

# CONTACT

MAJOR PROJECTS UPDATE - CANADIAN NUCLEAR LABORATORIES

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## ENVIRONMENTAL STEWARDSHIP



Canadian Nuclear  
Laboratories

Laboratoires Nucléaires  
Canadiens

*The Nuclear Power Demonstration (NPD) reactor, Canada's first power reactor, served an important role in the training and development of engineers and operators for Canada's CANDU<sup>®</sup> reactor fleet. The facility will be safely decommissioned over the coming years. Details on page 2.*

# NPD Reactor: A milestone facility in Canadian nuclear history

At 1:31 p.m. on 1962 June 04, a switch was turned on and electricity from the 20 MW Nuclear Power Demonstration (NPD) reactor near Rolphton, Ontario flowed into the local power grid.

NPD was built out of a partnership in 1954 between AECL, Ontario Hydro and Canadian General Electric. For 25 years, NPD served as a prototype for future CANDU designs and was an important test facility for researching new fuels, materials, components and instruments. From this partnership, an entire industry has grown, providing more than 71,000 jobs and \$6.6 billion in exports in this country. Equally important, but perhaps lesser known, was that NPD was used for training generations of Canadian and international nuclear staff on the safe operations of CANDU nuclear power plants all over the world.

While AECL still owns the site, CNL is responsible for the facility, which is presently in the Storage with Surveillance phase of decommissioning under a Decommissioning Waste Facility Licence issued by the Canadian Nuclear Safety Commission (CNSC).

## Preferred Decommissioning Technique

The below grade structures, including the reactor and associated reactor systems make the NPD site an ideal candidate for in-situ decommissioning. In-situ decommissioning, cementing in place or "grouting" results in the creation of a below surface concrete monolith. The grouted surface area will then be covered with an engineered barrier to prevent the entry of surface water. This structure will provide robust and durable containment to allow for continued radioactive decay.

## Protecting Species at Risk

Nine species at risk have been confirmed present on the overall NPD site. Targeted surveys have been conducted for those species. Learn more about our efforts to protect these important species at [www.cnl.ca/NPD](http://www.cnl.ca/NPD).

### Decommissioning at NPD

At the time of NPD shutdown in 1987, deferred decommissioning was the preferred strategy for management of the site. The deferment period has allowed a significant reduction of radiation fields within the facility which helps to reduce the risks to staff working on the closure project.

The NPD site is now in an ideal strategic position for completion of the remainder of the site decommissioning. The closure project will safely reduce Canada's nuclear legacy liabilities at this property.

### Proven technology

In-situ decommissioning has been in use for over five decades in the United States. A well understood decommissioning solution, in-situ technology and expertise has been developed and grown over this period. Several sites in the United States have used this approach.

**Rolphton, Ontario**

## Safe

In-situ decommissioning provides the best decommissioning option for workers, the public and the environment. The proposed decommissioning technique minimizes safety risks; for example it will reduce the chance of radiological dose to workers, and reduces the risk of an industrial accident. It also reduces handling, packaging, temporary storage and unnecessary movement of materials; all factors which help to minimize the risk to the public and the environment.

## Environmental Footprint

The footprint of the main reactor building and ancillary buildings represent a very small portion of the larger NPD property, with the majority of the land remaining unimpacted.



## Patrick Daly NPD Closure Project

Heading up the project is Patrick Daly, a veteran of the nuclear industry, who has spent 35 years on both the 'front end' of nuclear reactor operations and the so called 'back end', decommissioning nuclear sites. He recently wrapped up his time at the Zion Nuclear site, just north of Chicago, Illinois, where he was decommissioning two Pressurized Light Water reactors.

## Environmentally Sound

The Environmental Assessment (EA) is one of the first steps in assessing CNL's decommissioning option. The EA process will determine CNL's actions, guaranteeing continued responsible environmental stewardship. CNL has a solid record of accomplishment on environmental protection. The

EA process will ensure that the best and most environmentally compatible solutions for implementing the decommissioning process is chosen. CNL's environmental policy, Environmental Management System and processes, guide, monitor and inform reporting on CNL's environmental performance.

# Near Surface Disposal Facility: A proven, environmentally sound, and safe solution

For many years, CNL has safely placed waste from its operations and from Canadian hospitals and universities in interim storage facilities. The proposed Near Surface Disposal Facility (NSDF) will provide a permanent disposal solution for waste arising from historical operations and waste generated as CNL revitalizes Chalk River Laboratories and closes the Whiteshell Laboratories and the Nuclear Power Demonstration sites.

CNL has made an application to initiate the regulatory approvals process. This includes a federal environmental assessment, for a proposed NSDF for the management of CNL's low-level radioactive waste and other suitable waste streams.

A site selection process conducted on CNL's Chalk River property has identified two candidate sites for the proposed facility, one called the East Mattawa Road (EMR) Site, and the second the Alternate Site.

CNL plans to develop the NSDF over a five-year period. In 2016 and 2017, CNL will select the facility site, undertake the environmental assessment (EA) and complete the detailed design for the facility.

After this, CNL will seek approvals from the Canadian Nuclear Safety Commission (CNSC) to construct the NSDF. Subject to receipt of CNSC approvals, CNL will begin construction of the NSDF in 2018. Facility operation is planned to begin in 2020.

## Robust and Secure

The proposed Near Surface Disposal Facility is planned to have an operating life of at least 50 years and as proposed, would be an engineered mound built at near-surface level on the Chalk River Laboratories site.

### It's proven technology

This type of disposal facility has been successfully built and operated around the world. CNL is currently building two similar facilities in the Ontario municipalities of Port Hope and Clarington to replace historic wastes generated by the former Crown corporation, Eldorado Nuclear.

Near surface technology has been demonstrated internationally and the NSDF will build on these experiences, ensuring continued responsible stewardship.

Other examples include:

- Fernald Preserve, Hamilton, Ohio, USA
- Integrated Disposal Facility, Richland, Washington, USA
- Low Level Waste Repository, Cumbria, United Kingdom
- Centre de L'Aube, France

**Chalk River, Ontario**

## Modular Design

The proposed NSDF will have an integrated disposal design made up of multiple adjoining modules. The modules will be constructed on an as needed basis.

The engineered mound will consist of:

- base liner and final cover systems,
- leachate collection and leak detection systems, and
- environmental monitoring systems.

## Waste Types

The NSDF addresses CNL's low-level radioactive waste and other suitable waste streams. Low-level waste includes slightly contaminated clothing (e.g. gloves, shoe covers) and items that could come from a wide variety of activities such as decommissioning of buildings.

## Supporting Facilities

The NSDF will include a wastewater treatment plant, as well as supporting infrastructure, such as a truck wheel wash, vehicle monitoring and weighing stations, work stations, change facilities, and security systems.



**Jim Buckley**  
**LLRW Facilities**

Jim is an experienced leader with more than 35 years in nuclear waste management and decommissioning. He has led projects across the United States (Oak Ridge, Fernald, Hanford) and the United Kingdom, (Hinkley Point, Bradwell, Bridgewater) developing integrated waste strategies to safely and securely manage solution oriented approaches to diverse decommissioning sites.

### It's safe

The public and the environment will not be put at risk as a result of construction and operation of the proposed facility.

The NSDF will be designed and operated in accordance with applicable engineering codes and best practices that will protect the environment.

Design features such as multiple liners and two leachate detection systems are just two examples of the facility's protection aspects.

Location, construction and operation is subject to a rigorous regulatory approvals process and environmental assessment.

# Whiteshell Laboratories Closure Project

## The first site in Canada to undertake decommissioning

Decommissioning of the Whiteshell Laboratories has been underway for more than a decade. In 2003, the site received approval of an overall decommissioning framework, through the completion of an environmental assessment and the subsequent issuing of a site decommissioning licence by the Canadian Nuclear Safety Commission (CNSC). Since that time, redundant buildings have been demolished, and new enabling facilities for waste handling have been planned and constructed.

Environmental performance is continuously monitored and has confirmed CNL's responsible stewardship of the site. A renewed strategic plan has been developed. The new plan will see decommissioning of the entire site complete by 2024. Planning documents to begin decommissioning of the WR-1 Research Reactor, one of the largest facilities on the site, were recently submitted to the CNSC.

### SLOWPOKE Reactor

The SLOWPOKE Demonstration Reactor (SDR) was a 2 MW, unpressurized pool-type reactor that used natural circulation of light water to remove heat from the core. In 2016 April, CNL completed all decommissioning activities of the SDR with no lost time or recordable injuries, and no radiological incidents.

#### Location

Established in the 1960's, the Whiteshell Laboratories campus is located approximately 10 km west of Pinawa, MB and 100 km northeast of Winnipeg, on the east bank of the Winnipeg River.

#### Unique facilities and laboratories

When in service, the Whiteshell Laboratories comprised both nuclear and non-nuclear operations. Major facilities included the Whiteshell research reactor (WR-1), shielded facilities, research laboratories and radioactive waste management areas.

Research and development operations at Whiteshell Laboratories have concluded and the facilities are now being decommissioned by CNL acting under a licence from the CNSC.

*Pinawa, Manitoba*

## Building 505

In 2016 April, using all in-house resources and equipment, the project team safely demolished Building 505, the former concrete test facility, ahead of schedule and below budget. All waste from the demolition project was carefully sorted and where applicable sent offsite for recycling or managed on-site in the Whiteshell Laboratories waste management area. This endeavour was a pilot project designed to test the internal capabilities of the Whiteshell Laboratories team; it proved to be extremely successful.

## Building 300

Decommissioning of the primary research laboratory for the Whiteshell Laboratories site is well underway. Comprising an area of approximately 17,000 m<sup>2</sup>, the complex housed more than 170 labs, approximately 400 office spaces, mechanical rooms and a high bay area for large-scale engineering experiments.

## WR-1 Reactor

At roughly 60 MW, the initial focus for WR-1 was supporting research into organically-cooled reactor technology; the WR-1 reactor was also used for irradiations and experimental work. Today the proposed decommissioning of the WR-1 reactor is undergoing an Environmental Assessment process.

Material generated during decommissioning activities is categorized according to its level of radioactivity, segregated and packaged. Clean material (free of radioactive contamination) that can be re-used or recycled is sent off-site; clean waste that is non-reusable is placed in the on-site landfill or sent to an authorized off-site waste management facility. All radiologically contaminated materials are safely removed and stored at the on-site waste management area.



## Dan Coyne WL Closure Project

No stranger to projects of this scope, Dan joins CNL with over 30 years experience in nuclear and decommissioning projects. He recently led the decommissioning of the West Valley Nuclear Demonstration Project site in western New York.



*Pictured: The Environmental Stewardship Council visits the NPD reactor in Rolphton, Ontario.*

## Engaging our communities

### What is an Environmental Assessment (EA)?

Consideration for the environment is part of every project undertaken by CNL. The projects featured in this issue are subject to federal assessment under the Canadian Environmental Assessment Act.

As part of the project proposal phase the EA process thoroughly assesses and predicts environmental effects of proposed initiatives. The EA:

- provides opportunity for stakeholder input,
- identifies potential adverse environmental effects,
- proposes measures to mitigate adverse environmental effects,
- predicts whether there will be significant adverse environmental effects, after mitigation measures are implemented, and, includes a follow-up program to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures.

For more information on the EA process visit: [www.ceaa.gc.ca](http://www.ceaa.gc.ca)

### Open Houses and Public Information Sessions

CNL welcomes the opportunity to discuss the projects featured in this issue. Please join us at one of the events below, and we would be happy to answer your questions and listen to your feedback.

 Rapides-des-Joachims, Quebec  
Town Hall  
June 20, 6:00 - 9:00 p.m.

 Deep River, Ontario  
J.L. Gray Building  
June 21, 6:00 - 9:00 p.m.

 Stonecliffe, Ontario  
Township Hall & Community Centre  
June 22, 6:00 - 9:00 p.m.

 Sheenboro, Quebec  
Community Centre  
June 29, 6:00 - 9:00 p.m.

 Pembroke, Ontario  
Best Western Pembroke Inn  
July 6, 6:00 - 9:00 p.m.

 Petawawa, Ontario  
Petawawa Civic Centre  
July 7, 6:00 - 9:00 p.m.



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