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DRAFT STUDY REPORT ADAPTIVE PHASED MANAGEMENT



Elizabeth Dowdeswell
Continuous Learning

The Nuclear Waste Management Organization (NWMO) is proposing to recommend an Adaptive Phased Approach for the long-term care of used fuel from Canada's nuclear reactors. The NWMO has published its recommendations in draft for comment and review.

"Safety for people and the environment, and fairness for this and future generations, are the primary objectives of our recommendation," said NWMO President Elizabeth Dowdeswell. "Adaptive Phased Management acknowledges that Canadians will take responsibility now for waste we've produced, while leaving options open for future generations to make decisions in their own best interests," she said.

The NWMO is proposing a management system as well as a technical method. The man-

agement system is phased and adaptive. Options would be evaluated at every stage, and interested and affected citizens would be engaged to participate in decision-making about whether to proceed, stop, or reverse the process.

"We don't have all the answers, either about technology or about the future of society," said Ms. Dowdeswell. "Adaptive Phased Management is a commitment to continuous learning today to assist decision-making tomorrow."

The technical method being proposed is centralized containment and isolation of used nuclear fuel deep underground in suitable rock formations, possibly in the crystalline rock of the Canadian Shield, or in other formations like sedimentary rock. Through three envisaged implementation phases, lasting up to 300 years or more, the waste would be monitored and remain retrievable. All regulatory standards and licencing requirements of the Canadian Nuclear Safety Commission, and other national and international oversight bodies, will be met or exceeded at every stage to ensure safety and security.

In an illustrative description of how Adaptive Phased Management could unfold, the NWMO suggests a period of approximately 30 years when used fuel would remain safely managed at nuclear reactor sites. During this initial phase, working collaboratively with interested citizens, the goals would be to site a centralized facility and build an underground research laboratory to confirm suitability of

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KEEPING INFORMED NUCLEAR COMMUNITIES



NWMO's Sean Russell
Briefs Ajax Rotary Club

Over the course of its study, the NWMO has used a variety of innovative techniques to elicit comment and encourage dialogue. The organization has also relied on more traditional activities, including responding to requests for study updates.

There has been an ongoing dialogue with the Canadian Association of Nuclear Host Communities and with other organizations and groups representing people who live and work near nuclear electricity generating stations.

"Citizens who live in nuclear site communities bring special knowledge and insight to our dialogue," said NWMO technical advisor Sean Russell. "Their experience living near used nuclear fuel, where it is safely stored on an interim basis now, benefits our study immensely," he added.

Among nuclear community groups and organizations which have requested and received updates from the NWMO are: the Ajax Rotary Club, the Durham Nuclear Health Committee, the Pickering Community Advisory Committee, the Darlington Site Planning Committee, the South Bruce Impact Advisory Committee and Renfrew Concerned Citizens. ■

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ADAPTIVE PHASED MANAGEMENT

the site and the technology for a deep repository. A decision would also be taken on whether to build an interim shallow underground storage facility at the same site.

Depending on societal direction, used fuel could be moved to the central site for interim storage during the second thirty-year phase. Throughout this period the program of research and demonstration would continue.

Used fuel would be placed in the repository in phase three, expected to begin around year sixty. Future generations would decide in phase three whether and when to close the repository, and what kind of post-closure monitoring would be required.

The NWMO intends to seek a willing community to host the central facilities. Site selec-

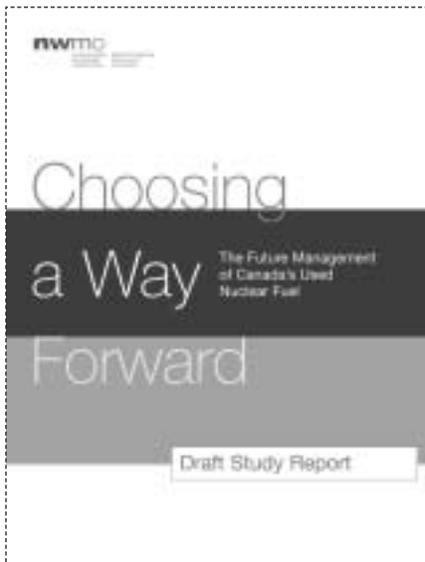
tion will focus on provinces which are currently involved in the nuclear fuel cycle; Saskatchewan, Ontario, Quebec and New Brunswick – although communities in other regions would not be denied the opportunity to be considered.

The NWMO developed its recommendation after learning from technical specialists and engaging more than 15,000 interested Canadians, including 2,000 Aboriginal People, in a wide-ranging dialogue on the values, principles and objectives they believe are required of a nuclear waste management approach that is socially acceptable, environmentally responsible, technically sound and economically feasible.

The proposal will be the subject of further dialogue before the organization presents its final report in November. The Government of Canada will decide from among the four approaches studied how used nuclear fuel will be managed over the long term. The NWMO will then be responsible for implementation.

If selected, Adaptive Phased Management is expected to cost \$24.4 billion. Under the "polluter pays" principle of the *Nuclear Fuel Waste Act*, nuclear energy producers have begun contributing to trust funds to ensure money will be available for the long-term nuclear waste management approach chosen.

The full Draft Study Report, *Choosing a Way Forward*, is available for download at: www.nwmo.ca or in hard copy by contacting the NWMO. ■



Draft Study Report
Comment and Review

Be Involved

The NWMO wants Canadians to become involved and help shape its study of nuclear waste management approaches. We're using electronic and face-to-face methods to dialogue with you and ensure your values and concerns are considered. Let your ideas and perspectives be known.

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INFORMATION AND DISCUSSION ACROSS CANADA



Information & Discussion
Timmins, Ontario

Almost 900 Canadians participated when NWMO staff and Assessment Team members fanned out from coast to coast over the winter convening 121 information and discussion sessions in 34 communities in every province and territory of the country. The interested citizens were asked about the strengths and lim-

itations of long-term nuclear waste management approaches being studied, and about the framework being proposed to compare them.

For the most part, the NWMO found wide support for the assessment framework. Most people said it was comprehensive, balanced, and reflective of the values and ethical principles of most Canadians. Many said inclusion of social values and ethical considerations alongside technical and financial concerns was a significant improvement over past efforts to develop a management approach for used nuclear fuel.

Safety from harm topped the list of objectives that people thought important. However, there were differing views on how that should be achieved. Some thought used nuclear fuel should be isolated and contained, while others

believed safety was best assured by storing it where it can be actively managed.

There was also wide agreement that Canada should take responsibility for its used fuel now. But, views differed on whether that meant this generation should decide on a final solution or accept responsibility for continuing to safely manage used fuel pending a decision by future generations.

Adaptability and flexibility were strongly supported, as was the need for ongoing information and education so that Canadians can better weigh the risks and benefits of used fuel management approaches.

A full report on the Information and Discussion sessions is available online: www.nwmo.ca/infoanddiscussion ■

ABORIGINAL ENGAGEMENT TRADITIONAL KNOWLEDGE



Mary Palliser, President, PIWA
Tony Hodge, NWMO

Traditional Knowledge is a critical component of the NWMO dialogue on long-term used nuclear fuel management. The NWMO supports a range of programs, designed and implemented by Aboriginal Peoples, through collaborative agreements it has with the national Aboriginal organizations and a number of regional and local organizations.

“Our work benefits immensely from a better understanding of the Aboriginal sense of responsibility to the environment, the land, animal life and their habitat,” says Tony Hodge, coordinator of the NWMO Aboriginal engagement program. “We want to build the foundation for a long-term positive relationship with the Indian, Inuit and Metis people of Canada,” he said.

More than 2,000 Aboriginal People across Canada have engaged in workshops, meetings, community retreats, presentations and discussions focussed on used nuclear fuel. Participating national groups include: the Assembly of First Nations, the Metis National Council, the Congress of Aboriginal Peoples, the Inuit Tapirit Kanatami, Pauktuutit Inuit Women’s Association, and the Native Women’s Association of Canada.

Often the NWMO is invited to attend and present at the sessions. Similar to broader public input, safety and security for people and the environment is the highest priority identified through the dialogues. Many participants have called for a reduction in energy use generally, and nuclear energy in particular. Most have opposed the importation of nuclear waste. And there is a general belief that more research is needed on a number of topics, including Traditional Knowledge and its application.

Aboriginal Dialogues on the Draft Study are ongoing. Reports from each of the Aboriginal organizations can be reviewed online: www.nwmo.ca/aboriginaldialogues ■

DRAFT STUDY REPORT QUESTIONS AND ANSWERS

Q. Now that a draft recommendation has been developed, what happens next?

A. The Draft Study Report is available for comment and review. It can be downloaded at www.nwmo.ca or provided in hard copy on request.

The NWMO wants to know if the recommended Adaptive Phased Management approach is appropriate for Canada, and what conditions are necessary to successfully implement the approach.

A series of in-depth dialogues is planned to hear from people who have been active participants in the study process. Open Houses and Aboriginal Dialogues are listed as they are scheduled at www.nwmo.ca/calendar. As always letters, electronic submissions and comments are invited and encouraged. The website also hosts a deliberative survey which can be completed, and an e-dialogue featuring an interview with NWMO president Elizabeth Dowdeswell, is also being developed. The NWMO responds to requests from groups wanting to discuss its work.

The NWMO must submit its study and recommendations to the Minister of Natural Resources Canada by November 15th, 2005.

Q. Why does NWMO suggest that site selection focus on Saskatchewan, Ontario, Quebec and New Brunswick?

A. The NWMO intends to seek a willing community to host the proposed central facilities. We believe the objective of fairness is best achieved by initially focussing on the four provinces directly involved in the nuclear fuel cycle. Ontario, Quebec and New Brunswick benefit from nuclear electricity generation and uranium used to make nuclear fuel is mined in Saskatchewan. However, communities in other regions would not be denied the opportunity to be considered for feasibility studies provided the potential site can be shown to meet all of the scientific, technical, safety and regulatory requirements.

The NWMO proposes that the siting process be open, inclusive and fair, giving everyone with an interest an opportunity to have their views heard and taken into account. Affected groups must be provided with the assistance they need to present their case effectively.

Q. Where will the money come from to finance long term nuclear waste management?

A. All costs will be paid for by the waste producers - Ontario Power Generation, Hydro-Québec, New Brunswick Power and Atomic Energy of Canada Ltd. The *Nuclear Fuel Waste Act* required nuclear generators and AECL to establish trust funds to ensure that money will be available. To date, these accounts hold approximately \$770-million. Audited financial reports are available for review online at: www.nwmo.ca/trustfunds. All of the money required to pay for the management approach selected by the government will be collected before construction of any facility is undertaken.

Q. How will the funds be guaranteed?

A. The funds are guaranteed by being placed in trust accounts held by independent financial institutions. They are accessible only by the NWMO and only after a construction or operating license is granted. Through its Annual Report to the Minister of Natural Resources Canada, the NWMO has the ability to adjust the amounts of financial contributions to ensure that sufficient money is available should costs and designs change over time.

Q. How hazardous is used fuel to humans and the environment and for how long?

A. When it is removed from an operating reactor, used nuclear fuel is highly radioactive and hazardous to humans and the environment. A brief period of direct exposure would have serious consequences.

Initially, the used bundles are placed in water-filled pools at the reactor sites which provide adequate shielding and a means of reducing the decay heat. After seven to ten years they can be transferred to dry storage containers on site.

Even though the radioactivity in used fuel decreases by a factor of about 1,000 after 10 years, significant steel and concrete shielding is still required to absorb and contain the radiation because it presents a health risk from both external and internal radiation exposure.

The health risk will diminish with time. After 1 million years of decay, the radioactivity in used fuel approaches that of a natural uranium ore body deep in the ground. Nevertheless, there is a small but remaining hazard to humans and the environment beyond that time.

The Canadian Nuclear Safety Commission sets radiation dose limits for members of the public and for nuclear energy workers in Canada. Any approach for long-term management of used nuclear fuel will need to provide confidence that its implementation will meet or exceed regulatory requirements established by Canadian authorities, including the Canadian Nuclear Safety Commission.

Q. What are the risks of a transportation accident?

A. If a long-term management approach for used nuclear fuel requires transportation, technology has been developed for a variety of transport modes including road, rail and water.

Transportation safety has been examined and researched in Canada and elsewhere including by experts in the United States, the European Union, Japan and the International Atomic Energy Agency. The analyses suggest that health risks are primarily those associated with conventional accidents, not with the radioactive content of the transport vessels.

There are about 30 million shipments of dangerous goods in Canada each year. Approximately 1 million of these are radioactive packages, mostly medical isotopes, with smaller amounts of low and intermediate level radioactive waste, and

some shipments of used nuclear fuel from operating reactors to the Atomic Energy of Canada Ltd. Chalk River Laboratory for examination and research.

There is also substantial international experience transporting used nuclear fuel.

Q. Who would regulate the transport of nuclear waste?

A. Transportation of used nuclear fuel in Canada is governed by the *Transportation of Dangerous Goods Act*. Among other things, regulations under the legislation prescribe specific safety standards. Approved emergency response assistance plans are explicitly required for the transportation of all radioactive materials. And there are requirements for employee training.

To transport used nuclear fuel a transporter must obtain a licence from the Canadian Nuclear Safety Commission that contains, in addition to the information required by the *Packaging and Transport of Nuclear Substances Regulations* of the *Nuclear Safety and Control Act*, a detailed transportation security plan.

Before a licence is issued, the security plan is reviewed by CNSC staff to ensure compliance with the regulations and a "best-practices" approach to the security arrangements.

Although the authority to regulate nuclear energy in Canada rests with the federal government, almost all provinces and territories include nuclear substances in the scope of legislation and regulations addressing the transportation of dangerous goods.

The International Atomic Energy Agency also develops standards for the safe transport of radioactive material. These are reviewed continually and revised as need is determined by international experts. Canada has adopted the IAEA requirements and new recommendations are reviewed every two years.

Q. What is the process after the NWMO submits its study?

A. The NWMO must submit its study and recommendations to the Minister of Natural Resources Canada by November 15th, 2005. The report will be made public at the same time. It will include the comments of the Advisory Council and a summary of comments from the general public and Aboriginal Peoples. Natural Resources Canada will initiate a review of the study, inviting comments from various federal departments, as well as the Canadian Nuclear Safety Commission.

The government will select an approach for long-term management of used nuclear fuel from the approaches studied by the NWMO. The government's choice will then be implemented by the NWMO, subject to all of the necessary regulatory approvals including an Environmental Assessment and licensing by the Canadian Nuclear Safety Commission.