

**Comment from:**  
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Nuclear Fuel Waste Act of 2002 Implementation  
A Personal Commentary

In November 2002, the Government of Canada enacted the Nuclear Fuel Waste Act. Its intent was to establish a framework within which Canada could make and implement decisions regarding the disposition of Canada's used nuclear fuel. Among the many provisions, a new organization, the Nuclear Waste Management Organization (NWMO), was established. NWMO was tasked to provide the Government its recommendation for the long term management of Canada's used nuclear fuel by November 15, 2005, a mere three years after the act's creation.

Even with a tight timeline to make the required recommendation, NWMO has developed innovative and in some respects, unique features to meet its mandate.. The process it is employing to recommend an approach to used fuel management (the HOW), the people it is involving (the WHO), and the substance of its work (the WHAT) all demonstrate a concerted intent to integrate the technical and societal dimensions. It is not an accident that NWMO describes its purpose: "to develop collaboratively with Canadians a management approach that is socially acceptable, technically sound, environmentally responsible, and economically feasible."

All countries attempting to solve the permanent disposition of used fuel, including Canada, have experienced major programmatic, technical, and institutional challenges. Disposition is a difficult issue in which reasonable people, armed with the facts, can still disagree. A number of trends have arisen as countries better understand some of the key features necessary to program progress, and adapt them to their particular circumstances. These include a more step-wise and transparent approach to decision making, and more meaningful involvement with the public, objectives in which NWMO is making fundamental advances.

## **HOW**

NWMO announced that the process in reaching the required recommendation is unfolding in a series of three discussion documents, each followed by intense and widespread dialogue with citizens, affected parties, and key decision makers. This iterative approach, with proactive engagement, facilitates one of the key elements of a credible approach – transparency. Use of the web complements structured dialogues with citizens across Canada and engagement of appropriate experts and affected organizations.

By beginning with an examination of the questions to be addressed in reaching a recommendation, NWMO makes it clear that it is approaching the job with an open mind

and does not start with a preconceived notion of the answer. This is reinforced by the involvement of a wide variety of individuals with experience and expertise over much more than the technical and economic dimensions of the issue. No option was dismissed before being fully evaluated. The intention to narrow the field of options was made clear in the discussion documents to allow for broad consideration before a final decision is taken.

## **WHO**

NWMO has crafted a number of outreach activities intended to construct an active dialogue with Canadian society. A most innovative National Citizen's Dialogue brings together citizens from across Canada to both learn about the issues and to share their perspectives. A scenarios workshop helped to explore the future and its implications for the management options. A panel of ethicists provides input on the moral and ethical dimensions. Background studies were commissioned for a wide variety of people to explore and report on the range of important issues. The web site is an active tool to communicate the results of NWMO's work and to encourage dialogue on difficult and contentious issues with the broader public.

An Assessment Team (of which I was a member) was created to identify and describe the options for used fuel management; to develop an assessment methodology for evaluating and comparing options; and to provide an initial application of the methodology to the options to demonstrate how well each option meets the desired objectives. The composition of the team was deliberately broad in expertise, experience, and outlook. Several members came from outside the traditional waste management community. The team makeup reflected that this is not just about developing a cost effective technical solution; this is Canadian society making up its mind.

## **WHAT**

The Assessment Team evaluated a number of methods that could be used to identify the diverse objectives of a program to manage used nuclear fuel in the long term and to assess how well the various objectives met these objectives. The Team concluded that multi-attribute utility analysis (MUA), a formal approach used in professional decision making, was an appropriate tool to aid in such analysis and in reaching a recommendation. This method has been used in assessing similar decisions in other countries. It is particularly suited to evaluating options that must simultaneously satisfy a wide variety of important objectives. Each option needs to be evaluated in how well it meets all of the important attributes, hence "multi-attribute utility analysis."

Of course no option for management meets all objectives perfectly and it is unlikely that any one option will outperform all other options in meeting every objective. MUA provides a rigorous and transparent process for identifying and weighing how well options meet the objectives in relation to one another. It provides for sensitivity analysis; that is how robust a preferred outcome is to changes in the input. And, importantly, it also

allows any interested parties to replace the Assessment Team's values with their own in the analysis and see how it would affect the outcome.

The Team was aided by a deliberate process to inform the team of the insights arising from the National Citizen's Dialogue, the ethics roundtable, the scenario workshop, dialogue through the web site, and other comparable NWMO-inspired activities. In fact, the Team developed a synthesis of Canadian values drawn from its assessment of these sources to use as a guide in conducting the assessment.

As part of the MUA process, the team identified a number of fundamental objectives that, in the team's view, needed to be well met for an option to be considered an attractive choice. A number of identified objectives were identical or similar to those of other analyses conducted for evaluating and choosing used nuclear fuel management options. These objectives included protection of public and worker health and safety, environmental quality, security, and costs. Some additional objectives reflect particular Canadian values identified through the NWMO outreach efforts including fairness, community well-being, and adaptability. While such factors have been considered in the deliberations of other countries, they have often not formed an integral part of the decision making process. This more comprehensive NWMO approach has broadened the dimensions of the considerations and led to explicit inclusion of societal factors along with technical and programmatic ones in informing the decision process.

This explicit recognition of facets of the decision process that focused on societal, ethical, and institutional dimensions of the choice reflects the inherent dilemma in managing used nuclear fuel that remains a hazard for a very long time. How can the decision best achieve fairness in all dimensions? How to balance decisions that entail shifting burdens and risks from one set of individuals, communities, and segments of society to another? And how can the program best provide intergenerational equity by solving the management problem in this generation while preserving the ability of future generations to adapt the program to what they see as in their best interests?

These are questions that do not have singular answers. They reflect different societal priorities. Information about the range of scores in the assessment process in addition to consensus or average scores, contributes to the transparency of the process. Transparency reinforces the informed judgment approach and enhances the opportunity for scrutiny and independent judgment.

As an important example, the NWMO consultation process across Canadian society has perhaps uniquely clarified the dual desire of Canadians to both solve the waste problem in a way that does not unduly burden future generations, while simultaneously preserving a degree of flexibility for future generations to modify decisions to meet their own objectives and to take advantage of scientific progress. Indeed, this insight is deliberately reflected in the core approach taken by of the Assessment Team.

While a number of programs have wrestled with many of these same powerful problems, the Canadian NWMO process has put them in stark relief and made them an inherent part in reaching an ultimate recommendation.

## **Biography: Thomas Isaacs**

Mr. Isaacs is Director of Policy, Planning and Special Studies at the Lawrence Livermore National Laboratory. This includes responsibility for shaping and outlining the Laboratory's mission, programs, scientific and technical accomplishments, and operational activities. The Laboratory has major national programs in national security, homeland security, energy, environment, biosciences, health care and basic sciences.

Previously, Mr. Isaacs held several senior management positions in the High-Level Radioactive Waste Program of the DOE. As Deputy Director of the Office of Geologic Repositories, he managed the comparative evaluation of candidate sites for the first U.S. repository. MR. Isaacs also managed the international technical cooperative program with several European nations and Canada, and was the lead U.S. delegate to the Radioactive Waste Management Committee of the Nuclear Energy Agency. He was a member of the 2003 U.S. National Academy of Science committee which released its report making recommendations on the development of used nuclear fuel waste management programs focused on geologic repositories. He serves on the advisory committees for the nuclear engineering departments at Texas A&M and Oregon State universities.

Earlier, Mr. Isaacs was Deputy Director of the DOE Office of Safeguards and Security with responsibility in federal actions to minimize prospects of nuclear proliferation, including establishing the program of technical assistance to the International Atomic Energy Agency for safeguarding nuclear facilities worldwide. Mr. Isaacs graduated cum laude with a B.S. in chemical engineering from the University of Pennsylvania, and was a member of the Tau Bet Pi National Engineering Honor Society. Mr. Isaacs received an M.S. in Engineering and Applied Physics from Harvard University.