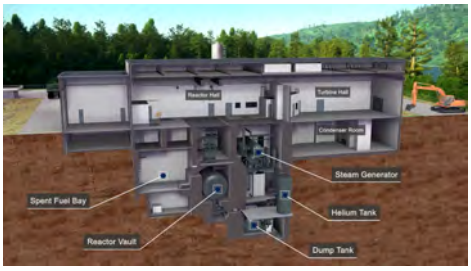
# NUCLEAR POWER DEMONSTRATION
# CLOSURE PROJECT

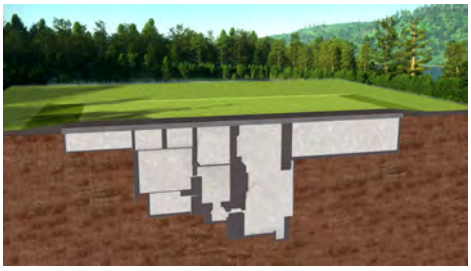
**www.cnl.ca/npd**

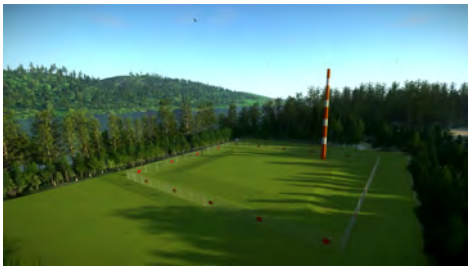
Canadian Nuclear Laboratories | Laboratoires Nucléaires Canadiens

December 2021

## NPD Closure Project Description in Brief





The proposed Nuclear Power Demonstration (NPD) Closure project is first and foremost an environmental remediation project, designed to protect the environment, including the Ottawa River. The project will significantly improve the conditions at the federally-owned NPD site in Rolphton, Ontario by enabling the safe reduction of nuclear liabilities through waste disposal.

The NPD reactor made history in 1962 when it generated electricity from nuclear power for the first time in Canada. The reactor, a prototype of the CANDU® design, operated from 1962 until it was shut down 1987, having served as a training centre for nuclear engineers and operators in Canada and around the world for a quarter of a century.

After the safe and controlled shutdown, the first stages of decommissioning were completed, including defueling the reactor and transfer of nuclear fuel and heavy water offsite site for safe storage at Chalk River. The site has been in a safe shutdown state for the last 30 years.

Ontario Hydro turned over control of the NPD site to its current owner and federal Crown Corporation, Atomic Energy of Canada Limited (AECL), in 1988, and Canadian Nuclear Laboratories (CNL) is now responsible for final decommissioning through the NPD Closure Project.

CNL has judged that in situ disposal is the best strategy for decommissioning because NPD is a small, below-ground, prototype reactor. This means the creation of a disposal facility solely for the legacy nuclear liability already at NPD. The remaining reactor components and existing waste inventory at NPD would be completely sealed by filling the underground structure with specially formulated grout to contain and isolate contaminants, ensure stability, and to reduce corrosion. The in-situ method was chosen to maximize protection of the environment and people, reduce the risk of worker exposure and limit the risks associated with activities such as dismantling the facility and movement of radioactive waste.

CNL continues to engage with local citizens, stakeholders and governments, including local Indigenous communities, to share information on the project and to hear concerns about the project, with a view to tailoring the proposal to address the issues raised.

It is expected that the decommissioning will take approximately two years to be completed, pending the Canadian Nuclear Safety Commission (CNSC) approving the environmental assessment and the project meeting all necessary licensing requirements.

The proposed disposal facility, resulting from the decommissioning, would be licensed under the Nuclear Safety and Control Act, and subject to the associated regulations and independent regulatory oversight from the CNSC.

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## NPD CLOSURE PROJECT QUICK FACTS

- NPD made history in 1962 when it generated electricity from nuclear power for the first time in Canada. It produced clean energy and served as a training facility for 25 years when, having fulfilled its purposed, it was shut down.
- NPD trained generations of nuclear engineers and helped us get where we are today with more than 60 per cent of Ontario's electricity consistently coming from carbon-free nuclear electrical power.
- The existing NPD structure sits 25 metres below grade and is built into the Canadian Shield.
- The facility was built with 8,000 cubic metres of concrete and walls up to 2.7 metres thick.
- 16,000 cubic metres of grout will be poured into the existing concrete structure to isolate and contain remaining contaminants.
- The estimated cost for in-situ disposal of the NPD reactor, including institutional control activities, is $60-$80 M. For comparison, continuing to maintain the facility in its current state of storage with surveillance is projected to cost $4.5 million per year.
- CNL has conducted more than 100 engagement activities with the public, including individual community members, government and environmental groups to share information and gain feedback on the project. Activities included public information sessions, presentations, meetings, community events, open houses and more.
- Indigenous communities are engaging with CNL on the NPD Closure Project to ensure Indigenous rights and interests are represented.
- CNL has conducted over 250 engagement activities on the NPD Closure Project with 15 identified Indigenous communities and organizations since 2016, and is committed to ongoing engagement should the project proceed.
- The facility's iconic red and white striped ventilation stack is an important roost for a migratory bird – the Chimney Swift. At any one time, there could be more than 1,000 birds at the site. The stack will be preserved to maintain what has become a habitat for one of the largest known population of Chimney Swifts in Canada. The Chimney Swift, designated a Species at Risk in Canada, use the stack as a roost when they return in spring to breed.

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# NPD CLOSURE PROJECT Q & A

**1. Why has CNL chosen to permanently close the reactor using the in-situ method, instead of completely removing it?**

The main NPD reactor components are located below ground and built into the rock of the Canadian Shield. Removing the remaining reactor structure (the fuel was removed from the NPD site in the 1980's) would be difficult and presents a higher risk to workers.

The in-situ method will reduce many of the risks to people and the environment that are associated with taking out the radioactive materials and transporting them to another location for temporary storage. There is no permanent disposal option available in Canada for reactor components, so in-situ disposal provides a safe and effective way to reduce one of Canada's nuclear legacy liabilities.

To completely seal the facility, CNL is proposing to fill the structure with custom formulated grout to help contain and isolate contaminants, ensure stability and to reduce corrosion.

This method will ensure the reactor systems and facility structure are safely encapsulated – or contained – below-grade, which limits long-term risks in the case of both normal and extreme weather events, like severe flooding.

**2. What will the site look like when the NPD closure project is finished?**

Currently, the NPD site is around 1,000 acres, however, the disposed facility will only take up a small footprint, which will be less than one per cent of the original site. When decommissioning work is complete the facility footprint will be covered with an engineered barrier designed to shed water. This area will be fenced and monitored.

The ventilation stack will remain in place, as it is habitat to a protected species, the Chimney Swift, and leaving it in place ensures the best chance for the population's survival.

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## NPD CLOSURE PROJECT Q & A

**3. Why does the International Atomic Energy Agency say in-situ decommissioning isn't a good choice?**

According to the International Atomic Energy Agency in their General Safety Requirement Part 6 – Decommissioning of Facilities, only two strategies have been adopted or considered by member states. That being immediate dismantling or deferred dismantling. The safety standard says that entombment should only be used under exceptional circumstances. Entombment is different than planned in-situ disposal. Entombment is a technique that is used typically in emergency situations to stabilize a size by encasing the facility in a long-lived material, thereby immediately stabilizing an uncontrolled condition. In-situ, as proposed by CNL for the NPD facility is a planned, engineered decommissioning approach that combines dismantling, demolition and fabrication of a permanent waste disposal facility in-situ.

CNL believes that the NPD facility a good candidate for in-situ disposal for these reasons:
- the location of the facility 25 metres below grade in bedrock;
- its thick concrete basement structure;
- the limited quantities of long-lived isotopes;
- and the remaining radioactivity is securely trapped inside the metals of the reactor components, which will take thousands of years to corrode.

The decommissioned structure, which would be licensed as a disposal facility, will only ever contain material from NPD.

**4. The reactor is right beside the Ottawa River, how are you going to protect the river?**

Drinking water is not at risk. The NPD Closure Project is designed to contain and isolate the contamination which will protect the surrounding environment.

CNL conducts regular monitoring at the NPD site, and the monitoring results continue to demonstrate safe performance and continued environmental protection at the NPD site. Monitoring will continue after the site's closure and the monitoring results will be posted on CNL's website.

CNL has undertaken thorough, detailed modeling of potential releases after the proposed closure, to understand how the plan could affect the Ottawa River. The scientific analysis demonstrates that the decommissioning project will protect the Ottawa River, with no negative impacts. The final grout design, a comprehensive study of the geology of the site, and a detailed earthquake assessment all contributed to this finding. As well, CNL will continue to have extensive monitoring systems in place, and mitigation strategies for worst case scenarios, to make sure the Ottawa River remains protected – no matter what.

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## NPD CLOSURE PROJECT Q & A

**5. What will happen to the facility after you close it? Will CNL will abandon it?**

No. The NPD site will not be abandoned following closure. It will remain under institutional controls and supervision for years to come. This includes an extensive surveillance and monitoring program to ensure the facility is performing as designed. Should any issues arise during that period, CNL will be in a position to address them. In addition, the site will remain licenced under the regulatory oversight of the Canadian Nuclear Safety Commission (CNSC).

At present, the plan states that the facility will remain under direct "institutional control" for a minimum of one hundred years. This is a minimum. Any possible eventual change in ownership or status of the site after this period would necessitate extensive consultation as well as decisions from the federal government and the CNSC.

**6. How do you know if the grouted facility can withstand a severe earthquake?**

CNL has conducted a quantitative analysis to assess how a catastrophic earthquake – one that might occur once every ten thousand years – would affect the facility. Results show that cracks would develop mainly in the areas of the NPD facility that are above the bedrock level. The grouted reactor vault would not be affected as it is well below this depth, with the grout providing increased protection against the stresses of the earthquake.

Modelling show that any impacts from such an earthquake would be well within the regulatory limits, ensuring safety of people and the environment. CNL has also conducted geological site characterization work within the last three years to strengthen our understanding of the geology around the NPD site.

**7. What is happening with the Environmental Impact Statement for the NPD Closure project?**

CNL submitted a draft Environmental Impact Statement (EIS) to the CNSC in 2017. Since that time, CNL has addressed several hundred comments and requests for information from the public, federal and provincial government agencies (including Health Canada and the Province of Quebec), stakeholders and Indigenous communities and expects to have a final version of the EIS by late 2021, with public hearings for the project anticipated for 2023.

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## NPD CLOSURE PROJECT Q & A

**8. Why is it taking so long to have the Environment Impact Statement approved?**

CNL has taken time to address several hundred comments and requests for further information received from the public, stakeholders, Indigenous communities, the CNSC and other regulators on the draft EIS.

It takes time to thoroughly research and respond to each of these comments and questions. This delay is not unusual for such unique projects, it was anticipated.

The time will allow CNL, with oversight from the CNSC, to clearly demonstrate that we have the best design possible to protect the environment and people.

**9. Why do you want to undertake this decommissioning of the NPD facility now?**

The NPD facility is no longer in use and has been shut down for the last 30 years. Previous NPD decommissioning strategies delayed closure of the NPD site until future disposal facilities became available. However, the decision was made to focus on environmental remediation in a timely manner – to take responsibility for Canada's nuclear legacy obligations now and not leave it for future generations.

**10. How can I have a say in how you are conducting this project?**

CNL has taken part in extensive engagement activities with the public, government officials and Indigenous communities.

We want to make sure that each project we undertake is thoroughly understood by members of the community. More importantly, we listen to people very carefully. And, we are willing to change our projects when stakeholders raise concerns we can act on.

CNL continues to hear from interested stakeholders and Indigenous communities and welcomes questions and concerns on the project. The environmental assessment process also has opportunities for public and Indigenous participation. Contact information and more details on how to get involved can be found at *www.cnl.ca/npd*.

**11. What about Indigenous communities? How are you ensuring their rights are protected?**

We are working very closely with Indigenous peoples and nations to ensure that their perspectives are heard. This includes ensuring that valued species are appropriately protected, and we are in discussion about potential involvement in monitoring activities as a part of the project. The environmental assessment must consider potential or established Indigenous or treaty rights pursuant to section 35 of the Constitution Act, 1982.

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# Quotes

Kristan Schruder, General Manager and Deputy VP, Environmental Remediation Management: "My job is to make sure that CNL brings the safest and most effective technologies to the decommissioning of the NPD reactor. These are proven techniques which have been used in other countries to safely retire nuclear reactors which have fulfilled their mandates, protecting both people and the environment. On a personal note, as someone who grew up locally, I am proud to be a part of closing the lifecycle of Canada's first nuclear power reactor in a way that ensures protection of future generations."

Joe McBrearty, CNL President & CEO: "CNL is conducting exciting research into new nuclear technologies for Canada's clean energy future. At the same time, we are taking care of the facilities that helped us achieve our technological edge. The NPD reactor put us in the history books, it's now time to responsibly decommission Canada's first nuclear power reactor."

David Thompson, Former Mayor of Deep River and Resident of Laurentian Hills: "In my opinion, the plan to decommission the NPD's site using the in situ approach of grout and concrete as described in the Environmental Impact Statement meets the objective of minimizing risks and has my full support."

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## About CNL

Canadian Nuclear Laboratories (CNL) is a world leader in nuclear science and technology, offering unique capabilities and solutions across a wide range of industries. Actively involved with industry-driven research and development in nuclear, transportation, clean technology, energy, defence, security and life sciences, we provide solutions to keep these sectors competitive internationally.
With ongoing investments in new facilities and a focused mandate, CNL is well positioned for the future. A new performance standard reinforced with a strong safety culture underscores every activity.
For more information on the complete range of CNL services, please visit *www.cnl.ca*.

## About AECL

Atomic Energy of Canada Limited (AECL) is a federal Crown corporation with an objective of driving nuclear innovation and cleaning up legacy wastes. AECL delivers its mandate through a long-term contract with CNL for the management and operation of its sites.

## CONTACT US


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