional personnel dose. Therefore, the reference plan is to manage wastes within existing facilities until disposal is available.**Additional detail on the process for designing and implementing anenhanced monitoring program at the WMA, assessing the fitness forservice of existing storage facilities and for stablishing remediationschedules has been added to the Addendum.
195	Pinawa Resident	Leaving the nuclear waste around for 60 yearsis not how to decommission a nuclear facilitiesresponsibly.	**The project schedule is dependent on waste disposal facilities being available off-site** and the schedule **assumptions for waste disposal are 2025 for low-level waste and 2050 for high-level waste.** For radiationsafety considerations the activity in the WR-1 core is being permittedto decay for approx. 50 years before dismantling begins.
202	Pinawa Resident	When people see that a nuclear facility cannotbe decommissioned in a timely manner, thenthey will not want nuclear industry to start intheir area. This will put in jeopardy the futureof the nuclear industry and AECL. As a result,AECL and resources to clean up WhiteshellLabs may	**The optimized decommissioning plan to minimize radiation doses and to control costs is scheduled over 60 years to coincide with waste disposal assumptions.**

		not exist in the future. ThereforeWhiteshell Labs needs to be cleaned now, andthe radioactive waste must be removed now.	
208	Pinawa Resident	There is no guarantee that we could transportthe waste out of Manitoba. Therefore we need atransportation corridor to remove the wastenow. We need to start transporting the wastedown corridor, and keep transporting the waste to keep the corridor open.	**Waste cannot be transported until there are established waste disposal facilities to receive it.** The shipping schedules will be addressedconsistent with waste disposal facility availability.
211	Pinawa resident	A major problem with the Whiteshell LabsDecommissioning Project is that the peoplegiven responsibility for decommissioning thelab do not have the authority to decommissionthe lab. They cannot decommission the labuntil the waste disposal facilities are built, andthey have no control over whether the wastedisposal facilities will ever be built. By movingthe radioactive waste to Chalk River, it willthen be located closer to where the authority to dispose of it is located.	The rationale for moving waste when disposal is available is given inSec. 3.3. **Moving waste initially to alternate storage and then to disposal incurs additional personnel dose. Therefore the reference plan is to manage wastes within existing facilities until disposal is available. Where necessary, and disposal facilities are not yet available, additional waste management facilities will be built at the WL WMA for interim storage.**

Appendix B: Radioactive wastes shipped to Chalk River from other federal nuclear sites in the period 01/01/2014 – 31/01/2019

Federal site from which wastes were shipped	Period over which wastes were shipped	No. of days on which shipments were received by CRL	No. of packages received by CRL	Total mass of waste received by CRL (metric tonnes)	Total volume of waste received by CRL (m^3)
NDP Reactor	29/01/2015 – 15/05/2018	15	623	16	73
Douglas Point	03/01/2017 – 30/01/2019	2	11	12	17
Port Hope	05/09/2018 – 05/12/2018	3	11	1	3
Gentilly 1	07/03/2018 – 24/01/2019	13	813	206	198
Whiteshell Labs	02/10/2017 – 28/01/2019	51	548	3004	3499
Grand Total		**84**	**2006**	**3239**	**3790**

Findings from the analysis of the AECL First Release Package data can be summarized as follows:

a) Radioactive waste shipments to CRL from the other AECL took sites were initiated in January 2015 and proceeded over the remaining 4-year period (Jan 2015 – Jan 2019) covered by the AECL First Release data. No such radioactive waste shipments seem to have taken place in 2014.**Shipments from Whiteshell commenced in October 2017**.

b) Over the 4-year period, shipments on a total of 84 different days were received by CRL from other AECL sites, **on the majority of days (51 days or about 60% of the total) from Whiteshell**.

c) Each of the 84 shipments comprised one or more 'packages', for an overall **total of 2006 packages,of which 548 or about 27% from Whiteshell**.

d) In terms of mass, a **total of about 3240 metric tonnes**of (packaged?) radioactive waste was received by CRL from the other AECL sites, **predominantly (more than 90%) from Whiteshell**.

e) In terms of volume, a **total about 3790 m^3** of (packaged) radioactive waste were received by CRL from the other AECL sites, **again predominantly (more than 90%) from Whiteshell**.

f) The radioisotope contents of radioactive waste consignments (packages, shipments) range from one single (or one predominant) radioisotope to more complex mixes of radioisotopes that may contain different fission products, transuranic isotopes, activation products (i.e. radioisotopes generated through neutron capture by stable isotopes), radioisotopes like H-3 and C-14 that may be generated through (ternary) fission or neutron capture induced activation, and/or naturally occurring radioisotopes like Ra-226 or K-40.

g) Data blocks for radioactive waste shipments from Douglas Point, Gentilly 1, and Whiteshell are labelled “protected sensitive”. Radioisotope & radioactivity level data pairs for shipments from Douglas Point and Gentilly 1 are heavily redacted such that one or more (up to 10) radioisotope names & activity level data pairs per shipment or per package are blackened out completely. Some similar redacting, but to a lesser extent, was also done to the Whiteshell data. It looks like the redacting has been focused, among others, on rendering inaccessible data on very long-lived transuranic radioisotopes such as PU-239 , PU-240, PU-242, CM-245/PU-241, AM-243, and/or other very-long-lived radioisotopes. The presence of significant amounts of such very long-lived radioisotopes in waste packages/shipments would render these ILW type waste packages/shipments, and this may have motivated the redacting, but this is no more than a hypothesis for further examination.

Appendix C: Numbers of radioactive waste shipments and volumes (to be) shipped from Whiteshell to Chalk River

	CNL plans numbers and estimated volumes of waste shipments from WL to CRL[a]	Radioactive wastes received by CRL from WL so far	Proportion of radioactive wastes already shipped
LLW -- number of shipments	1,500		
ILW – number of shipments	500		
HLW – number of shipments	47 – 50[b]		
Total number of shipments	2,047 – 2,050	51[e] (175)[d]	 (~ 8.5%)
LLW – volume (to be) shipped (m^3)	25,500	(3,557)[d]	
ILW – volume (to be) shipped (m^3)	1,560	(18)[d]	
HLW – volume (to be) shipped (baskets)	94 – 96[c]		
Total radioactive waste volume (m^3)	27,154 – 27,156	3,500[e] (3,575)[d]	~ 13%

Endnote: In addition to the above-listed waste shipments/volumes, there may be a need to transport **intermediate-level liquid waste (ILLW)** not processed on-site at WL and/or the **residual solid waste from onsite ILLW processing** as well as an **estimated 500 m^3 of hazardous and mixed wastes**, to be shipped off-site to licenced waste receivers for treatment and/or disposition.
(Sources: CNL application for WL licence renewal for 10-yr period 01/2020 – 12/2029, 15 November 2018 [6], Appendix D
CNL CMD for licence renewal application hearing, 01Aug2019) [1])

Footnotes:

a. Based on CNL licence renewal application, 15 November 2018 [6], Appendix D; and CNL CMD for licence renewal application hearings, 30 July 2019 [1].
b. This includes an estimated 1-4 shipments of HLW removed from the 171 concrete standpipes [6]
c. This includes an estimated 2-4 baskets of HLW removed from the 171 concrete standpipes [6]
d. As per the cover letter of the CNL staff CMD dated (30 July 2019) for the WL licence renewal application hearings (02-03Oct19) indicating total waste volumes already shipped and number of shipments from WL to CRL that have already taken place,as of 15 July 2019[1]
e. This is the number of days on which (one or more) shipments were received by CRL, and the waste volumes already received for the period 01/10/2017 – 31/01/19, as per the AECL "First Release Package" [5].