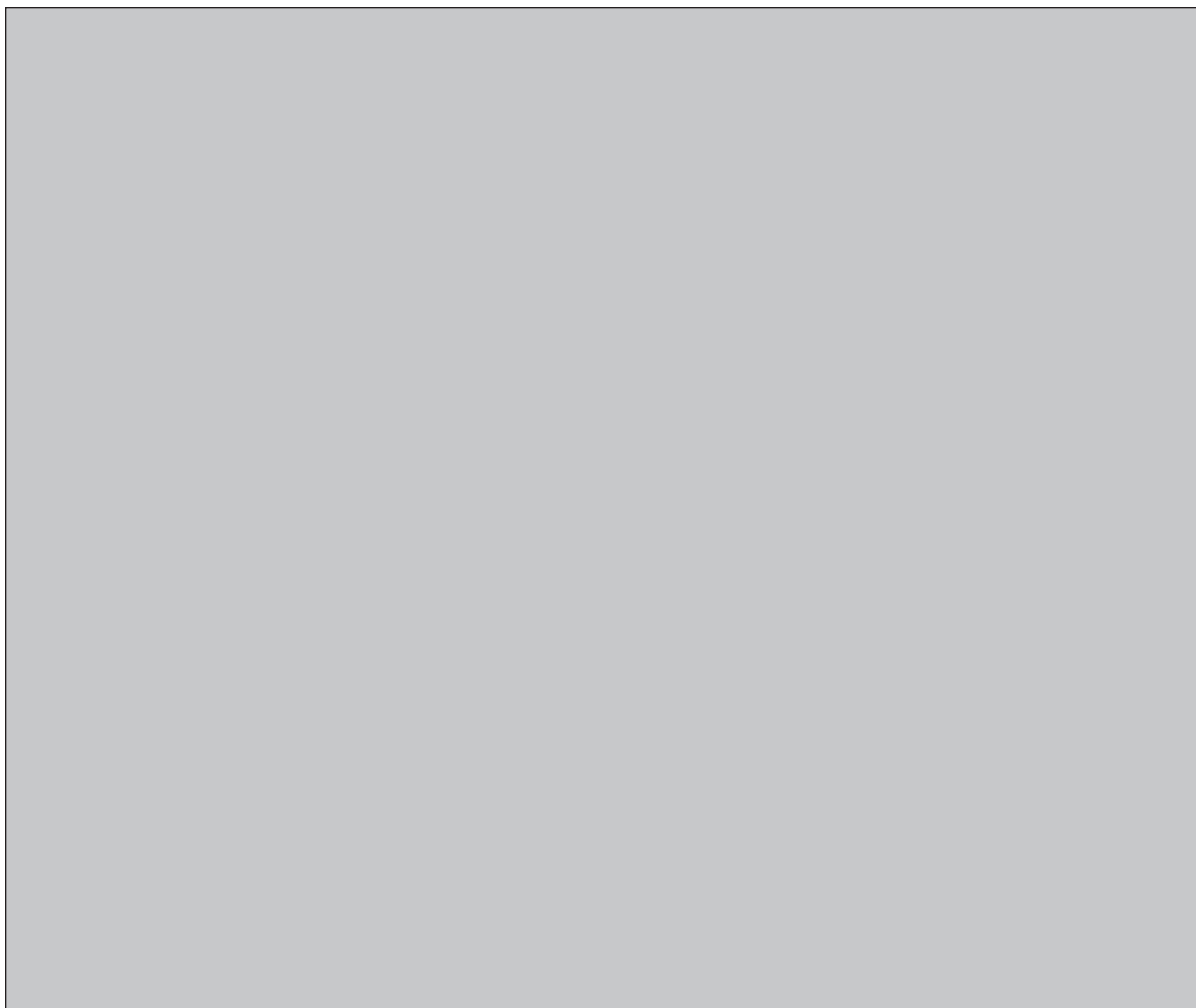


NWMO BACKGROUND PAPERS**7. INSTITUTIONS AND GOVERNANCE****7-9 REVIEW OF THE CNSC LICENSING PROCESS IN RELATION TO
SPENT FUEL MANAGEMENT**

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International Safety Research



NWMO Background Papers

NWMO has commissioned a series of background papers which present concepts and contextual information about the state of our knowledge on important topics related to the management of radioactive waste. The intent of these background papers is to provide input to defining possible approaches for the long-term management of used nuclear fuel and to contribute to an informed dialogue with the public and other stakeholders. The papers currently available are posted on NWMO's web site. Additional papers may be commissioned.

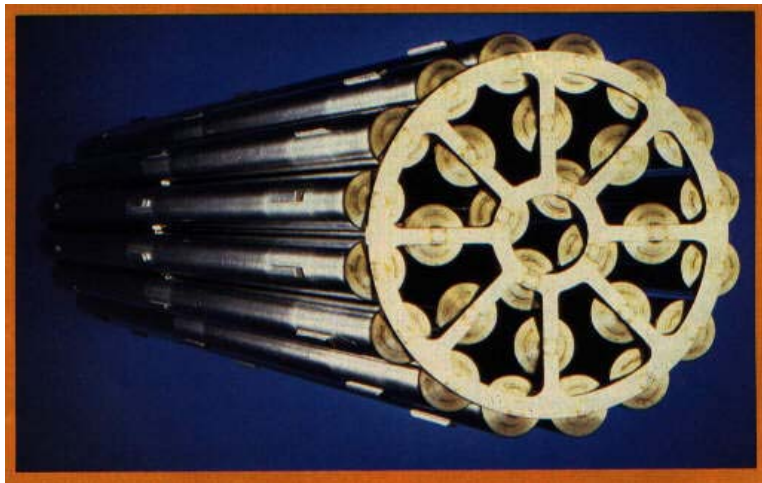
The topics of the background papers can be classified under the following broad headings:

1. **Guiding Concepts** – describe key concepts which can help guide an informed dialogue with the public and other stakeholders on the topic of radioactive waste management. They include perspectives on risk, security, the precautionary approach, adaptive management, traditional knowledge and sustainable development.
2. **Social and Ethical Dimensions** - provide perspectives on the social and ethical dimensions of radioactive waste management. They include background papers prepared for roundtable discussions.
3. **Health and Safety** – provide information on the status of relevant research, technologies, standards and procedures to reduce radiation and security risk associated with radioactive waste management.
4. **Science and Environment** – provide information on the current status of relevant research on ecosystem processes and environmental management issues. They include descriptions of the current efforts, as well as the status of research into our understanding of the biosphere and geosphere.
5. **Economic Factors** - provide insight into the economic factors and financial requirements for the long-term management of used nuclear fuel.
6. **Technical Methods** - provide general descriptions of the three methods for the long-term management of used nuclear fuel as defined in the NFWA, as well as other possible methods and related system requirements.
7. **Institutions and Governance** - outline the current relevant legal, administrative and institutional requirements that may be applicable to the long-term management of spent nuclear fuel in Canada, including legislation, regulations, guidelines, protocols, directives, policies and procedures of various jurisdictions.

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REVIEW OF THE CNSC LICENSING PROCESS IN RELATION TO SPENT FUEL MANAGEMENT



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EXECUTIVE SUMMARY

INTRODUCTION

The Nuclear Waste Management Organization (NWMO) was established to recommend a long-term approach for managing used nuclear fuel produced by Canada's electricity generators. Its methodology includes public consultation and the commissioning of a number of background papers on the various legislative, social, ethical, technical and economic aspects of long-term fuel management options.

This paper examines the CNSC licensing process that may apply to the preparation, construction and operation of facilities for the long-term management of used nuclear fuel. The CNSC is exclusively responsible for the licensing of nuclear facilities. However, the CNSC licensing process takes into account, when applicable, the results of an environmental assessment. Therefore, this paper also examines how the environmental assessment process is incorporated into the CNSC licensing process.

The aim of this paper is to:

- a. Describe and explain the current regulatory approach for licensing facilities for the long-term management of used nuclear fuel based on existing regulatory requirements and on recent experience with dry-fuel storage at Canadian nuclear power reactor sites; and
- b. Discuss how this approach may apply to the future implementation of a long-term fuel management strategy.

LEGISLATION AND ROLES

The paper summarizes some of the key legislation that affects the licensing process. Detailed descriptions are contained in other NWMO background documents.

Canadian Nuclear Safety Commission (CNSC)

The CNSC is responsible for awarding licenses to prepare, construct, operate, decommission and abandon nuclear fuel management facilities. The CNSC is also a Responsible Authority (the organization required to ensure that the assessment is carried out in compliance with the Act) under the Canadian Environmental Assessment Act (CEAA) for proposed nuclear fuel management projects. In past projects, the CNSC has so far been the only Responsible Authority within the federal government. However, this may not necessarily remain the case in future projects on long-term nuclear fuel management.

Canadian Environmental Assessment Agency

The Agency is responsible for administering the environmental assessment process, providing guidance on, and promoting/monitoring compliance with the CEAA.

Other federal government departments and agencies

Other federal departments and agencies may play a significant role in the licensing process through their involvement as Responsible or Federal Authorities, which are ministers of the Crown, agencies, departments and departmental corporations of the Government of Canada, or any other body prescribed by regulations, which have a role to play in the environmental assessment).

Provincial and municipal

The provincial governments are responsible for administering provincial environmental processes and ensuring compliance with applicable provincial legislation regarding proposed fuel management projects. Municipal legislation must also be satisfied.

Proponents

The generators and owners of spent fuel are the ones responsible for its long-term management. They are therefore proponents.

The Nuclear Waste Management Organization (NWMO) is responsible for investigating approaches for the long-term management of Canada's used nuclear fuel, and for implementing the government's preferred option. The NWMO is therefore the main proponent for the licensing of a long-term fuel management solution. However, it is likely that nuclear utilities will maintain a prominent role as proponents.

LICENSING PROCESS FOR FUEL MANAGEMENT FACILITIES

The Nuclear Safety and Control Act (NSCA) is the legislation passed by the government of Canada to regulate nuclear practices. According to this Act, nuclear facilities are divided into two categories: Class I and Class II. Class I nuclear facilities have been further subdivided to clarify the distinctions between various operations. Class IA covers facilities such as reactors, while Class IB applies to facilities such as medical isotope producing facilities and uranium processing facilities. Class II facilities, which present lower risks, include accelerators and medical and industrial irradiators.

Nuclear fuel management facilities are considered Class I facilities. Hence, the requirements described in Class I Nuclear Facilities Regulations, articles 3 to 8, apply. These describe the regulatory requirements for obtaining:

- a. a License to Prepare Site;
- b. a License to Construct;
- c. a License to Operate;
- d. a License to Decommission; or
- e. a License to Abandon.

The licensing process for fuel management facilities follows consistent guidelines but it remains flexible and adapted to the requirements and needs of each situation. The process is therefore defined to a certain degree on a case-by-case basis. Any license requires the submission of

licensing documentation that describes, in varying details, the characteristics of the facility, its operation and its impact on the environment. A detailed list of requirements is contained in the regulation for Class I facilities. This report describes each requirement.

To get a license, projects must satisfy the requirements of the Canadian Environmental Assessment Act. In practice, since much of the technical work required for the environmental assessment is also required for the CNSC licensing, this means that the CNSC licensing process for a used fuel storage facility is conducted in parallel with an environmental assessment process. The environmental assessment process requires public consultation and can take considerable time. Therefore, it is in the interest of the proponent to initiate its own program of public consultation and dialogue early.

The CNSC licensing process (as distinct from the environmental assessment process) focuses on the design, engineering and safety aspects of the proposed facility. Public consultation is not required until the final approval stage. The review of this information is internal to the CNSC and is conducted in concert with the proponent. The process is iterative. It involves several meetings between the proponent and the CNSC staff usually instigated by the proponent. It can take considerable time unless there is a common understanding on the part of the proponent and the CNSC staff on requirements and acceptability criteria.

When both the environmental assessment process and the CNSC staff review of the licensing submission have been successfully completed, a recommendation is prepared by the CNSC staff and a CNSC public hearing is held. Following this hearing, assuming that the CNSC agrees with the recommendation of its staff, a license is issued.

The environmental assessment process is described in detail in other NWMO background documents, as referenced in the main report. This report contains a summary of the main steps based on experience gained in the recent review of used fuel storage facility projects.

CURRENT EXPERIENCE WITH CANADIAN LICENSING OF NUCLEAR WASTE FACILITIES

Since the new Acts have been in effect (NSCA and CEAA), several used-fuel management projects have been submitted for licensing, including:

- a. the Darlington Used Fuel Dry Storage site;
- b. the Pickering Waste Management Facility phase II;
- c. the Gentilly-2 modification of the dry radioactive waste and fuel storage facilities;
- d. the Point Lepreau Generating Station (PLGS) Solid Radioactive Waste Management Facility (SRWMF).

Although these projects are quite different from the licensing of a facility for the long-term management of nuclear fuel, the process followed provides some insight on what can be expected for the latter. This report provides a brief description of these projects in terms of process. Two examples are examined in greater detail: one that is still in progress (Gentilly 2) and one that has recently been completed (PLGS).

RELEVANCE TO THE NWMO MANDATE

Current trends that may affect future implementation of the licensing process for used fuel storage facilities are discussed. They include the following:

- a. There are increased efforts to harmonize the federal and provincial environmental assessment processes. New agreements are expected to be signed, for example with the province of Quebec.
- b. A CNSC/federal working group is in the process of more systematically defining the licensing process for nuclear fuel management facilities.
- c. There is an increasing emphasis on public consultation before the key stages of a project can be approved.
- d. It is likely to remain simpler to modify a license than to obtain a new license for a new site. This process may be further streamlined as discussions are currently taking place within the CNSC to allow a delegated officer to approve environmental assessment guidelines.

The environmental assessment process for long-term fuel management options will probably dominate the overall licensing process even more than it has in recent years. It is likely that it will involve at least a comprehensive study or panel review. The CNSC may not be the only federal Responsible Authority. Several provinces are likely to be involved regardless of the option selected.

For options other than the deep geological disposal of spent nuclear fuel, there are still many technical issues that need to be analyzed and critically reviewed. These include, for example:

- a. Long-term behaviour of fuel storage structures and long-term environmental effects;
- b. For storage on reactor sites, operation of the facility after the nuclear reactor has been decommissioned;
- c. Security; and
- d. For off-site storage, transport of the used nuclear fuel.

The following Table summarizes some of the key safety and environmental assessment features that may have a major impact on the licensing process for the three main options considered by the NWMO.

Option	Safety assessment	Environmental assessment
Storage at nuclear reactor sites	The technical concept has been demonstrated in Canada. It appears acceptable for interim storage. However, safety assessments will need to address the long-term behaviour and safety of structures as well as the long-term operations, maintenance and security aspects.	Some environmental assessments have already been conducted. Screening assessments have been acceptable for interim storage but long-term storage could very well require a comprehensive assessment, review panel or mediation. Studies will also need to reflect results of safety assessment on evaluation of long-term environmental effects.
Centralized storage	The technical concept has not yet been demonstrated in Canada. Transport of the used fuel is likely to be a major concern.	No environmental assessment has yet been performed. Comprehensive assessment, review panel or mediation is most likely to be required.
Deep geological disposal	The concept had been adequately demonstrated from a technical perspective for a conceptual stage of development (Seaborn). A detailed analysis will still be required based on the details of the disposal site and method selected. Transport of the used fuel is likely to be a major concern.	Technical environmental studies have been conducted. However, public concern has not been adequately addressed. Comprehensive assessment, review panel or mediation is most likely to be required.

This report also identifies key factors, based on recent experience, that determine the effectiveness of the licensing process. Most are related to the conduct of the environmental assessment, which, as discussed before, represents the critical path for the approval of the license for a used-fuel storage strategy. These success factors are only some of the elements that should be considered by the NWMO in the planning and implementation of a licensing program for the long-term management of used nuclear fuel. They include:

Key success factors are examined. They include:

- a. Early identification of the need for environmental assessment at every stage of the project;
- b. Harmonized federal and provincial processes;
- c. Positive dialogue between the proponent, federal, provincial and municipal authorities.
- d. Start public consultation and dialogue early.
- e. Establish a tight control over design changes.
- f. Establish a realistic time frame.

SUMMARY AND CONCLUSION

The licensing process for the long-term management of used nuclear fuel is not yet fully defined and is likely to be determined based on the long-term management option selected. Experience with licensing of fuel management facilities under the new *Nuclear Safety and Control Act* and the revised Canadian *Environmental Assessment Act* is limited, but it provides a basis for the process that could be applied to long-term management options. The licensing process is likely to follow a dual track: the environmental assessment, which is a prerequisite to obtaining a license, and the technical assessment by the CNSC, which eventually leads to the license. The two processes are inseparable, given that the result of the environmental assessment is a key element considered by the CNSC before a license is awarded.

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REVIEW OF THE CNSC LICENSING PROCESS IN RELATION TO SPENT FUEL MANAGEMENT

1. INTRODUCTION

1.1 Background

Used nuclear fuel generated by Canadian nuclear utilities has so far been stored in pools and dry storage facilities located on power reactor sites. Dry storage on licensed sites is deemed to be an interim strategy, currently licensed for 50 years. Therefore, a long-term used fuel management strategy is required. Atomic Energy of Canada Ltd. (AECL) conducted extensive technical studies of a deep geological burial concept, including experiments conducted at the Underground Research Laboratory (URL) near Pinawa, Manitoba. The Seaborn Panel reviewed this concept and, in March 1998, found that although the concept had been adequately demonstrated from a technical perspective for a conceptual stage of development, it had not been demonstrated to have the broad public support or acceptability required to be adopted as Canada's preferred approach for managing nuclear fuel wastes.

The Nuclear Waste Management Organization (NWMO) was established to recommend a long-term approach for managing used nuclear fuel produced by Canada's electricity generators, and to implement the approach selected. Its methodology includes public consultation and the commissioning of a number of background papers on the various legislative, social, ethical, technical and economic aspects of long-term fuel management options.

This paper examines the licensing process that may apply to the preparation, construction and operation of sites and facilities for long-term used fuel management. The CNSC is exclusively responsible for the licensing of nuclear facilities. However, this licensing process takes into account, when applicable, the results of an environmental assessment. Therefore, this paper also examines how the environmental assessment process is incorporated into the CNSC licensing process.

1.2 Aim and scope

The aim of this paper is to:

- a. describe and explain the current regulatory approach for licensing sites and facilities for the management of used fuel based on existing regulatory requirements and on recent experience with dry-fuel storage at Canadian nuclear power reactor sites; and
- b. discuss how this approach may apply to the future implementation of a long-term fuel management strategy.

This paper focuses on the CNSC licensing process driven by the federal government Acts and regulations. The Environmental Assessment process has a major impact on the CNSC

licensing process. In that context, it is also examined from the perspective of how it influences the CNSC licensing process. However, this document does not contain a detailed description of all aspects of the Environmental Assessment process.

Any long-term fuel management project will also need to meet municipal and provincial requirements; this paper does not address these.

This paper also does not address the NWMO process for selecting a site or for selecting the best strategy and the region for implementation. Nor does it address in detail the following, which are covered in other background documents:

- a. legislation;
- b. safety analysis; and
- c. the public consultation process, which is also an integral part of the process required for obtaining a license.

This document should be seen as a guide to understanding the steps that will be required, not an in-depth discussion of the details of each step.

2. APPLICABLE LEGISLATION

The licensing process is influenced by several pieces of legislation. This section provides a brief summary of the most important ones. A more detailed description is provided in another NWMO background paper (NWMO 7-3) on the *Status of the Legal and Administrative Arrangements for High-level Radioactive Waste Management* [1].

2.1 Nuclear Safety and Control Act (NSCA)

The purpose of the Nuclear Safety and Control Act (NSCA) is to limit risks that are imposed upon national security, the health and safety of persons and the environment by the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information. The Act is also meant to implement Canada's international obligations regarding the development, production and use of nuclear energy.

The Nuclear Safety and Control Act (NSCA) establishes the Canadian Nuclear Safety Commission (CNSC). The CNSC is empowered to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances to prevent unreasonable risk to the environment and the health and safety of persons. It issues licenses allowing the possession, transfer, import, export, use and abandonment of nuclear substances. The scope of the CNSC's licensing powers includes the measures taken for the storage and disposal of nuclear substances.

The NSCA includes specific provisions for public participation in the review of license submissions.

The CNSC establishes detailed requirements through the promulgation of *regulations*. The important regulations for the long-term management of nuclear fuel include the following:

- a. Class I Nuclear Facilities Regulations;
- b. General Nuclear Safety and Control Regulations;
- c. Nuclear Safety Regulations;
- d. Packaging and Transport of Nuclear Substances Regulations; and
- e. Radiation Protection Regulations.

The CNSC also publishes regulatory guides and policies to amplify and explain the regulations. Examples relevant to the long-term management of nuclear fuel include the following (many more regulatory policies, regulations and guides will also apply):

- a. Draft Regulatory Policy P-290, Deep Geological Disposal of Nuclear Fuel Waste: Background Information and Regulatory Requirements Regarding the Concept Assessment Phase [2]; and
- b. Regulatory Guide R-72, Geological Considerations in Siting a Repository for Underground Disposal of High-Level Radioactive Waste [3].

2.2 Nuclear Fuel Waste Act (NFWA)

The Nuclear Fuel Waste Act provides a framework for identifying and implementing a future decision regarding the long-term management of used nuclear fuel. It requires the nuclear producers of electricity to establish the Nuclear Waste Management Organization (NWMO) to study potential approaches and present recommendations for the management of nuclear fuel waste.

The NFWA also makes specific provisions for public consultation. Studies and reports are to be submitted to the Minister of Natural Resources, who may pursue further consultations with the general public as is deemed necessary.

The Government of Canada is authorized to select one of the approaches presented by the NWMO for the management of nuclear fuel waste in Canada. The NWMO will then also be responsible for the implementation of the selected approach.

The Act also requires facility operators to establish and contribute to a continuing trust fund intended to finance the implementation of the approach selected.

2.3 Canadian Environmental Assessment Act (CEAA)

The Canadian Environmental Assessment Act (CEAA) is a federal law that requires Federal Authorities (FA) and federal departments or agencies that are responsible for decisions regarding proposed projects (i.e. Responsible Authorities, or RA), to consider the environmental effects of such projects before they are authorized to go ahead. Federal Authorities, in the context of this Act, are ministers of the Crown, agencies, departments and departmental corporations of the Government of Canada, or any other body prescribed by regulations, which have a role to play in the environmental assessment. The Responsible Authority is the organization required to ensure that the assessment is carried out in compliance with the Act.

The CEAA also establishes a process for conducting an environmental assessment and establishes the Canadian Environmental Assessment Agency (the Agency) to administer this process.

There are several levels of environmental assessment, depending on the nature of the proposed project, the expected environmental effects and the degree of public concern. Not all proposed projects are subject to an environmental assessment. The environmental assessment level is determined by the Responsible Authority in consultation with the Agency when a project description is provided and may be revised at key stages in the course of the evaluation. The levels are as follows:

- a. Screening;
- b. Comprehensive study;
- c. Review panel; and
- d. Mediation.

These levels of environmental assessment allow the regulator to adapt the process to the complexity of the project and to address the issues and concerns raised by the citizens [4].

For proposed projects for the management of used nuclear fuel, an environmental assessment must be performed before a license can be issued by the CNSC.

When it is determined that a proposed project is subject to an environmental assessment, assessment guidelines are developed. The way by which such guidelines are produced, reviewed and approved has changed since the implementation of the new NSCA. The environmental assessment guidelines for Gentilly's [5] and Point Lepreau's [6] dry waste storage projects are examples of such guidelines for fuel management projects initiated after the new NSCA (May 2000) and the revised CEAA (October 2003) came into effect.

2.4 Provincial and Territorial legislation

Although the federal government is responsible for the regulation of nuclear activities, this does not exclude provincial governments from imposing additional regulations on projects that have an impact on their jurisdictions. This means that proponents must meet both federal and provincial requirements in several areas, including but not limited to the need for an environmental assessment. Two other NWMO background papers, one on the legal and administrative arrangements, NWMO 7-3 [1], and a description of the environmental assessment process by Boulden [7] provide a detailed description of the provincial arrangements in this area and of the status of federal-provincial negotiations for the harmonization of the environmental assessment processes.

2.5 International Agreements

2.5.1 The Nuclear Non-Proliferation Treaty (NPT)

Canada is a signatory to the International Nuclear Non-Proliferation Treaty, which obliges all States Parties not to transfer nuclear items unless the transfer is subject to International Atomic Energy Agency (IAEA) safeguards. The CNSC administers Canada's domestic and international safeguards commitments under the authority of the NSCA. In conjunction with the IAEA and facility operators, the CNSC establishes and monitors Material Balance Areas within individual Canadian nuclear facilities. All nuclear material transfers - incoming and outgoing - must be accounted for as they pass through these areas. As well, a physical inventory can be taken to establish a nuclear material balance.

However, the IAEA is the proper body to deal with the task of verifying the compliance of Treaty members with the NPT. The CNSC maintains an office of international affairs, which manages a safeguards research and development program and advises on multi-lateral nuclear non-proliferation issues. The CNSC also ensures that security and safeguards provisions are addressed in the proponent's licensing submissions (see section 4.2.2.8).

2.5.2 Other international agreements

There are a number of bilateral and international agreements that apply to the operation of nuclear facilities, primarily related to the potential routine and accidental impacts on other countries. In the case of used fuel storage facilities, these are most likely to have a significant impact on the licensing process only if:

- a. The facility is located close to a national border; or
- b. The transport routes used for the transfer of used fuel are in proximity to a national border or international maritime ways.

Examples of international agreements include the following:

Joint Convention on the Safety of Spent-Fuel Management and on the Safety of Radioactive Waste Management

This Convention falls under the auspices of the International Atomic Energy Agency (IAEA). It addresses safety aspects of the control of facilities for spent fuel management.

The Convention on the Physical Protection of Nuclear Material

This Convention also falls under the auspices of the IAEA. It addresses security aspects of fuel storage facilities and of the transport of nuclear material.

Convention on Nuclear Safety

This Convention also falls under the auspices of the IAEA. It applies to storage, handling and treatment facilities for radioactive materials. However, the text of the Convention makes no specific reference to disposal facilities.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter

This Convention falls under the auspices of the Secretariat of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, of the International Maritime Organization. It bans the dumping of all radioactive wastes.

Agenda 21

Agenda 21 was signed by Participating Countries at Rio de Janeiro's Earth Summit, which was held in 1992. Chapter 22 of Agenda 21 addresses the safe and environmentally sound management of radioactive wastes, which includes transportation, storage and disposal activities.

Joint Radiological Emergency Response Plan

The Joint Plan augments the national nuclear emergency response systems of both countries. It was signed under the Agreement Between the Government of Canada and the Government of the United States of America on Cooperation in Comprehensive Civil Emergency Planning and Management (1986).

International Boundary Waters Treaty Act

This Act, administered by the Department of Foreign Affairs and International Trade, implements the 1909 Boundary Waters Treaty between Great Britain (on behalf of Canada) and the United States. The Treaty outlines principles and guidelines for the management of boundary and transboundary waters by Canada and the United States, with the primary objective of preventing or resolving disputes regarding the water quality and quantity of shared water resources. The Treaty establishes the International Joint Commission (IJC), an independent bi-national body with a regulatory, investigative and adjudicative role. This Act applies, for example, in issues of water pollution by radionuclides.

3. ROLES AND RESPONSIBILITIES WITH REGARDS TO THE LICENSING PROCESS

3.1 Federal

3.1.1 Canadian Nuclear Safety Commission (CNSC)

The CNSC is responsible for awarding licenses to prepare, construct, operate, decommission and abandon nuclear fuel management facilities. The CNSC is also a Responsible Authority under the CEEA for proposed nuclear fuel waste management projects. In past projects, the CNSC has so far been the only Responsible Authority within the federal government. However, this may not necessarily remain the case in future projects on long-term nuclear fuel management.

In practice, based on past experience with Point Lepreau, Gentilly-2 and Darlington, the CNSC delegates the responsibility for conducting environmental assessments to the proponent. This is not likely to change in the future.

3.1.2 Canadian Environmental Assessment Agency (The Agency)

The Agency is responsible for administering the environmental assessment process, providing guidance on, and promoting/monitoring compliance with, the CEEA.

3.1.3 Other federal government departments and agencies

Other federal departments and agencies may play a significant role in the licensing process through their involvement as Responsible or Federal Authorities in the environmental assessment process. So far, in addition to the CNSC, the most important federal departments have been:

- a. Environment Canada;
- b. Department of Fisheries and Oceans;
- c. Health Canada;
- d. Natural Resources Canada; and
- e. Indian and Northern Affairs Canada.

3.2 Provincial and municipal

The provincial governments are responsible for administering provincial environmental processes and ensuring compliance with applicable provincial legislation regarding proposed fuel management projects. Municipal legislation must also be satisfied. In that sense, and because municipal governments are often the jurisdictions most directly affected by a project involving nuclear fuel management, they are one of the key stakeholders in public consultations and play a significant role in the licensing process.

3.3 Proponents

3.3.1 Nuclear Waste Management Organization (NMWO)

The generators and owners of spent fuel are the ones responsible for its long-term management. In the context of this paper, they are therefore proponents. A list of spent fuel generators can be found in a NWMO fact sheet [8].

The Nuclear Waste Management Organization (NWMO) is responsible for investigating approaches for the long-term management of Canada's used nuclear fuel and for the implementation of the option selected. The NWMO was established by electricity generating companies that produce used nuclear fuel, as required under the Nuclear Fuel Waste Act (NFWA). It is therefore also a proponent. In fact, it is likely to be the main proponent with regards to the long-term management of nuclear fuel. However, given their stake and technical expertise, nuclear utilities are likely to be an integral part of the licensing process as proponents themselves.

3.3.2 Utilities

There are three provincially-owned electric power utilities that operate nuclear power plants:

- a. Ontario Power Generation (OPG) operates the Pickering Nuclear Generating Stations A and B, and the Darlington Nuclear Generating Station;
- b. Hydro Québec operates the Gentilly-2 Nuclear Generating Station; and
- c. New Brunswick Power operates the Point Lepreau Nuclear Generating Station.

Bruce Power is operated by a consortium and is the largest independent power producer in Ontario, but the spent nuclear fuel remains the property of Ontario Power Generation.

3.3.3 Research Organizations

Nuclear used fuel is also generated by Canadian research organizations, which include several universities that own and operate small research reactors, as well as Atomic Energy of Canada Ltd (AECL), which owns the fuel produced by the NRX and NRU research reactors (at the Chalk River Research Laboratories) and by the now-decommissioned reactors: Gentilly-1, Whiteshell (WR-1), Douglas Point and Nuclear Power Demonstration (NPD).

4. LICENSING PROCESS FOR FUEL MANAGEMENT FACILITIES

4.1 Licensing framework

The Nuclear Safety and Control Act (NSCA) is the legislation passed by the government of Canada to regulate nuclear practices. According to this Act, nuclear facilities are divided into two categories: Class I and Class II. Class I nuclear facilities have been further subdivided to clarify the distinctions between various operations. Class IA covers facilities such as reactors, while Class IB applies to facilities such as medical isotope producing facilities and uranium processing facilities. Class II facilities, which present lower risks, include accelerators and medical and industrial irradiators.

Nuclear fuel management facilities are considered class I facilities. Hence, the requirements described in Class I Nuclear Facilities Regulations [9], articles 3 to 8, apply. These describe the regulatory requirements for obtaining:

- a. a license to Prepare Site;
- b. a license to Construct;
- c. a license to Operate;
- d. a license to Decommission; or
- e. a license to Abandon.

These licenses must be obtained sequentially and, in theory, all apply to the long-term management of used nuclear fuel. However, if the site chosen for fuel storage is an existing facility, which may need to be expanded, then the *License to Prepare Site* is not necessarily required.

The implications for long-term nuclear fuel management strategies are still being defined by the CNSC. The current licensing process for fuel management facilities follows consistent guidelines but it remains flexible and adapted to the requirements and needs of each situation. The process is therefore defined to a certain degree on a case-by-case basis.

Any license requires the submission of licensing documentation that describes, in varying details, the characteristics of the facility, its operation and its impact on the environment. Table 1 provides a summary of the requirements for the first three license types. A detailed list is contained in the regulation for class I facilities. These requirements apply to a general Class I facility and do not specifically address facilities for the long-term management of used fuel. Section H of the CNSC's *Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management* [10] discusses how those considerations may be applied to used-fuel storage facilities.

Table 1: Summary of licensing submission information requirements

License type	Information required
Site preparation	• Description of the site evaluation process and of the investigation and preparatory work that will be done. • Description of the site susceptibility to human activities and natural phenomena. • Proposed program to determine the environmental baseline characteristics. • Proposed quality assurance program for design. • Effects on the environment and the health and safety of persons that may result from the activity, and measures that will be taken to mitigate those effects.
Construction	• Description of the proposed design, including the manner in which the physical and environmental characteristics of the site are taken into account. • Description of the environmental baseline characteristics. • Proposed construction program and schedule. • Description of design of structures. • Description of design of systems and equipment. • Preliminary safety analysis. • Proposed quality assurance program for design. • Proposed safeguards arrangements. • Effects on the environment and the health and safety of persons that may result from the construction, operation and decommissioning of the facility, and measures that will be taken to mitigate those effects. • Proposed location of points of release and release quantities of nuclear and hazardous substances to the environment. • Proposed measures to control releases. • Proposed program for recruiting, training and qualifying workers.
Operation	• Description of structures. • Description of systems and equipment. • Final safety analysis report. • Proposed operating measures, policies, methods and procedures. • Proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances. • Proposed safeguards arrangements. • Proposed commissioning program. • Effects on the environment and the health and safety of persons that may result from the construction, operation and decommissioning of the facility, and measures that will be taken to mitigate those effects. • Proposed location of points of release and release quantities of nuclear and hazardous substances to the environment. • Proposed measures to control releases. • Proposed measures to prevent or mitigate the effects of accidental releases (emergency plan). • Proposed measures to prevent acts of sabotage. • Proposed responsibilities of, qualification requirements and training program for workers. • Results achieved in recruiting, training and qualifying workers.

As can be seen in Table 1, there are many recurring themes for each license type. The differences lie in the degree of details required at each level. One of the critical recurring themes is the need for an assessment of the environmental effects (and for public acceptance) of the proposed facility. Given the length of the environmental assessment process, the need to meet both federal and provincial requirements in this area, and the fact that the CNSC is the main Responsible Authority for the administration of the Canadian Environmental Assessment Act with regards to nuclear fuel management, it is not possible to decouple the licensing process and the environmental assessment process. Indeed, acceptance of the environmental evaluation is a necessary condition for obtaining a license, and it is the most constraining requirement, both in terms of time and level of effort.

At present, the degree to which an environmental assessment process must apply to each license type is not fully determined. In accordance with the CEAA, the level of environmental assessment will depend on the possible significance of the environmental effects and on the expected degree of public concern. Experience to date under the new NSCA and the revised NFWA has been limited to construction licenses for Darlington, Pickering, Gentilly and Point Lepreau nuclear fuel waste storage facility expansion projects. A license to prepare site has not been required since the proposed fuel storage facilities are located on an existing licensed sites.

What is clear based on recent experience with the application of the new Acts for nuclear fuel management facilities is that the licensing process and the environmental assessment process are intrinsically intertwined. This is illustrated in Figure 1. It is therefore convenient to look at the overall licensing process as a dual-track process. In the next sections, both processes are described and the juncture points are presented and explained.

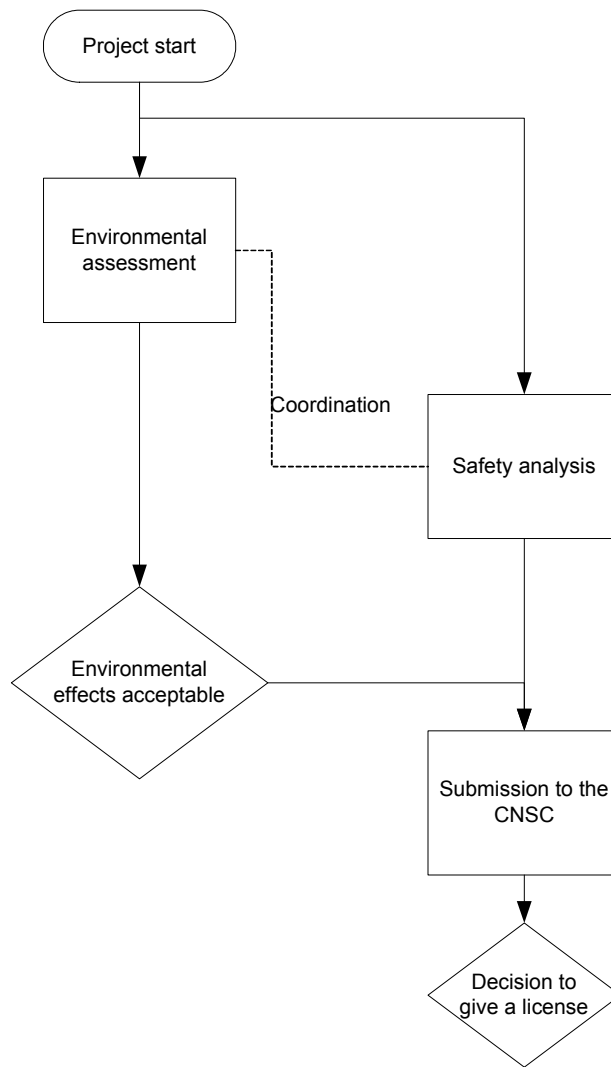


Figure 1: Overview of the overall CNSC licensing process for licensing nuclear fuel waste facilities (The right-hand column represents the *specific* CNSC licensing process.)

4.2 Licensing submission process

The licensing submission process is parallel to the environmental assessment process. It is summarized in Figure 2. This process applies for any license type. The depth and level of details to be included as well as the type of environmental assessment required to obtain the license depend on the license type.

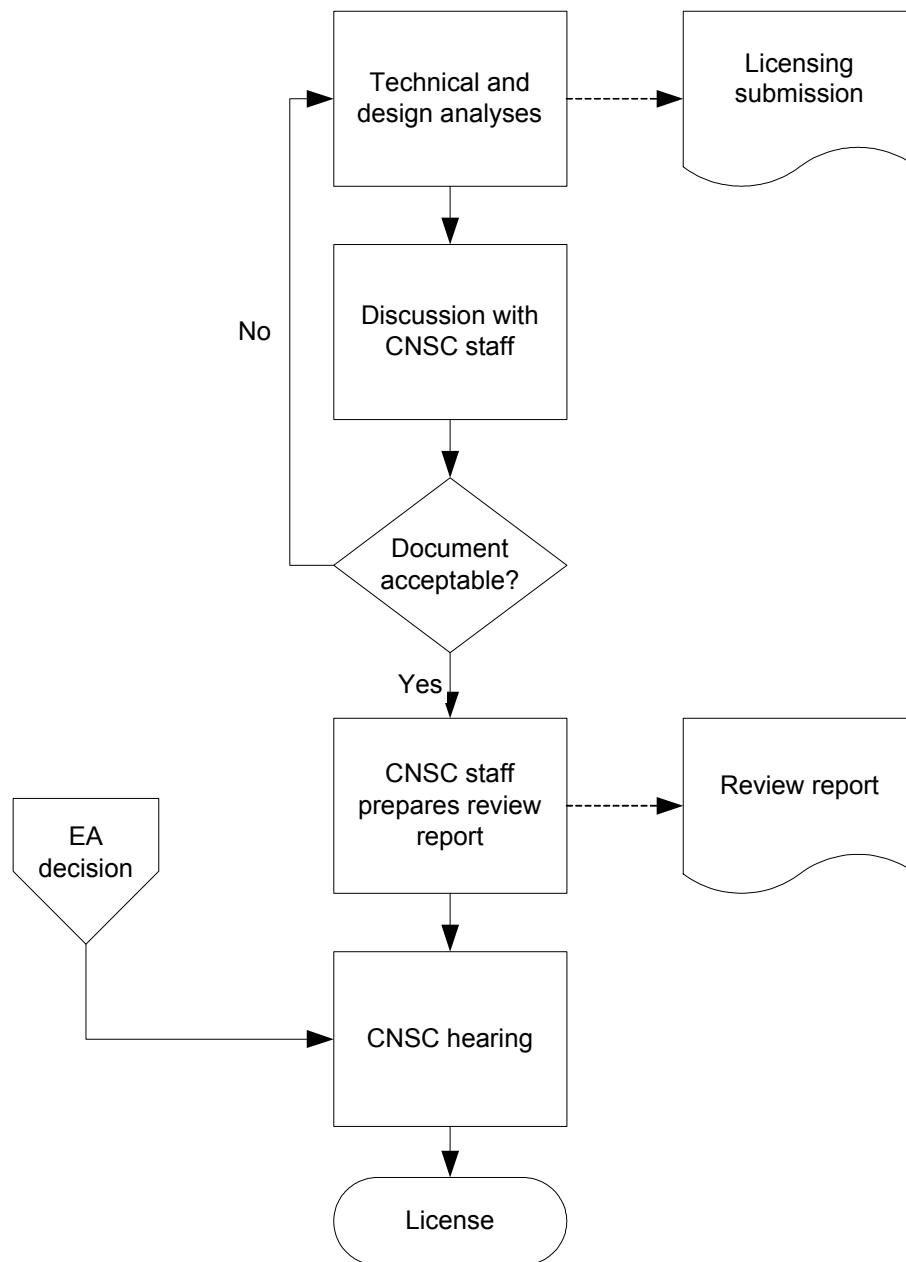
Notwithstanding the requirement for an environmental assessment as an integral condition for a license, the licensing process focuses on the design, engineering and safety aspects of the proposed facility. Public consultation is not required until the final approval stage. The review is internal to the CNSC and is conducted in concert with the proponent. The process is iterative. It involves several meetings between the proponent and the CNSC staff usually instigated by the proponent. It can take considerable time unless there is a common understanding on the part of the proponent and the CNSC staff on requirements and acceptability criteria.

When the CNSC specialists are satisfied that their requirements have been met, a recommendation report to the CNSC is prepared. It is a necessary condition that the environmental assessment process be completed by then. Unless the environmental risk is considered acceptable, the process does not go any further.

When both the environmental assessment process and the CNSC staff review of the licensing submission have been successfully completed, a CNSC public hearing is held. Following this hearing, assuming that the CNSC agrees with the recommendation of its staff, a license is awarded. The decision of the CNSC takes into account public submissions and, provided that public consultation was conducted diligently, it is unlikely that the licensing submission will be rejected in whole at this point (conditions to the license could be imposed). It is also hypothetically possible for the decision of the CNSC to be appealed by an interest group. This was the case in early 2000, when the decision by the CNSC to award a licence for the Bruce dry fuel storage facility was contested in a federal court by Inverhuron, a citizen's group that demanded an improved health and safety study of the facility as part of the environmental assessment. The court judgment rejected the request.

The following subsections briefly describe the licensing requirements based on the items contained in Table 1. Items that are covered by the environmental assessment process are noted.

It is important to note that facilities for the long-term management of used nuclear fuel have never been licensed in Canada. Therefore, it is likely that the requirements listed below may evolve in the course of the NWMO project. This list must thus be seen as a generic basis for the licensing of such facilities.

**Figure 2: Licensing submission process**

4.2.1 Site preparation license

4.2.1.1 Description of the site evaluation process and of the investigation and preparatory work that will be done

This item is covered by the environmental assessment.

4.2.1.2 Description of the site susceptibility to human activities and natural phenomena

This item is covered by the environmental assessment.

4.2.1.3 Proposed program to determine the environmental baseline characteristics

This item is covered by the environmental assessment.

4.2.1.4 Proposed quality assurance program for design

The proponent needs to provide a general description of the quality assurance program that will apply throughout the life cycle of the proposed project. Quality assurance must address all aspects of the proposed project. There are numerous standards and guidelines that apply to quality assurance programs for nuclear facilities. As a minimum, quality assurance policies and programs must satisfy the N.286 series of Canadian Standards Association Standards (CSA)[11]. The following are some examples of applicable quality assurance standards and guides:

- CAN/CSA-N292.2-96 (R2001): Dry Storage of Irradiated Fuel
- ASME-NQA-1-00: Quality Assurance Requirements for Nuclear Facility Applications
- CAN/CSA-N286.0-92 (R1998): Overall Quality Assurance Program Requirements for Nuclear Power Plants
- CAN/CSA-N286.4-M86 (R2000): Commissioning Quality Assurance for Nuclear Power Plants
- CAN/CSA-N286.5-95 (R2000): Operations Quality Assurance for Nuclear Power Plants
- Technical and Quality Assurance Standards for Dosimetry Services in Canada, CNSC Regulatory Guide S-106, 1998
- CAN3-Z299.0-86 (R2002): Guide for Selecting and Implementing the CAN3-Z299-85 Quality Assurance Program Standards
- CAN3-Z299.1-85 (R2002): Quality Assurance Program - Category 1
- N286.1-00: Procurement Quality Assurance for Nuclear Power Plants
- N286.2-00: Design Quality Assurance for Nuclear Power Plants
- N286.3-99: Construction Quality Assurance for Nuclear Power Plants
- N286.7-99: Quality Assurance of Analytical, Scientific and Design Computer Programs for Nuclear Power Plants

There are also international standards for quality assurance, such as those promulgated by the International Standards Organization (ISO) and those proposed by the International Atomic Energy Agency (IAEA), which can apply to nuclear facilities. The proponent needs

to describe the basis for its quality program and the means by which it will be enforced, monitored and evaluated.

4.2.1.5 Effects on the environment and the health and safety of persons that may result from the activity, and measures that will be taken to mitigate those effects

This item is covered in the environmental assessment.

4.2.2 Construction license

4.2.2.1 Description of the proposed design, including the manner in which the physical and environmental characteristics of the site are taken into account

The proponent must submit a comprehensive engineering design for the proposed facility. Environmental factors that could affect the performance of the facility over the long-term need to be taken into consideration. This includes, for example:

- a. seismic events, tornadoes and floods;
- b. topography and soil/rock characteristics;
- c. water movements;
- d. integrity of the selected site;
- e. other site specific factors.

4.2.2.2 Description of the environmental baseline characteristics

This aspect is covered in the environmental assessment.

4.2.2.3 Proposed construction program and schedule

This item addresses the entire construction cycle. It should also cover resources and project risk management.

4.2.2.4 Description of design of structures

This item includes a comprehensive engineering design of the main structures intended to store the used fuel, with a special emphasis on safety and reliability.

4.2.2.5 Description of design of systems and equipment

This includes a comprehensive engineering design of the main and auxiliary systems that will be used to operate and secure the facility, including, for example:

- a. transfer systems;
- b. safety systems;
- c. monitoring systems; and
- d. security systems.

4.2.2.6 Preliminary safety analysis

The proponent needs to prepare a Preliminary Safety Analysis Report (PSAR). This report must address all radiation and industrial safety aspects associated with the construction and operation of the facility. Amongst other things, it must demonstrate that:

- a. The structural integrity shall be maintained over the design life of the structure ;
- b. Public and worker regulatory limits for exposure to radiation will not be exceeded;
- c. There will be no loss of effective shielding during the design life of the structure;
- d. There will be no significant release of radioactive or hazardous contaminants over the design life of the structure; and
- e. There will be no significant tilt, or upset, of the storage containers under normal conditions.

Physical protection and security aspects of the facility design must also be addressed. Security requirements are contained in the CNSC regulatory requirements [12] and discussed in NWMO background paper 3-3 on the *Status of Canadian and International Efforts to Reduce the Security Risk of Nuclear Fuel Waste* [13].

4.2.2.7 Proposed quality assurance program for design

The requirements associated with this item are similar to those described in the QA requirements for the site preparation license (section 4.2.1.4). This item must contain the details of the quality assurance program that was and that will continue to be applied to the design of the facility, the systems and the equipments.

4.2.2.8 Proposed safeguards arrangements

The submission must contain a detailed description of the arrangements that will be made to meet Canada's obligations under the nuclear Non-Proliferation Treaty. These arrangements must cover the entire scope of operation of the facility, including transport of the used nuclear fuel. It must include Material Accounting Areas, means for verifying quantities, surveillance equipment and seals.

4.2.2.9 Effects on the environment and the health and safety of persons that may result from the construction, operation and decommissioning of the facility, and measures that will be taken to mitigate those effects

This aspect is normally addressed in the environmental assessment.

If the construction of the facility involves a radiation hazard to the construction personnel, then the radiation protection program for those workers also needs to be included in the submission. This would be the case, for example, if the facility were to be built on the site of an existing radioactive waste storage facility, or if the construction plan included provisions for expansion of the facility after some used fuel has already been stored.

4.2.2.10 *Proposed location of points of release and release quantities of nuclear and hazardous substances to the environment and proposed measures to control releases*

Long-term nuclear fuel storage facilities would not be releasing routine quantities of radioactive material. This item should therefore not apply. Accidental releases should be addressed in the emergency preparedness section.

4.2.2.11 *Proposed program for recruiting, training and qualifying workers*

Finally, the proponent must demonstrate that the construction organization structure and human resources will be adequate to satisfy the regulatory requirements for safety and to meet the goals stated in its submission for a construction license. In addition, security screening requirements are now more stringent, and the proponent should address this aspect in the selection of personnel.

4.2.3 Operation license

4.2.3.1 *Description of structures*

During construction, design changes of the structures may have occurred for practical and engineering reasons. The CNSC must be kept informed of the need, rationale and details of such design changes. Significant changes may require a review of the construction license. The revised engineering design of the structure must therefore be included in the submission for a license to operate. This implies a formal procedure for agreeing to and documenting any changes.

4.2.3.2 *Description of systems and equipment*

The discussion above also applies to systems and equipment

4.2.3.3 *Final safety analysis report*

The PSAR will be discussed extensively with the CNSC staff and could possibly be presented to the CNSC during special hearings. Comments resulting from this review as well as any changes in the design, construction or proposed operation of the systems and equipment need to be incorporated in a Final Safety Analysis Report (FSAR).

4.2.3.4 *Proposed operating measures, policies, methods and procedures and proposed procedures for handling, storing, loading and transporting nuclear substances and hazardous substances.*

The proponent must demonstrate that it has a well-structured set of procedural documents to ensure that the facility can be operated as designed. This structure of documents becomes part of the license. In practice, the proponent must establish a hierarchy of procedural documents that incorporate concepts of an adequate safety management system. During the operation of the facility, only top documents, such as policies and methods, usually require regulatory approval. Procedures and checklists are subject to regulatory review but do not normally

require regulatory approval to be modified. This aspect must be considered in the conceptual development of the document structure.

This aspect also needs to address the requirement for the operator of the facility to maintain key records during the operation of the facility, including (but are not necessarily limited to) the following:

- a. operating and maintenance procedures;
- b. radiation protection policies, procedures and records;
- c. the results of the commissioning program referred to in the licence;
- d. the results of the inspection and maintenance programs referred to in the license;
- e. the nature and amount of radiation, nuclear substances and hazardous substances within the nuclear facility; and
- f. the status of each worker's qualifications, requalification and training, including the results of all tests and examinations completed in accordance with the license.

4.2.3.5 Proposed safeguards arrangements

This aspect is based on the submission for the construction license and must reflect any changes made in the actual design and proposed operation of the facility.

4.2.3.6 Proposed commissioning program

The proponent must demonstrate that adequate tests and verifications will be conducted prior to the operation of the facility. Commissioning tests must address issues of performance of the facility and equipment used to transport, transfer and store the used fuel.

4.2.3.7 Effects on the environment and the health and safety of persons that may result from the construction, operation and decommissioning of the facility, and measures that will be taken to mitigate those effects.

This aspect is covered in the environmental assessment.

4.2.3.8 Proposed location of points of release and release quantities of nuclear and hazardous substances to the environment and proposed measures to control releases

As discussed above, this item should not apply to facilities for the long-term management of used fuel.

4.2.3.9 Proposed measures to prevent or mitigate the effects of accidental releases (emergency plan)

The proponent must submit an emergency plan that complies with the guidelines of the CNSC [14].

4.2.3.10 Proposed measures to prevent acts of sabotage.

The proponent must demonstrate that adequate measures are in place to prevent malicious acts aimed at jeopardizing the safety of the facility personnel and the public. This applies to all aspects of the facility operation, including transport of the used fuel.

4.2.3.11 Proposed responsibilities of, qualification requirements and training program for workers.

The proponent must demonstrate that it has established an adequate organizational and human resources structure to support all aspects of the facility operation. This must cover the entire life of the facility.

4.2.3.12 Results achieved in recruiting, training and qualifying workers.

Finally, the proponent must demonstrate that it has achieved a critical mass of properly qualified and trained personnel to initiate the operation of the facility.

4.3 Environmental evaluation process

The environmental assessment process depends greatly on the level of assessment required, i.e.:

- a. Screening level assessment;
- b. Comprehensive review;
- c. Review panel; or
- d. Mediation.

The NSCA does not specifically trigger an environmental assessment process. However, until references to the old Atomic Energy Control Act contained in the CEAA are amended, section 44 of the Interpretation Act deems references to the former legislation to be references to the analogous provisions of the NSCA. In that sense, a request for a new or amended operating license for spent fuel storage facilities is a trigger for an EA under the CEAA.

An overview of the process is described in Figure 3, Figure 4 and Figure 5. This overview, based on recent experience with fuel storage facilities, focuses on screening and comprehensive environmental assessments. Under a review panel (which is quite possible for the long-term management of nuclear fuel) or mediation, the process may be very different and the role of the CNSC in the review may change; the CNSC may still be involved in the establishment of guidelines and in the review, at the discretion of the panel or mediator. However, the outcome of the environmental assessment would be used in the CNSC licensing process in the same manner as described in Figure 2.

A more detailed description of the full process can be found in Boulden's background paper [7]. The main steps are numbered for convenience and are summarized in the following sub-sections.

It is important to note that, within the context of the CEAA, it is the Responsible Authority that is responsible for the environmental assessment. However, based on previous environmental assessments at Canadian nuclear power stations, for nuclear fuel management facilities, the main Responsible Authority (CNSC) normally delegates the environmental analysis to the proponent. This is reflected in the discussion below.

4.3.1 Project description (step 1)

The proponent must submit a project description to the CNSC. The contents of this document are described in Canadian Environmental Assessment Agency documents as follows:

- a. A summary description of the project;
- b. Information indicating the location of the project and the areas potentially affected by the project;
- c. A summary description of the physical and biological environments within the areas potentially affected by the project; and
- d. The mailing address and phone number of a contact person who can provide additional information about the project.

This document becomes the trigger for the CNSC to initiate the environmental review process.

It should be noted that the contents of a submission for an environmental assessment differ significantly from those required to evaluate the facility design and safety, as part of the CNSC licensing process (see section 4.2 above). The former must focus on the external effects while the latter focuses on the design features and design safety.

A project description must also be submitted to the provincial authorities, in accordance with applicable provincial legislation.

4.3.2 CNSC staff circulates the project description (step 2)

The CNSC staff distributes the project description to all federal departments for an evaluation of their potential role in an eventual environmental assessment of the project. This is also likely to be the first point at which relevant provincial authorities will be consulted to determine what provincial environmental assessment regulations may apply and if/how the federal and provincial processes can be harmonized.

4.3.3 Federal departments determine their respective roles (step 3)

Federal departments must then decide if they are:

- a. A responsible authority (organization required to ensure that the assessment is carried out in compliance with the Act).;
- b. A federal authority (ministers of the Crown, agencies, departments and departmental corporations of the Government of Canada, or any other body prescribed by regulations, which have a role to play in the environmental assessment).; or
- c. Not involved.

In the first case, the CNSC and the other Responsible Authorities need to come to an agreement on a common process.

Federal authorities are those that are deemed to have a role as subject-matter experts and who will be consulted throughout the review process.

4.3.4 Decision on level of environmental assessment (step 4)

The decision to conduct an environmental assessment or not, and the level of the assessment is made by a designated officer of the CNSC, in consultation with the Agency. The factors affecting this decision are described in detail by Boulden [7]. In short, the decision depends on the perceived significance of the environmental effects and on the expected degree of public concern.

It is also possible that the Responsible Authority(ies) may already decide at this point to go to a review panel or mediation. Such processes are addressed in Boulden [7] and would affect the process as it is subsequently described. For one, the role of the CNSC in drafting guidelines and evaluating submissions may change, depending on the decision of the review panel or mediator.

Based on recent experience with dry-fuel storage at nuclear facilities, any project involving long-term storage of used nuclear fuel will require at least a screening environmental assessment. There are no precedents of comprehensive environmental studies with the revised Acts. However, it is likely that:

- a. If a “green” site is chosen, a screening environmental assessment will be required before a license to prepare site is awarded, followed by comprehensive assessment, review panel or mediation for the license to construct.
- b. If an existing licensed site is chosen, a license to prepare site may not be required, and a screening environmental assessment may be sufficient to obtain a license to construct.

4.3.5 Discussion with province (step 5)

In theory, the federal process can be completely separate from the provincial one. However, in practice, the CNSC will try to harmonize as much as possible. For example, in New Brunswick, the processes were fully harmonized and the CNSC took the lead. In Quebec, the processes are separate and it was left up to the proponent to find a way to harmonize their interactions with provincial and federal authorities. However, in the future, this is likely to change as an agreement is about to be signed between the Quebec and federal governments.

In Saskatchewan, the environmental assessment for uranium mining projects was subjected to a joint federal-provincial agreement on a harmonized process. The Agreement, signed in November 1999, was negotiated to implement the Sub-agreement on Environmental Assessment, signed by Canadian Environment Ministers (except Quebec) in January 1998. Under the Agreement, projects that require an environmental assessment by both the Government of Canada and the Government of Saskatchewan will undergo a single assessment, administered cooperatively by both governments. One government takes the lead in administering the assessment, but both governments are full and active partners in it. The Agreement clarifies for government officials, the public and proponents how cooperation will occur in these instances.

A detailed discussion of the harmonization process and status of harmonization with the provinces is contained in Boulden's NWMO background paper [7].

4.3.6 Environmental assessment guidelines (step 6)

In concert with the Agency, Federal Authorities and the province, the CNSC staff develops environmental assessment guidelines, which define the scope and depth of the assessment required. The degree of consultation with the province depends on the degree of harmonization.

4.3.7 Public consultation on the EA guidelines (step 7)

There is an opportunity for the public to review the environmental assessment guidelines. The process, method and length of this consultation depend on the level of the environmental assessment and on the degree of harmonization with the province. The approval authority for the environmental guidelines also depends on the level of the assessment. Depending on the degree of public concern, the Responsible Authority and the Agency may also decide to change the level of the assessment. This is also described in detail by Boulden [7].

Based on recent experience, which applies to screening level assessments, guidelines are made available to the public and a CNSC public hearing is held, during which the public has the opportunity to present its concerns. The CNSC approves the guidelines. As stated in section 4.3.4, the process and the role of the CNSC in the development of guidelines may be different under a panel review or mediation.

4.3.8 Environmental analysis (step 8)

As previously stated, although the Responsible Authority is responsible for the technical studies, these have so far been delegated to the proponent. This task is carried out in accordance with the guidelines and leads to the production of the first draft of the environmental assessment report. If the federal and provincial processes were harmonized, as was the case in New Brunswick, the proponent only has one set of guidelines to follow. If, on the other hand, the federal and provincial processes are not harmonized, as is currently the case in Quebec at the time of writing this document, then the proponent has two sets of guidelines to follow. It is up to the proponent to determine how best to meet those two sets of requirements. The practical approach adopted by Hydro Quebec has been to consolidate the two sets of guidelines into one all-encompassing guideline document, which establishes a cross-correlation of requirements and aims at producing one single environmental assessment report that meets both sets of guidelines.

It is important to note that the proponent is normally asked to assess the potential degree of public opposition to its project. Since public opposition can significantly affect the complexity of the process and its outcome, it is in the interest of the proponent to initiate public consultations and dialogues early on, well before the environmental analysis begins. The proponent may then have to provide a convincing and credible case to the Responsible Authority to justify its findings, which should include the assistance of experts in this field (e.g. sociologists).

The next steps vary according to the degree of harmonization between the federal and provincial processes.

4.3.9 Case 1: Harmonized federal and provincial processes

4.3.9.1 *Draft environmental assessment report review (step 9)*

The CNSC staff, in consultation with federal experts from federal authorities (and also possibly including provincial experts) review the environmental assessment report. Comments are discussed with the proponent and a revised (draft final) environmental assessment report is produced.

4.3.9.2 *Review report (step 10)*

Again, the CNSC, in consultation with Federal Authorities (and possibly provincial experts), reviews the final draft of the environmental assessment report. A draft review report is produced with, as an annex, the proponent's environmental assessment report.

4.3.9.3 *Public consultation (step 11)*

The CNSC staff review report and the environmental assessment report are made available to the public for comments. In the past, this consultation period has taken no less than 30 days.

4.3.9.4 Review of public comments (step 12)

Public comments are reviewed by the CNSC staff in consultation with other experts and with the proponent. Comments from the public are systematically addressed and a table of disposition of comments is produced. This leads to the finalization of the environmental assessment report, by the proponent, and of the federal review report, by the Responsible Authority.

Both reports are presented at the federal level for approval. The decisional authority depends on the level of the assessment. Previous screening assessments related to nuclear fuel management have been presented to the CNSC in a one or two-day public hearing. Comprehensive studies would be presented to the Minister of Environment or to a review panel. More information on the final approval process and criteria is contained in the NWMO background paper by Boulden [7].

4.3.10 Case 2: Separate federal and provincial processes

If the federal and provincial processes are not harmonized, the critical path is likely to be the provincial process, as described below.

4.3.10.1 Provincial review (step 13)

Provincial authorities review the draft environmental assessment report and produce their comments.

4.3.10.2 Federal review (step 14)

The federal review, probably led by the CNSC staff, takes place separately from the provincial review. The mechanisms for this review depend on the level of the assessment, and on the number of Responsible and Federal Authorities.

4.3.10.3 Joint federal-provincial review consolidation (step 15)

Federal and provincial authorities meet to consolidate their review comments and to produce a single, consolidated list of comments for the proponent. Again, the exact mechanism for this joint review will be determined on a case-by-case basis and will depend on the level of the assessment and on the degree of cooperation between the federal and provincial processes.

4.3.10.4 Revision of draft EA report (step 16)

The proponent then produces a final environmental assessment report. Again, the mechanism for this revision will depend on the strategy adopted at the outset. For example, if a single environmental assessment report was produced to satisfy both federal and provincial guidelines, only one final report will be produced. It is also possible to envisage the possibility that two reports could be produced. However, this could make the process somewhat more challenging for the proponent.

4.3.10.5 CNSC staff review (step 17)

In preparation for the provincial public consultation, which could likely take the form of public hearings, the CNSC reviews the final environmental assessment report and produces a draft CNSC review report. This report will be the basis for the CNSC staff's eventual participation in the provincial public consultation process.

4.3.10.6 Provincial public consultation (step 18)

The public consultation process is the next critical step. This could follow a protracted evolution, depending on the provincial environmental regulations. The CNSC staff and other federal experts are likely to be invited to participate as technical experts. It is anticipated that, in most cases, the provincial consultation process would focus mainly on public concerns, whereas the CNSC review and input would focus more on the technical issues. This is not a rule but it is based on recent experiences in Quebec, New Brunswick and Ontario.

The exact mechanism for this public consultation depends on the provincial regulations. For example, in Quebec, public consultation will include public hearings conducted by the Bureau des audiences publiques (BAPE).

4.3.10.7 Provincial decision (step 19)

The provincial authorities then come to a decision regarding the significance of the environmental effects of the proposed project. In theory, the federal decision does not have to agree with the provincial one. However, in practice (e.g. in the case of the Gentilly-2 dry fuel storage project), the CNSC will not proceed further before the provincial decision is rendered.

4.3.10.8 CNSC (federal) review (step 20)

Once the provincial decision has been made, and assuming that this decision is favourable for the proposed project, another federal review takes place, probably led by the CNSC staff, depending on the level of the assessment. This review incorporates the public comments received during the provincial public consultation and the decision by the provincial authorities. A final CNSC or federal review report is compiled and submitted to the appropriate federal authority for a decision.

As discussed in section 4.3.4, the federal decisional authority depends on the level of assessment.

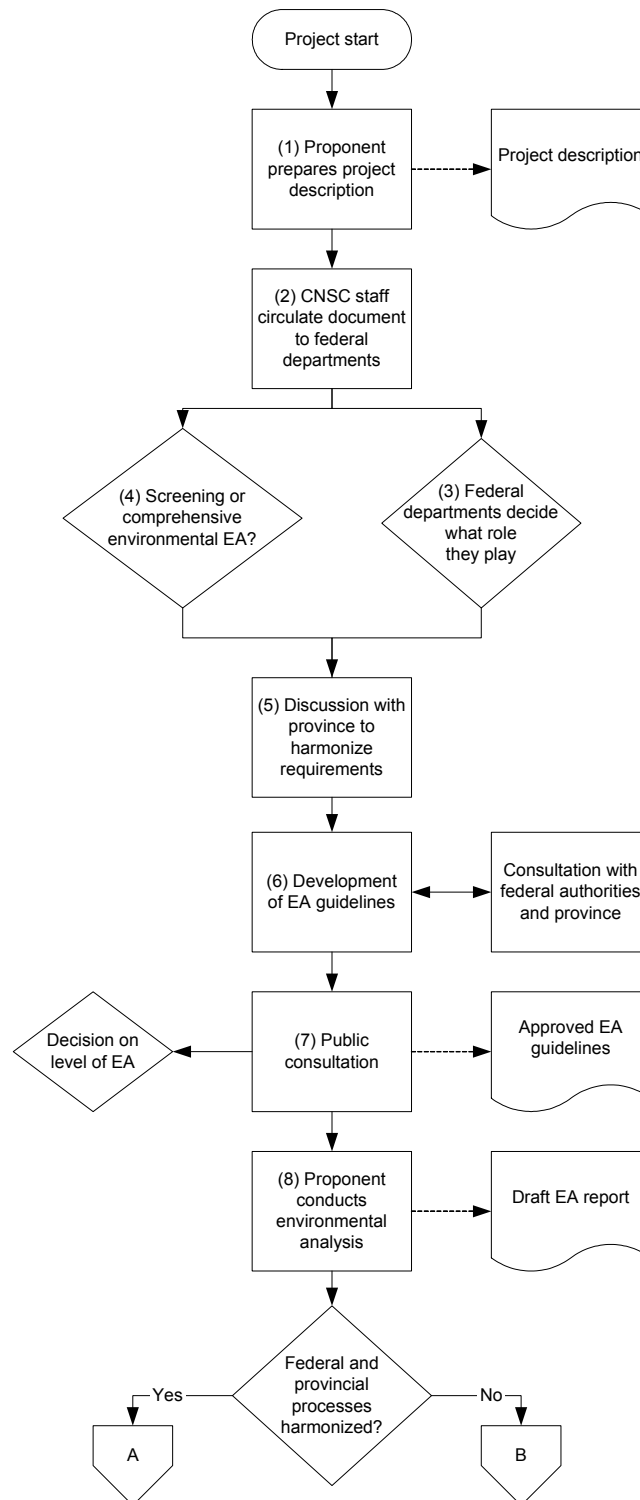


Figure 3: Environmental assessment process (part 1 of 3)

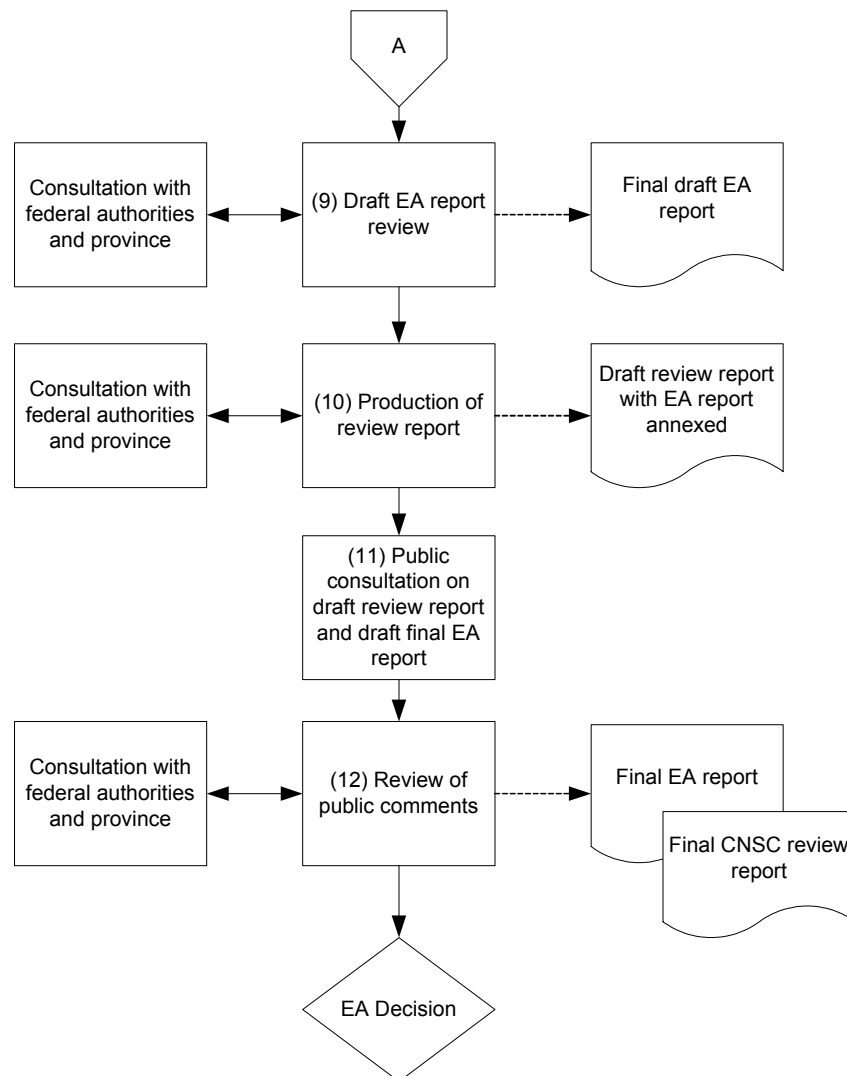


Figure 4: Environmental assessment process (part 2 of 3)

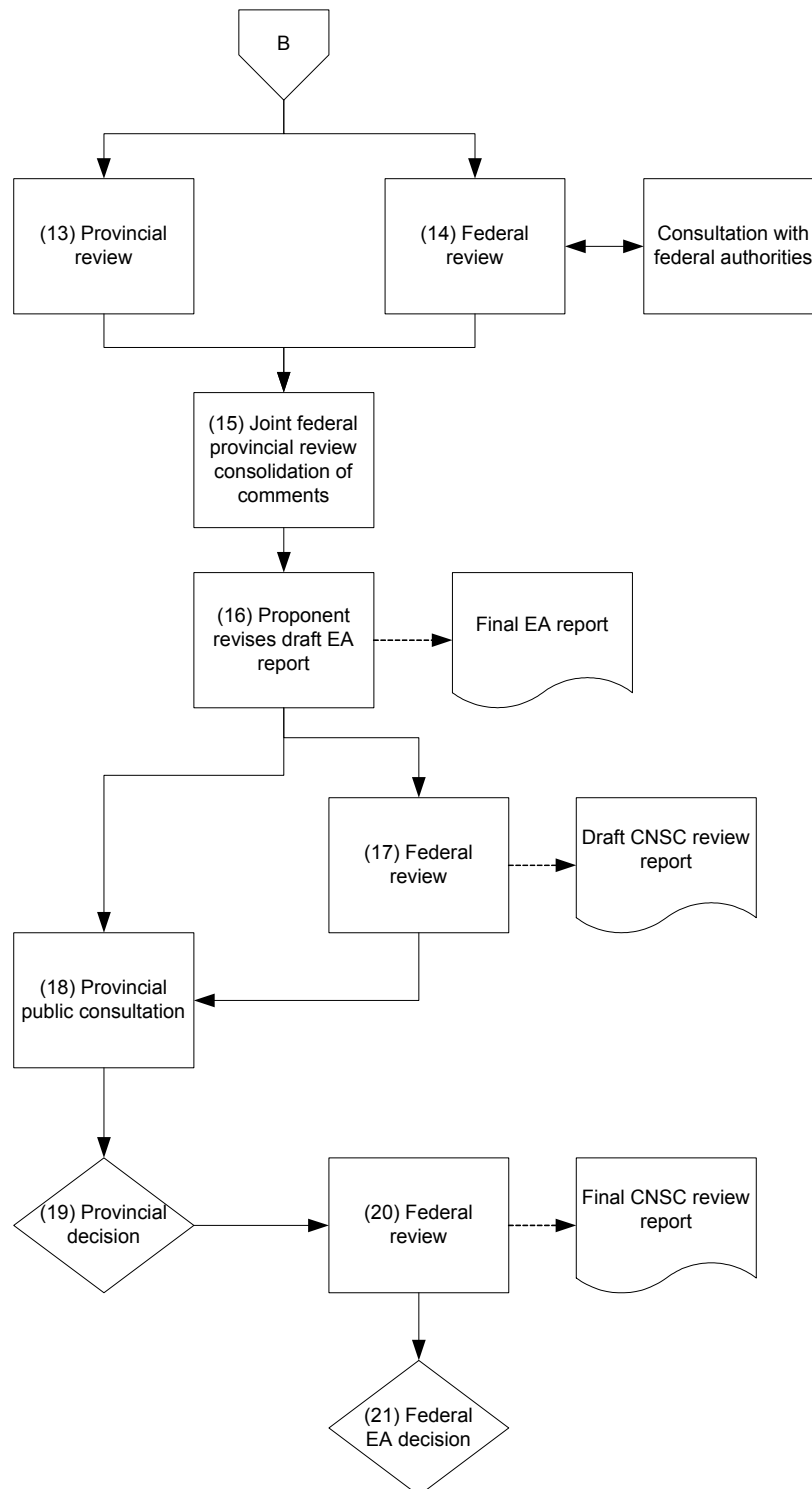


Figure 5: Environmental assessment process (part 3 of 3)

4.4 Duration of the licensing process

It is difficult to estimate the exact duration of the licensing process for planning purposes. Much of it depends on the mechanisms for the coordination of federal and provincial authorities and on the method chosen for the public consultation. However, based on recent experience, it is clear that the environmental assessment process is the critical path. Not counting the preparatory tasks by the proponent to, for example, set up the project infrastructure and conduct initial public consultation, recent experience in New Brunswick and Quebec indicates that the full licensing process, including a screening level environmental assessment, can take over two years. This time could possibly be considerably longer if a comprehensive assessment, panel review or mediation were to be conducted, as is likely to be the case for any new proposed facility for the long-term management of used fuel.

It is also possible that a strict schedule be established at the outset. For example, in Quebec, when the BAPE is involved, the provincial process must follow a very tight and strict schedule. This is further illustrated in section 5.3, which discusses the Gentilly 2 radioactive waste management facility project.

5. CURRENT EXPERIENCE WITH CANADIAN LICENSING OF NUCLEAR WASTE FACILITIES

5.1 Introduction

Several used nuclear fuel storage sites have been licensed by the federal and provincial regulators over the last few decades. The NWMO background paper on the *Status of Reactor Site Storage Systems for Used Nuclear Fuel* (NWMO 6-1) by Senes provides a detailed description of these sites [15]. The licensing process evolved over time. The current legislation has built on this experience.

Since the new Acts have been in effect (NSCA-2000 and the amended CEAA-2003), several used-fuel management projects have been submitted for licensing, including:

- e. the Darlington Used Fuel Dry Storage site;
- f. The Pickering Waste Management Facility phase II;
- g. the Gentilly-2 modification of the dry radioactive waste and fuel storage facilities;
- h. the Point Lepreau Generating Station (PLGS) Solid Radioactive Waste Management Facility (SRWMF).

Although these projects are quite different from the licensing of a facility for the long-term management of used nuclear fuel, the process followed provides some insight on what can be expected for the latter. However, it should be noted that, in all cases, only a screening-level environmental assessment was or is being conducted because the proposed facilities are located on sites that are already licensed for nuclear activities. For this same reason, the submission for a license to construct includes considerations for the preparation of the site (i.e. a separate submission for a license to prepare the site was not made) and is usually presented as an amendment to the existing license for the site. The process may therefore not be completely representative of what would apply to long-term used fuel management.

The following provides a brief description of these projects in terms of process. Two examples are examined in greater detail: one that is still in progress (Gentilly-2) and one that has recently been completed (PLGS).

5.2 Ontario Power Generation projects

5.2.1 Darlington

OPG proposed to build a used fuel dry storage facility on the Darlington site over three years ago. The environmental assessment was initiated in February 2001. Draft environmental assessment guidelines were made available by the CNSC for public review in February 2002. Following a public hearing held by the CNSC on 27 June 2002, the guidelines for the environmental assessment were approved on 26 July 2002. A draft environmental screening report by the proponent was published in November 2003. Following discussions with the CNSC, other federal, provincial and municipal departments, a revised screening report was produced in March 2003. Following a public hearing held on 25 September 2003, the CNSC announced its conclusion that the proposed Darlington Used Fuel Dry Storage Project, taking into account the appropriate mitigation measures, is not likely to cause significant adverse environmental effects.

The CNSC is now considering the license application for construction of the facility and a public hearing on this subject will be held at a later date.

5.2.2 Pickering

OPG proposed to amend its existing operating license to the Pickering Waste Management Facility Phase I (PWMF I). The amendment seeks to obtain authorization for the construction and operation of an extension. The proposed facility is for the purpose of storing used nuclear fuel in dry storage containers and would be located within the general site of the Pickering Nuclear Generating Station, Pickering, Ontario.

The existing Facility is licensed as a Class IB nuclear facility under the Nuclear Safety and Control Act, and an environmental assessment was completed for the PWMF I in 1999. On 20 March 2003, following a public hearing on 13 December 2002 and 27 February 2003, the CNSC renewed the operating license for the Pickering Waste Management Facility located near Pickering, Ontario.

Draft Environmental Assessment Guidelines were made available for public comment in October 2002. On 8 May 2003, following a public hearing on 10 April 2003, the CNSC announced its approval of the Environmental Assessment Guidelines (Scope of Project and Assessment) that will be used to direct a screening environmental assessment of Ontario Power Generation's proposed Pickering Waste Management Facility Phase II. The CNSC also announced its decision not to request from the Federal Minister of the Environment a referral to a mediator or a review panel.

The environmental assessment is in progress.

5.3 Gentilly

5.3.1 Background

Hydro Quebec is currently in the process of obtaining a construction license for the expansion of the dry waste and fuel storage facility in preparation for the extension of the station's operational life beyond 2013. Pressure tubes and other reactor components will need to be replaced as part of this refurbishment effort. The current dry storage facility is reaching capacity. Additional structures will be required to store the waste generated by the refurbishment project and by the continued operation of the nuclear power plant beyond 2013.

5.3.2 Environmental assessment

Based on the fact that a dry storage facility already exists, that a modification to an existing license is required, and that the CNSC was not aware, at project inception, of any potential environmental effects or public concern associated with the proposed project, only a screening level environmental assessment was required.

The CNSC is the only Responsible Authority under the CEAA. Other federal departments involved as expert Federal Authorities are:

- d. Environment Canada;
- e. Department of Fisheries and Oceans;
- f. Health Canada;
- g. Natural Resources Canada; and
- h. Indian and Northern Affairs Canada.

The overall process schedule is shown in Figure 6. The pre-project preparation tasks were initiated in 2001. The environmental study started in earnest in 2002. To reduce delays, Hydro Quebec initiated the environmental work on the basis of the CNSC environmental assessment guidelines for PLGS.

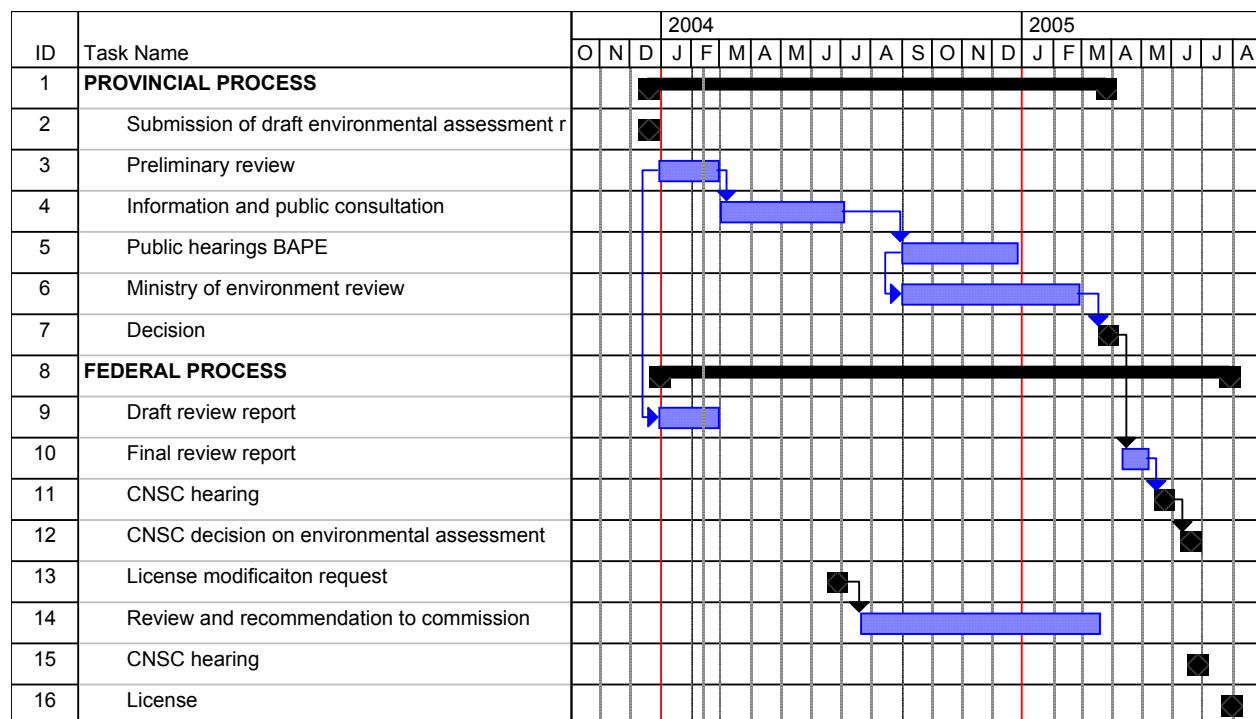


Figure 6: Licensing process for Gentilly-2 expansion of the dry waste and fuel storage facility

Upon submission of the project description, several meetings were held by the proponent with the CNSC staff to define the environmental assessment guidelines. Subsequent monthly meetings were held with the CNSC and with the provincial representative from the ministry of environment (MENV) responsible for the provincial environmental assessment process in order to:

- Harmonize, as much as possible, the provincial and federal guidelines;
- Present an update on the approach adopted by Hydro-Quebec to conduct the environmental studies; and
- Maintain good relations between the proponent and the approval authorities.

These meetings were held on the initiative of the proponent and are not a formal part of the licensing or environmental assessment process.

An initial public information and consultation campaign was conducted by the proponent from February to September 2003. This consultation addressed the following specific target groups:

- Municipal officials;
- Governmental agencies;
- Aboriginal groups;
- Health organizations;
- Environmental and ecological groups;
- Media;

- g. Nuclear industry partners;
- h. Teaching institutions;
- i. Professional and local associations; and
- j. Members of a provincial information exchange group.

The main objectives of this initial consultation were to inform the public, answer questions, collect comments, foster a positive relationship between the industry and the public, and promote an understanding of issues leading to the acceptance of the project.

Several activities were conducted as part of this consultation process including:

- a. Media conference;
- b. Meetings with key individuals;
- c. Public information sessions;
- d. Meetings with stakeholders;
- e. Interviews with focus groups; and
- f. Surveys.

A toll-free public telephone line and a web site were also established to collect comments from the public.

A large number of comments were received, predominantly in the following areas:

- a. Social aspects of the proposed life extension;
- b. Current and long-term waste management;
- c. Environment and health;
- d. Safety;
- e. Energy choices;
- f. Power plant operation; and
- g. Economical aspects.

The results of this public consultation indicated that:

- a. The general population did not express significant concern;
- b. Opponents tended to monopolize public sessions and meetings;
- c. Comments received extended well beyond the scope of the proposed project;
- d. Participants wish to continue receiving information on the proposed project; and
- e. It was deemed by the proponent (and subsequently agreed to by the CNSC) that there was no significant public opposition to the project.

This public consultation will continue throughout the duration of the licensing process.

When the project started, the federal and Quebec environmental assessment processes were not harmonized. However, the CNSC and the Quebec ministry of environment agreed to use the same environmental assessment, as much as possible, in order to meet the federal and provincial requirements. A one-day public hearing was held with the CNSC in June 2003 to finalize the environmental assessment guidelines. The environmental assessment guidelines were approved by the CNSC on 29 August 2003.

This means that Hydro-Quebec has to satisfy two sets of requirements. A decision was made to produce a single environmental assessment report that would satisfy both sets of requirements. This required the development of a consolidated guidelines document by Hydro-Quebec. This document establishes a cross-reference between the federal and provincial requirements and identifies those requirements that are specific to each jurisdiction.

5.3.3 Licensing

A license modification request (to include the new construction license to the existing site license) is expected to be submitted to the CNSC around June 2004.

5.3.4 Status

A workshop was held in the last quarter of 2003 to present the preliminary results of the environmental assessment (étude sectorielle) and to identify early questions that need to be addressed in the environmental assessment report. Work is in progress and, at the time of this report, Hydro-Quebec has already made several interim presentations to the CNSC on the project. Although not explicitly shown in the process described in section 4, these interim presentations are an integral part of the coordination mechanism between the CNSC and the proponent, and they are an essential element of the on-going public consultation process.

5.4 PLGS

5.4.1 Background

NB Power is currently planning to conduct a maintenance outage lasting approximately 18-months. The major activity would be the replacement of all 380 Fuel Channel and Calandria Tube Assemblies and the lower portion of all connecting feeder pipes. This activity is referred to as Retube. NB Power would also take advantage of this outage to conduct a number of repairs, replacements, inspections and upgrades. These collective activities (Retube and all other work) are referred to as Refurbishment. This would allow the station to operate for an additional 25 to 30 years. Currently the plan is to start the outage in spring 2007.

NB Power plans to store the radioactive waste generated from the Retube activity in structures to be located at the Point Lepreau Generating Station (PLGS) Solid Radioactive Waste Management Facility (SRWMF). The SRWMF was originally sized for two units and only about a quarter of the overall licensed area has so far been developed. Currently there are vault structures to store low level waste and canisters to store fuel. These are referred to as the Phase I and II areas respectively.

The construction of the additional structures at the SRWMF requires an amendment to the SRWMF operating license (to include the new construction license to the existing site license). CNSC staff indicated that this amendment would trigger a need for an environmental assessment. The environmental assessment was entered into a public registry with the Agency and is listed on the Federal Environmental Assessment Index (FEAI) as #27931 "Modification to

Point Lepreau SRWMF". As is the case for Gentilly-2, only a screening level environmental assessment was required.

5.4.2 Environmental assessment

A single set of environmental guidelines was developed. The Responsible and Federal Authorities under the CEAA are the same as for the Gentilly-2 project discussed above. At the provincial level, the review has been coordinated by the New Brunswick Department of Environment and Local Government (NBDELG) through the establishment of a Provincial Technical Review Committee (PTRC). Other provincial departments and agencies involved are:

- a. Department of Natural Resources and Energy;
- b. Department of Public Safety; and
- c. Workplace, Health, Safety and Compensation Commissions.

General discussions with the CNSC started in June 2000. The CNSC staff issued draft environmental assessment guidelines for public comment on 8 February 2002. This led to a one-day CNSC public hearing on the environmental assessment guidelines on 22 May 2002. Final guidelines were issued on 24 June 2002.

NB Power was assigned the responsibility of preparing the environmental assessment study report. This report was subsequently completed and submitted to the CNSC and the NBDELG on 13 September 2002. Following review of the report by the CNSC staff and the other expert authorities, NB Power submitted a revised report on 29 November 2002.

The CNSC staff issued a draft environmental assessment screening report (with the environmental assessment study report) for public comments on 18 March 2003. On 8 May 2003, following the review of public comments, NB Power Nuclear submitted its final environmental assessment screening report.

On 12 May 2003, the CNSC staff issued its final screening report in preparation for an environmental assessment hearing. This hearing took place in SaintJohn, NB, on 27 June 2003. On August 25 2003, the CNSC and NBDELG announced their decisions on the environmental assessment. The CNSC concluded that the project, taking into account the appropriate mitigation measures identified in the environmental assessment, is not likely to cause significant adverse environmental effects. The CNSC also decided not to refer the project to the Minister of Environment for referral to a review panel or mediator.

A significant community relations program was conducted as part of the environmental assessment. Information in support of this program is available through both the CNSC and NB Power websites.

5.4.3 Licensing

The CNSC outlined their expectations relating to licensing for the modification to the waste site (to include the construction of the new facility) in the last quarter of 2001. NB Power issued a letter on 8 August 2002 providing an overview of the design of the additional structures to be located at the Solid Radioactive Waste Management Facility (SRWMF) and identifying the

material that would be submitted to the CNSC for review. Over the next few months NB Power submitted the required documentation to the CNSC, and in a letter dated 21 February 2003, formally requested an amendment be made to the SRWMF operating license. This request was revised in May 2003 to reflect the latest status of the design and supporting documentation, and the results of CNSC staff reviews.

In July of 2003, the CNSC determined that there should be a two-day hearing held on the request for the SRWMF license amendment. In August 2003, NB Power submitted the documentation to be presented at the Day-1 hearing set for 25 September 2003 and the CNSC staff issued CMD 03-H31, which outlined CNSC staff recommendations on the NBP request for SRWMF license amendment. This hearing was closed to the public.

Following the Day-1 hearing, supplementary information was provided both by NB Power and CNSC staff and a Day-2 hearing, open to the public, took place on 26 November 2003.

5.4.4 Status

The environmental assessment process is completed. A decision on the request for a construction license is expected either late December 2003 or early January 2004.

6. RELEVANCE TO THE NWMO MANDATE

6.1 Process definition and regulatory trends

Up to now, experience with the licensing process under the new Acts for fuel management facilities is limited. At the federal level, the process is defined on a case-by-case basis, which has the advantage of being adaptable to the specific characteristics and concerns associated with each proposed project. Current experience has been limited to the simpler *Screening Level*, and there are no examples of more complex levels of assessment for nuclear waste carried out under the new Acts. Therefore, it is difficult to predict how the current precedents will apply to long-term fuel management projects undertaken by the NWMO.

However, based on current trends, the following likely developments should be taken into consideration:

- a. There are increased efforts to harmonize the federal and provincial environmental assessment processes. New agreements are expected to be signed, for example with the province of Quebec. New Brunswick has already agreed to a harmonized process.
- b. A CNSC/federal working group is in the process of more systematically defining the licensing process for nuclear fuel management facilities. A draft report is expected before the end of 2003.
- c. There is an increasing emphasis on public consultation throughout the project life cycle.
- d. It is likely to remain simpler to modify a license than to obtain a new license for a new site. This EA process may be further streamlined, as discussions are currently taking place within the CNSC to allow a delegated officer to approve environmental assessment guidelines.

6.2 Applicability to licensing of long-term spent fuel management

It is difficult to predict how the current licensing process will be adapted to facilities for the long-term management of used nuclear fuel. In some respects, the recent application of the licensing process to the Darlington, Pickering, PLGS and Gentilly-2 waste storage sites provides a blueprint of things to come. However, it is quite likely that there will be significant differences in terms of process and technical analysis.

6.2.1 Process

It is generally believed that the environmental assessment process for long-term used fuel management will dominate the overall licensing process even more than it has in recent years. It is also likely that it will involve at least a comprehensive study or panel review. The CNSC may not be the only federal Responsible Authority.

Several provinces are likely to be involved regardless of the option selected. If the fuel is to be stored on site, then all provinces with used nuclear fuel need to be involved, though not

necessarily at the same time. If the fuel is to be stored in a centralized facility, including at a deep geological disposal site, fuel will have to be transported over several provinces.

The environmental assessment is also expected to involve a larger number of federal and provincial authorities. For example, maritime seaway authorities will need to be involved if the used fuel is to be transported by ship. Maritime transport of used fuel may also require coordination with the United States government and may be subject to bilateral and international agreements regarding the transport of radioactive and hazardous material.

6.2.2 Technical analysis

With the exception of the deep geological disposal option, are many issues related to the long-term management of used nuclear fuel still need to be analyzed and critically reviewed. These include, for example:

- a. Long-term behaviour of fuel storage structures and long-term environmental effects (the AECL study on deep geological disposal addresses technical safety issues related to this item. However, this has not yet been through a licensing process);
- b. For storage on reactor sites, operation of the facility after the nuclear reactor has been decommissioned;
- c. Security; and
- d. For off-site storage, transport of the used nuclear fuel.

This last point is important for off-site storage solutions. Transportation safety and security is likely to raise significant concerns in the communities located on the proposed routes. This was clearly demonstrated with regards to the proposed shipment of very small quantities of enriched uranium for Atomic Energy of Canada Ltd. Furthermore, differences in provincial transport regulations could potentially complicate the authorization process in the case of cross-border shipments.

Table 2 provides a comparison of the three main options for the long-term management of used-fuel from a point of view of licensing.

Table 2: Comparison of main long-term fuel management options from a licensing perspective

Option	Safety assessment	Environmental assessment
Storage at nuclear reactor sites	The technical concept has been demonstrated in Canada. It appears acceptable for interim storage. However, safety assessments will need to address the long-term behaviour and safety of structures as well as the long-term operations, maintenance and security aspects.	Some environmental assessments have already been conducted. Screening assessments have been acceptable for interim storage but long-term storage could very well require a comprehensive assessment, review panel or mediation. Studies will also need to reflect results of safety assessment on evaluation of long-term environmental effects. Transport may not be an issue if the fuel is stored on its original site.
Centralized storage	The technical concept has not yet been demonstrated in Canada. Transport of the used fuel is likely to be a major concern.	No environmental assessment has yet been performed. Comprehensive assessment, review panel or mediation is most likely to be required.
Deep geological disposal	The concept had been adequately demonstrated from a technical perspective for a conceptual stage of development (Seaborn). A detailed analysis will still be required based on the details of the disposal site and method selected. Transport of the used fuel is likely to be a major concern.	Technical environmental studies have been conducted. However, public concern has not been adequately addressed. Comprehensive assessment, review panel or mediation is most likely to be required.

6.3 Key success factors

The most recent experience in licensing a used-fuel management facility reveals key factors that will determine the effectiveness of the licensing process. Most are related to the conduct of the environmental assessment, which, as discussed before, represents the critical path for the approval of the license for a used-fuel storage strategy. These success factors are only some of the elements that should be considered by the NWMO in the planning and implementation of a licensing program for the long-term management of used nuclear fuel. They include:

- Identify the need for environmental assessment. Clarify early on if and what level of environmental assessment may be required at the various stages of the licensing process.
- Harmonize federal and provincial processes. Harmonizing federal and provincial environmental assessment processes can greatly improve the effectiveness of the process by eliminating duplications and by rationalizing the reporting structure for the proponent.
- Promote dialogue with federal, provincial and municipal authorities. The proponent has to deal with several orders and levels of government. By actively facilitating a dialogue

with and between these authorities, the proponent can help maintain a common focus and vision regarding the criteria for acceptance of the proposed project.

- d. Start public consultation and dialogue early. The regulatory process and the environmental assessment process will require public consultation. However, based on recent cases involving the licensing of used nuclear fuel storage facilities, an initiative by the proponent to initiate an early public consultation campaign can greatly improve the ability of the proponent to address public concerns at the concept stage and can reduced the time required to obtain a license. A thorough discussion of these issues is found in NWMO background paper 2-4 on *Long-Term Management of Nuclear Fuel Waste: Issues and Concerns Raised at Nuclear Facility Sites 1996-2003* [4]. If transport of nuclear fuel through communities is anticipated, this consultation and dialogue process will need to extend to a potentially large number of stakeholders.
- e. Establish a tight control over design changes. It is normal for design changes to occur in the course of a project. Design changes required as a result of a review by regulatory authorities may be unavoidable and should be considered in the establishment of the project schedule. On the other hand, design changes that originate within the proponent's organization create uncertainties and re-analysis of several aspects related to the project, which will in turn increase the pressures on the proponent to meet deadlines or increase the time required to obtain an authorization. It is therefore critical that the design be firmed up as early as possible in the process before any significant technical analyses are conducted, and that changes to the design be formally approved, justified, and documented. .
- f. Establish a realistic time frame. Recent licensing projects associated with the storage of used nuclear fuel have taken in excess of two years, not counting the early work performed by the proponent for the establishment of the project organization, concept studies and project definition preliminary analyses. Future projects are likely to take even longer. Unrealistic deadlines may impact the quality of the design work, result in untimely design changes and further delay the licensing process.

7. SUMMARY AND CONCLUSION

The licensing process for the long-term management of used nuclear fuel is not yet fully defined and is likely to be determined on a case-by-case basis for the three main management strategies considered. Experience with licensing of fuel management facilities under the new Nuclear Safety and Control Act and the revised Canadian Environmental Assessment Act is limited, but it provides a basis for the process that could be applied to long-term management options. The licensing process is likely to follow a dual track: the environment assessment, which is a prerequisite to obtaining a license, and the technical assessment by the CNSC, which eventually leads to the license. The two processes are inseparable, given that the result of the environmental assessment is a key element considered by the CNSC before a license is awarded.

Experience with the licensing of the Darlington, Pickering, PLGS and Gentilly-2 facilities provides some useful insight on the challenges that the NWMO may encounter in its effort to propose and license a facility for the long-term management of used fuel. However, the process is likely to vary and the discussion contained in this paper should be viewed in the context of an evolving framework for the licensing of fuel management facilities.

ANNEX A: ACRONYMS AND DEFINITIONS

AECL	Atomic Energy of Canada Limited
Agency	Canadian Environmental Assessment Agency
BAPE	Bureau des audiences publiques sur l'environnement. This is the provincial authority in charge of public hearings on environmental assessments in Quebec.
CEAA	Canadian Environmental Assessment Act
Centralized storage	Used fuel storage in facilities located either above or below ground
CNSC	Canadian Nuclear Safety Commission, made up of appointed Commission members
CNSC staff	Canadian Nuclear Safety Commission personnel that support the CNSC
CSA	Canadian Standards Association
Deep geological disposal in the Canadian shield	Disposal of the used fuel in deep vaults located in the stable Canadian shield
EA	Environmental assessment, under the Canadian Environmental Assessment Act
Federal Authority (FA)	Ministers of the Crown, agencies, departments and departmental corporations of the Government of Canada, or any other body prescribed by regulations, which have a role in the environmental evaluation process
FSAR	Final safety assessment report
IAEA	International Atomic Energy Agency
MENV	Ministry of Environment of the province of Quebec
NBDELG	New Brunswick Department of Environment and Local Government
NBP	New Brunswick Power
NFWA	Nuclear Fuel Waste Act
NPT	Nuclear non-proliferation treaty
NSCA	Nuclear Safety and Control Act
NWMO	Nuclear Waste Management Organization
OPG	Ontario Power Generation
PLGS	Point Lepreau Generating Station
PSAR	Preliminary safety assessment report
PTRC	Provincial Technical Review Committee
Responsible Authority (RA)	Federal authority that is required under the Act to ensure that an EA of a project is conducted
SRWMF	Solid Radioactive Waste Management Facility
Storage at nuclear reactor sites	Used fuel storage in facilities located on existing nuclear power plant sites

ANNEX B: REFERENCES

- 1 *Status of the Legal and Administrative Arrangements for High-level Radioactive Waste Management (HLRWM)*, NWMO 7-3, Mark Madras & Stacey Ferrara, Gowling Lafleur Henderson LLP
- 2 *Deep Geological Disposal of Nuclear Fuel Waste: Background Information and Regulatory Requirements Regarding the Concept Assessment Phase*, CNSC R-71.
- 3 *Geological Considerations in Siting a Repository for Underground Disposal of High-Level Radioactive Waste*, CNSC R-72.
- 4 *Long-Term Management of Nuclear Fuel Waste - Issues and Concerns Raised at Nuclear Facility Sites 1996 – 2003*, NWMO 2-4, Chris Haussmann & Peter Mueller, Haussmann Consulting.
- 5 *Lignes directrices sur l'évaluation environnementale (Portée du projet et évaluation) aux installations de stockage de déchets radioactifs de la centrale nucléaire de Gentilly-2 proposé par Hydro-Québec*, CCSN, 29 août 2003
- 6 *Draft Environmental Assessment Guidelines (Scope of Project and Assessment): Environmental Assessment of Proposed Modifications to the Point Lepreau Solid Radioactive Waste Management Facility*, CNSC, February 2002
- 7 *Review of Canadian Environmental Assessment Act (CEAA) Process in Relation to Nuclear Waste Management*, NWMO background paper, Boulden Environmental Consulting
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- 9 *Nuclear Safety and Control Act, Class I Nuclear Facilities Regulations*, P.C. 2000-784, 31 May, 2000
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- 11 *Canadian National Report for the Convention on Nuclear Safety, Second Review Meeting*, CNSC, October 2001
- 12 *Nuclear Security Regulations, Nuclear Safety and Control Act*, SOR/2000-209, 31 May, 2000
- 13 *Status of Canadian and International Efforts to Reduce the Security Risk of Nuclear Fuel Waste*, SAIC, NWMO 3-3
- 14 *Emergency Planning at Class I Nuclear Facility and Uranium Mines and Mills*, CNSC Regulatory Guide G-225, August 2001

- 15 *Status of Reactor Site Storage Systems for Used Nuclear Fuel*, NWMO 6-1, SENES Consultants Limited, October 2003