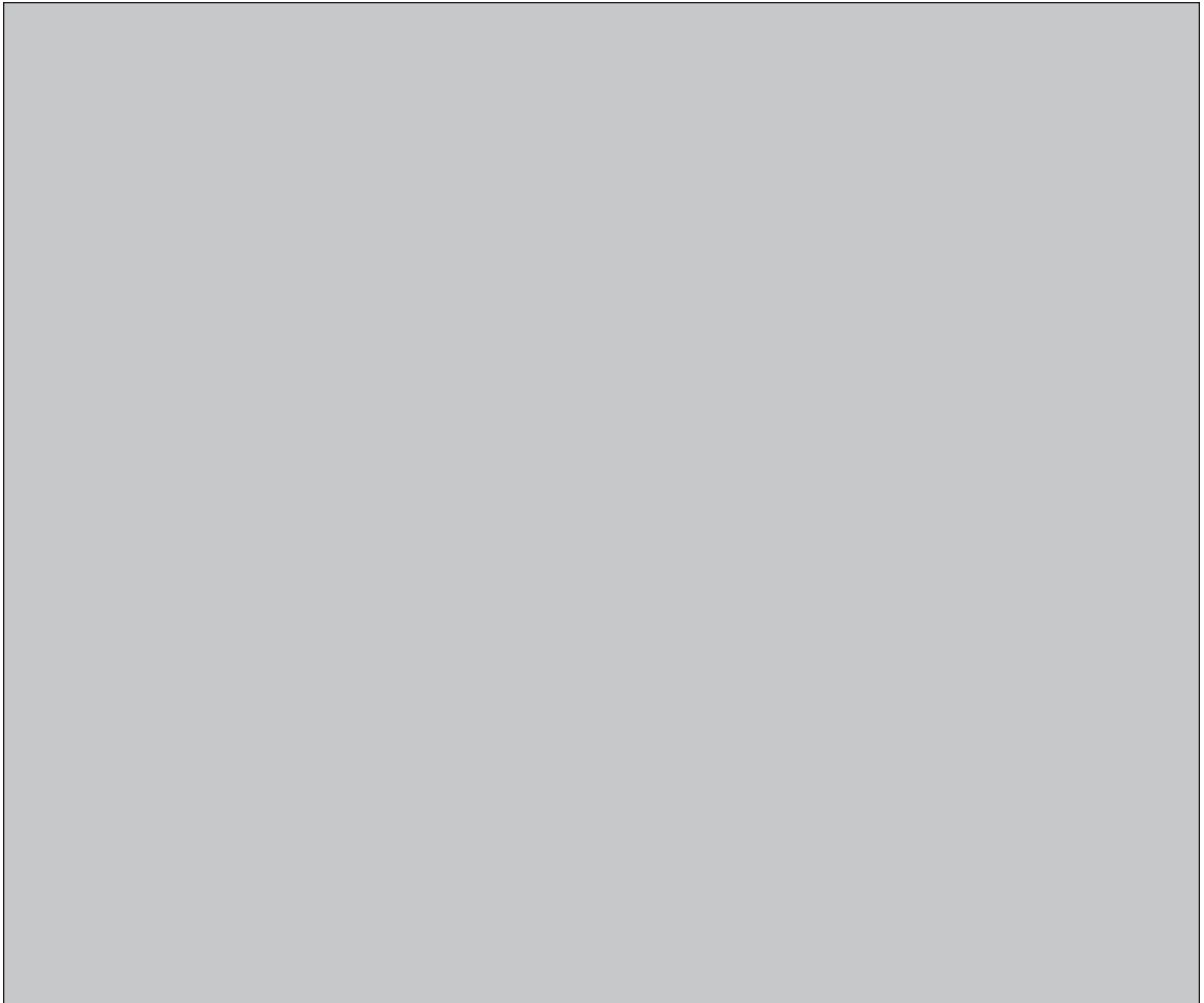


**NWMO BACKGROUND PAPERS
6. TECHNICAL METHODS**

**6-10 REVIEW OF CONCEPTUAL ENGINEERING DESIGNS FOR
USED NUCLEAR FUEL MANAGEMENT IN CANADA (FINAL REPORT)**

EXECUTIVE SUMMARY

ADH Technologies Inc.



1.0 Executive Summary:

The Nuclear Fuel Waste Act (NFWA) requires the NWMO to submit a report to the Government of Canada which includes comparison of costs, risks and benefits of at least three approaches for managing Canada's nuclear fuel wastes over the long-term.

In advance of the NWMO being established, Ontario Power Generation, Hydro-Québec, AECL and New Brunswick Power (the "Joint Waste Owners") – anticipating their responsibilities under the NFWA to establish the NWMO and to ensure that a comprehensive study is completed within the legislated timelines – commissioned work to develop conceptual designs for the options in the then draft NFWA.

Specifically, the Joint Waste Owners commissioned some studies in 2001 and 2002 based on the anticipated requirements in the Act, prior to the establishment of the NWMO. These studies concerned the development of technical descriptions for the alternative approaches and associated cost estimates for three technical methods for long term management of used fuel. In particular, they developed conceptual designs for the technical methods set out in the Act, and the associated cost estimates.

The Joint Waste Owners presented this body of work to the NWMO at the end of 2003, for use in the NWMO's study of used fuel management approaches.

Conceptual designs were prepared by the Joint Waste Owners for the following approaches to used fuel management:

- Deep Geologic Repository (DGR)
- Reactor Extended Storage (RES)
- Centralised Extended storage (CES)

In addition, conceptual design information was developed for transportation systems that would be required for design options that use centralized facilities (i.e. DGR and CES).

A key assumption was that the total amount of used fuel bundles to be managed is 3.6 million. A set of reports and CDROMs consisting of design information have been provided that document the assumptions used and conceptual design details.

The NWMO made a decision that it would invite a third-party review of the conceptual designs to validate the engineering process used in their preparation. This review and validation by a qualified third party was seen as necessary to provide the NWMO with the assurance of the integrity of the design work. The NWMO felt it particularly important to ensure that the designs have been developed in a manner consistent with established industry standards and practice. The purpose of this present review is to give confidence to the users of the design information that it is reliable and can be used for the intended purpose of assessing and comparing the relative merits of the given approaches.

Accordingly, in April 2004 the NWMO launched a third-party review of the conceptual design engineering process used by the Joint Waste Owners. The NWMO engaged ADH Technologies Inc. to undertake this review.

The focus of this project was to review and validate the conceptual design process and to comment on the underlying assumptions. In addition, the review was to comment on the flexibility to adapt the design as assumptions and circumstances change in the future.

The NWMO set out seven specific criteria for validation as follows:

1. *Document the process and assumptions used by the Joint Waste Owners to develop the conceptual designs for each method.*
2. *Comment on how each method has been described to account for possible future changes in the volume of fuel used and other key related assumptions.*
3. *Comment on the extent to which the conceptual designs adequately describe the technical methods that the NWMO must study as outlined in Section 12 of the NFWA.*
4. *Comment on the extent to which the conceptual designs for each method have taken into account “natural and other events that have a reasonable probability of occurring” as described in Section 13 of the NFWA.*
5. *Map the document trail that supports the conceptual designs, assess the documentation and comment on the quality and completeness of the documentation.*
6. *Document how accepted engineering standards were followed in the development of the various conceptual designs.*
7. *Deliver a signed opinion on the processes and standards that were followed in developing the conceptual engineering designs and the extent to which the descriptions of the conceptual designs for each method adequately meet the requirements of the NFWA.*

The reviewers undertook an extensive review of the conceptual designs provided and arrived at an assessment against each the criteria listed above. These specific assessments are set out in Section 6 of this report.

The team also arrived at an overall assessment and conclusion concerning the conceptual designs which is summarized as follows:

The conceptual designs are assessed to be suitable for the intended purpose which is to assess the options presented and arrive at a recommended approach. The conceptual designs are well developed and documented and prepared in a manner consistent with established engineering practice.

Accordingly, it is reasonable to expect that any of the options reviewed could be developed into a full detailed-design that would meet the requirements of the NWMO program. It should be noted however, that should there be a requirement to accommodate non-standard fuels, the designs would have to be adapted to address such a need. It is reasonable to expect that this could be done within the overall design concepts presented although there would be an impact on the overall system design and program cost.