Canadian Nuclear Safety Commission | Commission canadienne de sûreté nucléaire

CMD 22-H7.5

File / dossier : 6.01.07
Date: 2022-03-05
Edocs: 6756766

Oral presentation

Written submission from the Canadian Nuclear Society

Exposé oral

Mémoire de la Société nucléaire canadienne

In the Matter of the

À l'égard des

Canadian Nuclear Laboratories (CNL)

Laboratoires Nucléaires Canadiens (LNC)

Application from the CNL to amend its Chalk River Laboratories site licence to authorize the construction of a near surface disposal facility

Demande des LNC visant à modifier le permis du site des Laboratoires de Chalk River pour autoriser la construction d'une installation de gestion des déchets près de la surface

Commission Public Hearing
Part 2

Audience publique de la Commission
Partie 2

May and June 2022

Mai et juin 2022

Canada

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

Application Canadian Nuclear Laboratories (CNL)
For the assessment of its proposed Near Surface Disposal Facility (NSDF)
(Ref 2022-H-07)

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Introduction

The Canadian Nuclear Society (CNS) views with great interest the proposal by Canadian Nuclear Laboratories (CNL) for the Near Surface Disposal Facility (NSDF) by the Canadian Nuclear Safety Commission (CNSC). In this short paper, the CNS will present its independent and professional perspective on the importance of the NSDF as pertains to nuclear science in Canada.

The CNS is Canada's learned society of nuclear science and technology professionals. We represent more than 1,000 professionals, scientists and other researchers, engineers and other nuclear professionals engaged in various aspects within Canada's nuclear industry. Our mandate is to provide accurate and objective information on nuclear science, engineering and technology. 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.

It is the purpose of this submission to provide our Society's professional views on the importance of these licensing decisions.

Nuclear Power in Canada

Nuclear technology plays an important role in Canada, and it has done so for more than 60 years. Canada was the second nation after the USA and its 1942 Chicago Pile to demonstrate controlled fission with the startup of the ZEEP reactor at Chalk River Laboratories (CRL), currently known as Canadian Nuclear Laboratories (CNL). Moreover, Canada was one of the first nations to build a demonstration nuclear power reactor, the NPD reactor at Rolphton in 1962. And it was the second nation in the world to build and operate a multi-unit commercial nuclear power station, Pickering NGS.

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 and 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. Other than enrichment 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 plants in other nations as well.

Canada is one of the very few nations to innovate, develop and deploy a domestic nuclear reactor technology, the CANDU, and its success has been shown by its extensive, safe, and economic operation in Canada as well as 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 baseload 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.

The following is a list of operating CANDU reactors, both in Canada and around the world.

Table I: CANDU Nuclear Reactor Performance

Reactor	In Service	Capacity (MW)
Point Lepreau	1983	680
Wolsong 2	1997	730
Wolsong 3	1998	729
Wolsong 4	1999	730
Embalse	1984	648
Cernavoda 1	1996	706
Cernavoda 2	2007	705
Qinshan 4	2002	700
Qinshan 5	2003	700
Pickering 1	1971	542
Pickering 4	1973	542
Pickering 5	1983	540
Pickering 6	1984	540
Pickering 7	1985	540
Pickering 8	1986	540
Bruce 1	1977	825
Bruce 2	1978	825
Bruce 3	1978	825
Bruce 4	1979	825
Bruce 5	1985	872
Bruce 6	1984	872
Bruce 7	1986	872
Bruce 8	1987	872
Darlington 1	1992	934
Darlington 2	1990	934
Darlington 3	1993	934
Darlington 4	1993	934

CNS Nuclear Canada Yearbook, 2019.

In total, these reactors have produced more than 3200 TWh of electricity during their years of operation.

Importance of Canadian Nuclear Laboratories to Canada

The Current Situation

Canadian Nuclear Laboratories (CNL) formerly known as Chalk River Laboratories (CRL), located near the town of Deep River, Ontario, is the largest nuclear research facility in Canada. It is also the largest publicly owned physics research facility of any kind in Canada. CRL was created during the Second World War as a location for Great Britain's participation in the Manhattan Project. This came about after the decision to move the research initiatives from the Montreal Laboratories in Montreal to a new site north of Ottawa.

Since that time, all of the major developments of basic nuclear science have come from the former CRL. These have included basic research and development of nuclear medicine, production of radioisotopes used in nuclear medicine, research of materials and testing under neutron bombardment, neutron scanning of interior structures of solid materials, testing and development of nuclear fuels, materials and components for power generation.

Thus, CNL/CRL is an old nuclear research site, one of the oldest in the world. This is highly relevant to the need for NSDF. As a site in use for more than 80 years, there are significant amounts of low-level nuclear materials deposited over the years by methods such as burial trenches in sand. In addition, many of the buildings of CRL are old, some more than half a century, and are now being replaced with new buildings.

Government Policy Change

In 2015, the Government of Canada selected a coalition of private companies with experience in managing a nuclear laboratory, to form a partnership now called Canadian Nuclear Laboratories (CNL). The purpose of this new entity was to operate CRL and be responsible for meeting the requirements of its operating licence. In turn, Atomic Energy of Canada Limited became the holding company to administer the responsibilities of the shareholder, the Government of Canada.

At that time, the government determined that CRL needs to be redeveloped to better conduct its mandate of nuclear research and development. This requires, *inter alia*, the construction of new research facilities in modern premises better suited to the needs of modern research. In addition, the redevelopment should also improve the management and control of its historic radioactive wastes impounded at various locations on the property.

The combination of these two mandates meant the necessary construction of a new facility to manage low level wastes. This would include both old building materials with low levels of contamination as well as historic wastes of similarly low levels of contamination.

The Importance of NSDF

Renewal of the Canadian Nuclear Laboratories is essential if Canada is to retain its nuclear research capacity. Stated simply, the old lightly contaminated building materials must be removed from where they are now located to provide room for new development. The first of these new buildings can be found in the Harriet Brooks laboratory and the main administration building.

But much more work remains to be undertaken and completed to revitalize the CNL nuclear campus. What also remains is proper storage of the low-level historic waste buried at CNL.

It is the conviction of the CNS that completion of NSDF will:
1. follow industry best practices at similar nuclear laboratories around the world, such as Savannah River and Oak Ridge National Laboratories in the United States;
2. allow improvement in the quality of nuclear science research into clean energy;
3. allow research and development of new materials of broad application across most of Canada's industrial and commercial economy;
4. allow improved environmental protection through the removal of old buildings in poor condition;
5. allow improved environmental protection through the proper storage of historic radioactive waste materials.

It is also the view of the CNS that opposition to NSDF means:
1. Canada being an outlier among its peer nations in terms of industry best practices in managing a nuclear laboratory and its attendant nuclear waste.
2. *de facto* opposition to nuclear research and development in Canada;
3. *de facto* opposition to improving the research facilities of Canada's largest physics research centre;
4. *de facto* opposition to improving environmental protection, for both water and soil, from radioactive materials.

It is the understanding of the CNS that both the regulator, the Canadian Nuclear Safety Commission (CNSC) and CNL have achieved agreement on the standards that NSDF will have to meet to ensure its acceptability for licensing as a nuclear facility. Based upon the assumption that CNL will meet or exceed all regulatory requirements, the CNS believes that the project should proceed promptly as outlined in the CNL proposal.

Therefore, the CNS supports the application by CRL for its proposed NSDF.