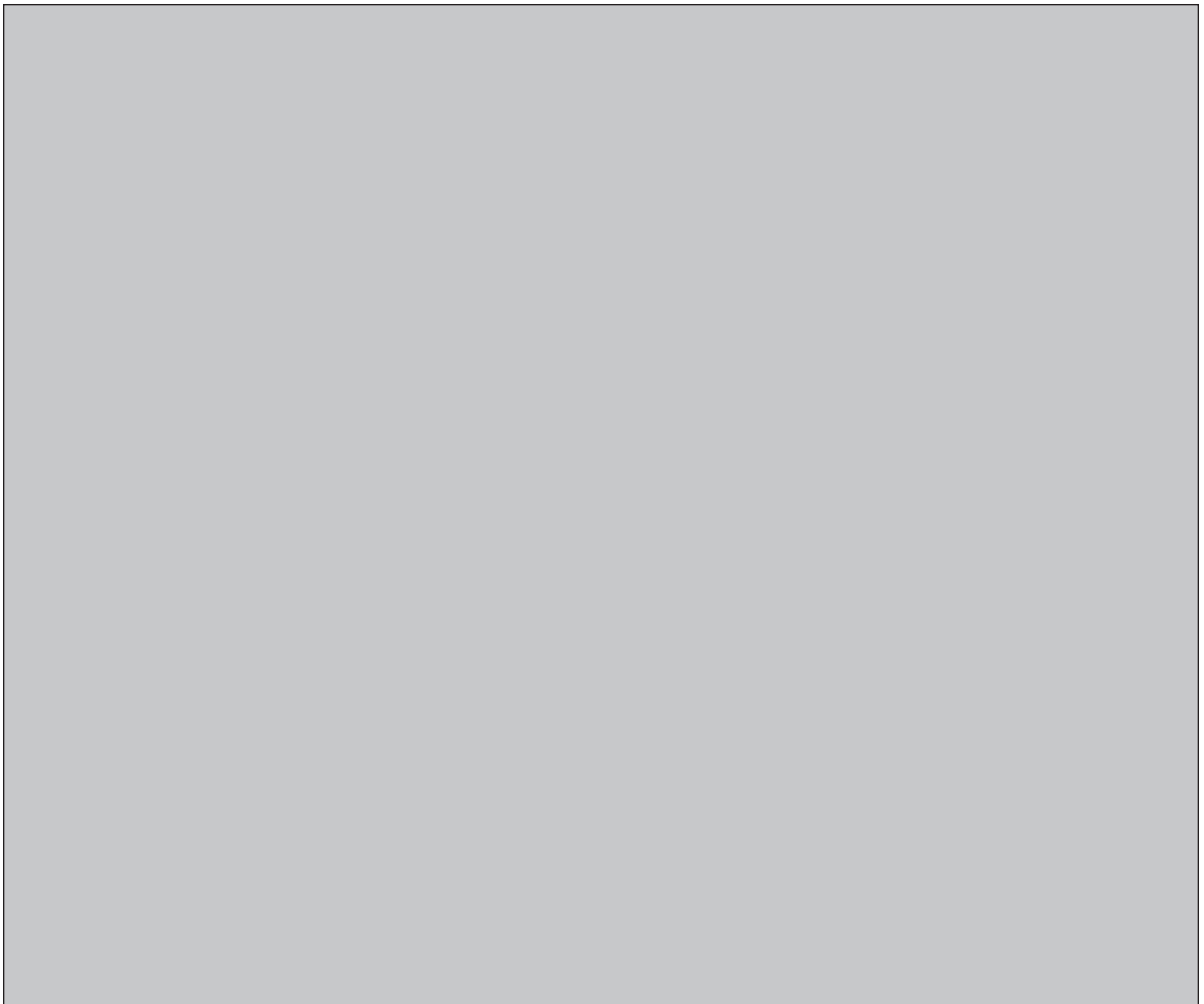



**NWMO BACKGROUND PAPERS****3. HEALTH AND SAFETY****3-4 CONSIDERATIONS IN DEVELOPING A SAFETY CASE FOR SPENT  
NUCLEAR FUEL MANAGEMENT FACILITIES AND ASSOCIATED  
INFRASTRUCTURE IN CANADA  
EXECUTIVE SUMMARY**

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## Executive Summary

The long-term management of spent nuclear fuel must satisfy the concerns of the public, and meet the needs of regulatory, technical and government authorities. These authorities are committed to a number of safety objectives such as public safety, environmental protection, worker safety, material safety and security. The process for providing the confidence that these safety objectives will be met has evolved over many years of experience in risk industries into the requirement for a complete Safety Case.

The first objective of this paper is to provide an understanding of what is the nature of a Safety Case. That is, what are the key components that are necessary to build and communicate a convincing argument that a proposal has sound engineering, is environmentally safe, and will meet all regulatory requirements. The second objective is to describe what is involved in a Safety Case for options now being considered for the long-term management of nuclear fuel waste. The information in this document has been compiled from Canadian and international sources, and is consistent with the requirements of the Canadian nuclear regulator, The Canadian Nuclear Safety Commission (CNSC).

The Safety Case is the integration of arguments and evidence that describe, quantify and substantiate the safety, and the level of confidence in the safety, of a facility or activity. Concurrent with the advancement of Safety Case concepts has been the evolution of requirements in Canadian regulations for licensing facilities and associated activities. The licensing requirements are consistent with the Safety Case. In essence, if all the requirements for licensing are met, the information required for a complete Safety Case would also then be available. However, a Safety Case would also need to be well structured to assist in the communication of the conclusions on safety and the development of confidence in these conclusions.


The Safety Case must include the following:

(1) A **framework** within which the information – arguments or analyses and facts or evidence – must be presented. The key categories describing the framework for the Safety Case are:

- Organization and Scope
- Quality Assurance
- Safety Philosophy, Principles and Criteria

(2) A **complete set of facts** about the undertaking that provide the base of information for further analyses and assessments. This should include a description of the facilities and the activities proposed; a description of the procedures and processes for decision making; and the criteria and limits that will be imposed for the operation or performance of activities. The key categories describing the base of information for the Safety Case are:

- Documented Design
- Description of Activities and Facility Operation Program
- Public Safety and Protection of the Environment

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- Occupational Safety
- Security and Safeguards

(3) The **analyses, assessments and arguments** that demonstrate satisfactory resolution of the safety issues raised. The set of information provided, specifically including the documented design and description of operation, is used to analyze the proposed facilities and activities and to evaluate the potential hazards. The ability of the design to address any issues raised is then evaluated by applying specifications for safety, determined through regulations, international recommendations, or best practices. Naturally, radiological hazards are emphasized in performing analyses for nuclear facilities, however all hazards must be addressed in the Safety Case. The analyses and assessments must be performed within the framework described and shown to be consistent with the collection of facts as documented. The key categories describing the analyses and assessments for the Safety Case are:


- Safety Analysis
- Accident Management
- External Hazards

The challenge in developing the safety case for the long-term management of spent nuclear fuel is to address all the phases of activity before and after long-term storage and before and after final disposal. This would include the overall approach to the long-term management solution being addressed, which includes the activities to handle the spent fuel, to contain and package it as required, transportation of spent fuel, handling the receipt of the spent fuel and its interim storage or final disposal.

The extended period of time for which an assessment would need to be valid makes the challenge even greater, as the time frames that have been considered in most developed Safety Cases include actual experience and verified performance of components and materials and predictable environmental conditions.

In reviewing the eleven key categories mentioned above and the lists of required information for each, it becomes clear that there is much work to do to establish a comprehensive Safety Case that is both technically sound and acceptable to two key stakeholders, the regulator and the public. The following recommendations are made to the NWMO in the context of furthering its work in these two critical areas.

1. To continue efforts to determine areas of greatest public concern with respect to spent nuclear fuel management and to make this information available for the development of the Safety Case.
2. To begin discussions with the CNSC to develop a working understanding of expectations with respect to regulations and standards, as well as methodologies needed for developing the Safety Case.
3. To further define the elements of the Safety Case applicable to the specific options and to assess the difficulty of meeting the requirements.

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4. To interact with organizations in other jurisdictions that are involved in spent fuel management, specifically to better understand good industry practices, develop benchmark approaches with respect to safety and public acceptance, and learn lessons regarding technical acceptance criteria, obtaining regulatory approval and achieving public acceptance.