Intervention by the Canadian Nuclear Society (CNS)
Before the Canadian Nuclear Safety Commission (CNSC)

Application by Canadian Nuclear Laboratories (CNL)
To renew to April 1, 2018 the operating licence for the Chalk River Laboratories
(Ref 2018-H-01)

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Introduction

The Canadian Nuclear Society (CNS) views with great interest the renewal of the operating licence for the Chalk River Laboratories under review today during Day 2 of the hearings by the Canadian Nuclear Safety Commission (CNSC). In this short paper, the CNS will present some perspective on the importance of the Chalk River Laboratories and its central role in nuclear research and development in Canada and in the province of Ontario.

The specific focus of this intervention by the CNS is the renewal of the Chalk River site and the construction of the Near Surface Disposal Facility (NSDF).

The licensing of a nuclear facility is not an abstract activity. To operate, all regulated nuclear facilities in Canada must meet the safety performance requirements of the CNSC. However, all regulated nuclear facilities in Canada exist for important commercial, research, or energy supply reasons. This means that licensing decisions have direct research, technical and commercial consequences. It is the purpose of this paper to provide the views of the CNS on the importance of these licensing decisions.

The CNS is Canada's learned society for the nuclear industry. We are a not-for-profit organization representing more than 1,000 professionals, scientists and other researchers, engineers and other nuclear professionals engaged in various aspects within Canada's nuclear industry. We do not represent any company or other organization within the industry. The CNS believes that the views of Canada's nuclear professionals, as embodied by its learned society, may provide useful assistance to the CNSC in its deliberations.

Nuclear Technology in Canada

Nuclear technology plays an important role in Canada, and it has done so for more than 70 years. Canada was the second nation to demonstrate controlled fission with the startup of the ZEEP reactor at Chalk River Laboratories. It was one of the first nations to build a demonstration nuclear power reactor, the NPD reactor at Rolphton, Ontario. With the eight nuclear reactors at Bruce, Canada has the world's largest operating nuclear generating facility.

As a Tier-1 nuclear nation, Canada is one of the very few nations of the world in which all of the following activities take place:

- Design of nuclear reactor technology
- Construction and operation of nuclear power plants
- Uranium mining, fuel fabrication and production
- Medical and industrial isotope production
- Decommissioning, environmental remediation and high level, long term waste management
- Full scope nuclear laboratory services and R&D
- Post-secondary nuclear education up to doctorate level.

Canada is the second largest producer of commercial uranium in the world, with annual production averaging approximately 10,000 tonnes of uranium consistently over the past 40 years. And it has all of the facilities and technology to provide the full spectrum of uranium supply, both to meet Canada's needs and to supply uranium for nuclear power in other nations as well.

The success of Canada's nuclear reactor technology has been shown by its extensive, safe and economic operation in Canada. It has also been acquired by a number of other nations as well, including South Korea, Romania, Argentina and China. In all of these countries, CANDU technology has been shown to be both reliable and economic, providing large quantities of electricity to meet these nations' energy needs. Canada's CANDU technology was also adopted by India and Pakistan, and in the case of India, their heavy water reactor technology is to this day the mainstay of that country's commercial power program.

Canadian Nuclear Research and Development

There are many centres of nuclear research and development across Canada. However, Chalk River Laboratories, operated by Canadian Nuclear Laboratories is the centerpiece of Canada's nuclear research infrastructure. And it has been so since the 1940s, emerging out of various wartime projects such as the Montreal Laboratories. For more than 65 years, Chalk River has been the centre of nuclear development based on its research reactors ZEEP, NRX and NRU. It has been the focus of National Research Council (NRC) nuclear research programs. All this infrastructure has attracted over the decades thousands of experts and their research from across Canada and around the world.

This research has produced many different nuclear related technologies including:

- Canada's CANDU power reactor technology;
- the world's first commercial small modular reactor, the SLOWPOKE;
- medical research and applied technologies using radioisotopes;
- innovation in the development and use of neutron spectroscopy for the study of the internal structure of solid materials;

To this day, Chalk River remains one of the world's largest and most active sites for nuclear research and development.

In 2015, the Government of Canada made the decision that Chalk River Laboratories should be retained in public sector ownership but operated by a private management team. The federal government provided the new management team with its direction as to what was to be achieved with the new organization. In providing funding for CNL, the government stated that its wishes were that the site would be renovated and expanded to new nuclear research and development activities while retaining its capacity to sustain established technology.

It should be noted here that CNL's responsibilities are not limited to the Chalk River site but extend to all of the holdings of Atomic Energy of Canada Limited, including Whiteshell Laboratories in Manitoba and now shut down facilities across Canada such as Gentilly 1 in Quebec, and the CANDU prototypes Douglas Point and NPD-2 in Rolphton.

Accordingly, CNL prepared a plan for managing all these facilities, and it tabled its first plans in 2016. What concerns us today is the large-scale plan for the redevelopment and renewal of Chalk River Laboratories.

Renewal at Chalk River

Since its inception in the late 1940s, the Chalk River site has grown incrementally over the years. This incremental growth took place as the mandate for nuclear research and development grew to the point where over 100 buildings were located at CRL. In addition, CRL was required to accept radioactive waste material from a variety of government and medical sources over the decades.

To comply with the federal Government's requirements, as noted above, CNL prepared its plan for renewal of the site. Instead of hundreds of separate buildings and structures, CNL would instead establish a research campus with many fewer and larger buildings better suited to modern research and development requirements. CNL, in formulating its plans, both expected and planned for the disposal of the large quantity of low level radioactive waste that would be created by this renovation of Chalk River. This low-level waste would include both new waste material from the demolition of old structures as well as part of the historic waste located for years on the site. It should be noted that the federal government has agreed to the plan tabled by CNL.

Commented [PE1]: The legacy waste includes higher level waste , not just low-level.

It is the observation of the CNS that CRL is indeed in dire need of renovation, and the CNS credits the federal government for acknowledging this and for making available the funding that would be required. . The CNS would further observe that research purposes for activities like nuclear are best suited in large . The CNS would further observe that research purposes for activities like nuclear are best suited in large facilities where security of material and protection of workers and the public can be both more effective and more efficient.

The CNS therefore agrees that the federal government acted responsibly in deciding that CRL needed renovation to continue to be effective as a research centre. The CNS also agrees that the management plan developed by CNL to meet the government's objectives was and is sound. The CNS notes that the plan has already begun to take effect with the opening of the new Harriet Brooks Laboratory.

Near Surface Disposal Facility (NSDF)

Before a site can be renovated, consideration must be given to scrap material that will be produced in removing old structures. The CNS observed with interest the steps taken by CNL to assess both the quantity and the radioactivity levels of the scrap material that would be produced by tearing down its large inventory of old buildings. The CNS also observed the steps taken by CNL to assay and quantify the amounts of historic low level radioactive waste stored on the CRL site.

Based on those assessments, the proposed solution by CNL was the construction of the NSDF. As noted above, CNL has characterized the radioactive materials from all its activities to determine which would be appropriate for long term storage of low level radioactive materials. Under CNL's proposed plan, operation of the NSDF would begin in 2040 and be complete by 2070. At that time, the facility would be closed and long-term monitoring commence. The CNL plan provides for up to 300 years of institutional control and monitoring. This is consistent with plans for the long-term storage of radioactive waste from power reactors, as required by legislation and for which the Nuclear Waste Management Organization (NWMO) is currently assessing sites in willing communities.

Commented [PE2]: We might want to include this for perspective, although I'm not wedded to the suggestion.

With the NSDF, CNL will be establishing a dedicated facility not just to manage historic waste material from nuclear research programs but all of the wastes from hospitals and universities generated over the past six decades. For the first time, all Canadians can know what quantities of low level wastes have been generated and where and how they are, and will continue to be managed on a permanent basis.

It should be observed that one of the principal potential environmental hazards of such a facility is leakage to the surroundings via ground water transport. It is the view of the CNS that CNL has considered carefully this possible problem and that the solution it proposes is appropriate and sufficient.

The CNS notes that in terms of technology that CNL is not actually proposing anything new or surprising with the NSDF. Very similar methods of containment of low level radioactive materials have been proposed and implemented at places like Port Hope, Ontario. These similar methods have been recommended by their specific environmental assessments, accepted by the federal government under Canada's environmental assessment legislation requirements, and licensed to operate by the CNSC.

Conclusions

1. The CNS accepts that CNL has provided a safe and appropriate proposal for management of its low level radioactive wastes.
2. The CNS agrees with the government of Canada that CRL is in need of significant renovation if Canada's nuclear research and development is to continue in its world-leading capacity.
3. The CNS agrees that CNL's plan for restoration of the CRL site is appropriate.
4. The CNS therefore supports CNL's request for an operating licence from the CNSC for a 10-year duration.