



Implementing Adaptive Phased Management 2008 to 2012



Revised June 2008

nwmo

NUCLEAR WASTE
MANAGEMENT
ORGANIZATION

SOCIÉTÉ DE GESTION
DES DÉCHETS
NUCLÉAIRES

Contents

03	Preface
04	Executive Summary
05	The Organization
07	Our First Five Years Adaptive Phased Management
10	Priorities for the Next Five Years Strategic Objectives Building Relationships Building Knowledge - Technical and Social Research Technical Research Social Research Financial Surety Review, Adjust and Validate Plans Governance Structure Building an Implementing Organization Collaborative Design and Initiation of a Siting Process
23	The Road Ahead
24	Glossary



Preface

In June 2007, the Nuclear Waste Management Organization (NWMO) was given responsibility for implementing Adaptive Phased Management (APM), Canada's long-term plan for used nuclear fuel. This Implementation Plan sets out our ideas about how to move forward over the next five years. The Plan has been developed with guidance received in our public engagement program, initiated in Summer 2007.

The Plan was released in draft for public comment in April 2008. Following the close of the review period, the Plan was revised to reflect many of the comments received. The NWMO also received many suggestions that will be considered and implemented as it goes forward to design specific program elements. A summary of the comments received is posted on the website www.nwmo.ca.

This document begins with an overview of the NWMO, Adaptive Phased Management, and how we arrived at this point. The Plan is built upon our priorities and strategic planning objectives. With this Plan, the NWMO reconfirms and demonstrates its commitment to engaging and collaborating with Canadians in defining how we go forward.

Executive Summary

STRATEGIC OBJECTIVES



Seek to build long-term relationships with interested Canadians and Aboriginal people.

Advance technical and social research.

Develop and refine a funding formula and trust fund deposit schedules that address financial surety and long-term program funding.

Continually review, adjust and validate plans.

Continue to develop and maintain a governance structure.

Build NWMO as an implementing organization.

Proceed with the collaborative design of a process for site selection.

In June 2007, the Nuclear Waste Management Organization (NWMO) was given responsibility for implementing Adaptive Phased Management (APM), Canada's long-term plan for used nuclear fuel. Technically, APM has as its end-point the containment and isolation of used nuclear fuel in a deep repository constructed in a suitable rock formation. Collaboration, continuous learning and adaptability will underpin our implementation of APM as it unfolds over many decades. All aspects of NWMO's work is subject to extensive oversight and regulatory approvals, and the NWMO will meet or exceed all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

With its new mandate, the NWMO is making the transition from a study group to a sustainable implementing organization. This Implementation Plan describes how we expect to move forward to build our organization, strengthen our governance structure and policies, continue to build on our solid foundation of technical and social research, design the process for deciding where to contain and isolate Canada's used nuclear fuel, and engage Canadians meaningfully in all of these activities.

To guide our planning, the Board of Directors of NWMO has embraced seven strategic planning objectives. This Implementation Plan describes initiatives that we intend to undertake in a coordinated and systematic way in each of these seven areas over the period 2008 to 2012. It was developed with guidance from interested Canadians.

The Implementation Plan is a living document that will be regularly assessed, strengthened and redirected in response to new information, advances in technology and science, changes in societal values and the evolution of public policy.

USED NUCLEAR FUEL



Over 40 years Canada's nuclear power program has produced just over two million used fuel bundles. Each fuel bundle is about the size and shape of a fireplace log, weighing approximately 24 kg.

If the entire current inventory of used fuel bundles could be stacked end-to-end like cordwood, it would fit into a space the size of six hockey rinks from the ice surface to the top of the boards.

After a fuel bundle is removed from a reactor, it is safely managed in facilities licensed for temporary storage at the reactor site. First it is placed in a water-filled pool for seven to ten years where its heat and radioactivity decrease. Afterwards, used bundles are typically placed in dry storage containers, silos or vaults.

About 85,000 used nuclear fuel bundles are generated in Canada each year. Based on the current rate of production by existing nuclear electricity generation plants, it is estimated that 3.6 million used fuel bundles will exist in Canada by the end of 2033.

The Organization

NWMO Vision: The long-term management of Canada's nuclear waste in a manner that safeguards people and respects the environment now and in the future.

The Government of Canada, through the *Nuclear Fuel Waste Act (2002)* assigned responsibility for the long-term management of all of Canada's used nuclear fuel to the NWMO. Used nuclear fuel remains radioactive for a long period of time and the material must be contained and isolated from people and the environment essentially indefinitely. Canada's used nuclear fuel is presently safely stored on an interim basis at licensed facilities at nuclear reactor sites in Ontario, Québec and New Brunswick and at Atomic Energy of Canada Limited's nuclear research site in Manitoba. Established as a not-for-profit corporation by Canada's major nuclear fuel waste owners, Ontario Power Generation, Hydro-Québec and New Brunswick Power Corporation¹, the NWMO's mandate is to implement a management approach for the long-term care of Canada's used nuclear fuel that is socially acceptable, technically sound, environmentally responsible and economically feasible.

The Organization began in 2002 as a study group to examine approaches for the long-term care of used nuclear fuel. In 2007, it received the mandate to implement the government's decision, and the process to lay the foundation for a job that will continue for many decades began. The NWMO is now building a multi-disciplinary team with a range of experience in the fields of social and technical research, public engagement, communications, finance and governance. We continue to collaborate with an extended network of consultants, practitioners and academics from across Canada and around the world to ensure that our work benefits from the best available knowledge.

¹ In 2004, through a transfer order, the Government of New Brunswick assigned responsibility for all aspects of the provincially-owned nuclear generating assets to a new subsidiary corporation, NB Power Nuclear.

The NWMO is overseen by a Board of Directors appointed by the nuclear fuel waste owners. Canadians also have the benefit of an independent Advisory Council that monitors the work of the NWMO. The NWMO Advisory Council is appointed by the NWMO Board of Directors, as required by the *Nuclear Fuel Waste Act (2002)*. This group of individuals is knowledgeable in nuclear waste management issues and experienced in working with citizens and communities on a range of public policy issues.

NWMO is guided by five fundamental values:

INTEGRITY

We will conduct ourselves with openness, honesty and respect for all persons and organizations with whom we deal.

EXCELLENCE

We will pursue the best knowledge, understanding and innovative thinking in our analysis, engagement processes and decision-making.

ENGAGEMENT

We will seek the participation of all communities of interest and be responsive to a diversity of views and perspectives. We will communicate and consult actively, promoting thoughtful reflection and facilitating a constructive dialogue.

ACCOUNTABILITY

We will be fully responsible for the wise, prudent and efficient management of resources and be accountable for all our actions.

TRANSPARENCY

We will be open and transparent in our process, communications and decision-making, so that the approach is clear to all Canadians.

Our First Five Years

The *Nuclear Fuel Waste Act (2002)* required the NWMO to provide a recommendation to the Government of Canada on the long-term management of used nuclear fuel, one that considered more than the traditional technical issues.

Within three years of the legislation coming into force, the NWMO was required to submit to the Minister of Natural Resources proposals for the management of used nuclear fuel, along with comments of the Advisory Council, and a recommended approach. The NWMO completed its study with the input of over 18,000 Canadians. In November 2005, it presented its report and recommended approach to the Minister of Natural Resources.

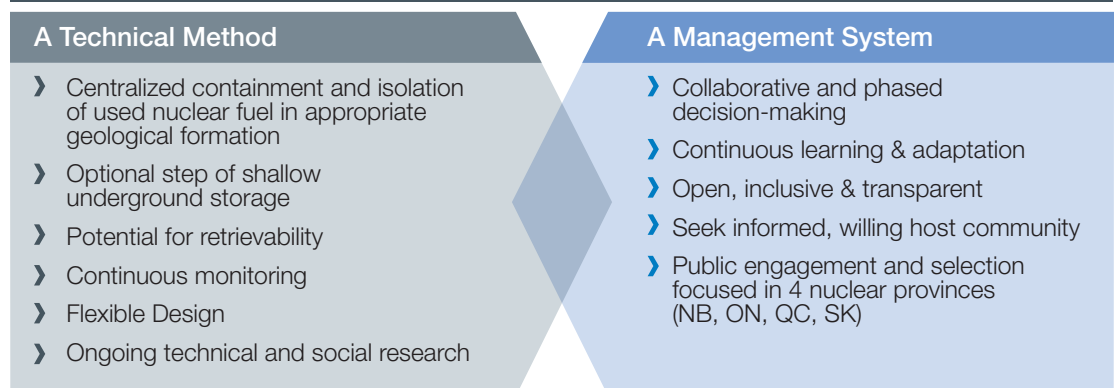
The legislation authorized the Government of Canada to decide on the approach and in June 2007, the government selected Adaptive Phased Management (APM), the approach recommended by the NWMO. The NWMO is now responsible for implementing APM subject to all of the necessary regulatory approvals.

The legislation also required the nuclear fuel waste owners to establish segregated trust funds to finance the long-term management of the used fuel. These funds were established in 2002 and contributions are made annually by the waste owners. Audited financial statements are posted on the NWMO web site.

Adaptive Phased Management

Technically, Adaptive Phased Management has as its end-point the isolation and containment of used nuclear fuel in a deep repository constructed in a suitable rock formation.

Figure 1 **Overview of Adaptive Phased Management**



Collaboration, continuous learning and adaptability will underpin our implementation of the approach as it unfolds over many decades. All aspects of NWMO's work will be subject to extensive oversight and regulatory approvals and will meet or exceed all applicable regulatory standards and requirements for protecting the health, safety and security of humans and the environment.

APM emerged from a three-year dialogue with thousands of citizens from all parts of Canadian society. Through this dialogue we heard that the approach for managing used nuclear fuel must meet a number of objectives:

Fairness

To ensure fairness (in substance and process) in the distribution of costs, benefits, risks and responsibilities, within this generation and across generations.

Public Health and Safety

To protect public health from the risk of exposure to radioactive or other hazardous materials and from the threat of injuries or deaths due to accidents.

Worker Health and Safety

To protect workers from and minimize hazards associated with managing used nuclear fuel.

Community Well-being

To ensure the well-being of all communities with a shared interest.

Security

To ensure the security of facilities, materials and infrastructure.

Environmental Integrity

To ensure that environmental integrity is maintained over the long term.

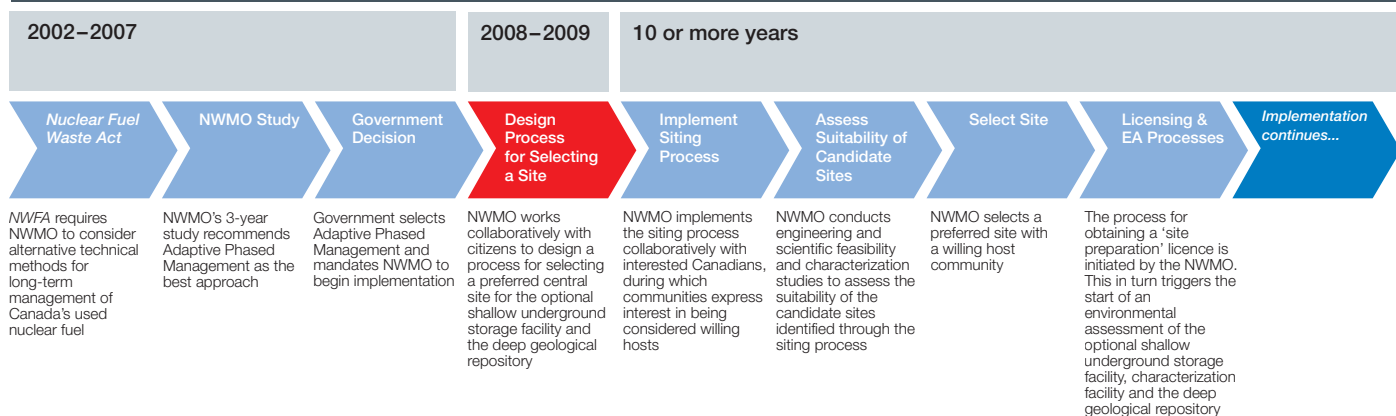
Economic Viability

To ensure the economic viability of the waste management system, while simultaneously contributing positively to the local economy.

Adaptability

To ensure a capacity to adapt to changing knowledge and conditions over time.

Figure 2 **Initial Stages of Implementation of APM – Timeline**



Canadians believe that as an approach, APM has the potential to realise these objectives because it links technical needs to a management system that can embrace change in technology and science, societal values and public policy. This is because APM breaks implementation into realistic, manageable phases, each marked by explicit decision points with opportunities for input by Canadians. APM is flexible and the timeframe is not fixed. Such an approach allows the implementation of APM to meet Canadians' expectations, as listed below:

- » continue building new knowledge;
- » inform the public about emerging innovations;
- » seek third-party verification as a measure of trust;
- » consider the work of other countries;
- » assure that best knowledge and expertise are applied;
- » measure actions against independent benchmarks;
- » report in easy-to-understand, non-technical language; and
- » ensure ongoing public involvement in decision-making.

Implementation of APM will be regulated at all stages, providing further opportunities for public input. The NWMO will be required to obtain licences from the Canadian Nuclear Safety Commission (CNSC) for site preparation, construction, operation and decommissioning for the centralized facilities. The transportation of used nuclear fuel will be regulated by the CNSC and Transport Canada. The studies and documentation required for each of these assessments and licence applications will be addressed in future implementation and work plans.

APM moves towards a goal that Canadians themselves identified: safe, secure, long-term containment and isolation of used nuclear fuel produced in Canada, with flexibility for future generations to make their own decisions. The trust and the credibility that the NWMO has built throughout the study phase have earned NWMO a social license to proceed to implement Canada's plan.

Priorities for the Next Five Years

STRATEGIC OBJECTIVES



Seek to build long-term relationships with interested Canadians and Aboriginal people.

Advance technical and social research.

Develop and refine a funding formula and trust fund deposit schedules that address financial surety and long-term program funding.

Continually review, adjust and validate plans.

Continue to develop and maintain a governance structure.

Build NWMO as an implementing organization.

Proceed with the collaborative design of a process for site selection.

Over the next five years, the NWMO will prepare to implement APM in a manner that meets Canadians' expectations. Critical to success in implementation is the involvement of citizens at key stages and key decisions through engagement processes that are open, transparent and inclusive. In short, we will take the time necessary to collaboratively plan and then confirm each step with Canadians before moving forward.

Our plans must balance Canadians' desire for meaningful and expedited progress with the work required to fully embrace the issues of APM that go beyond siting a central facility.

With the NWMO's new mandate to implement APM, we must transition from a study group to a sustainable implementing organization. In the near term, we will move forward to build this organization, strengthen our governance structure and policies, continue to build on our solid foundation of technical and social research, design the process for deciding where to contain and isolate Canada's used nuclear fuel, and engage Canadians meaningfully in all these activities.

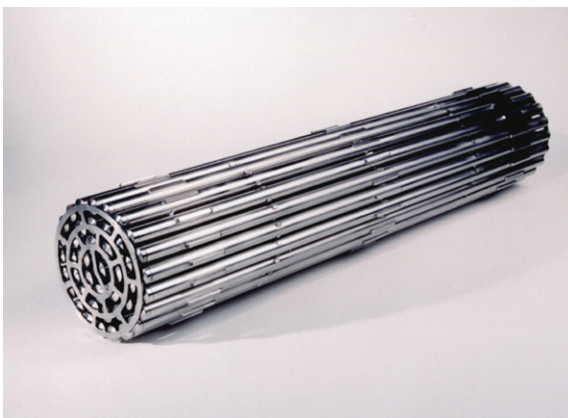
We must also be ready to demonstrate the adaptability of APM to the potential implications of changes in nuclear energy policy, such as the management of used fuel from new nuclear generation plants.

To guide our work in addressing these many issues, the NWMO Board of Directors has embraced seven strategic planning objectives. These objectives flow from the NWMO's Vision, Mission and Values, and the objectives and expectations that Canadians said were important for APM.

The Strategic Objectives provide the framework for developing work programs to assess and address the implications of the many issues related to the implementation of APM.

The Strategic Objectives are the foundation for our first five-year Implementation Plan. The initiatives described in the following sections are intended to guide our work in a coordinated and systematic way over the period 2008 to 2012. It is our intention that our work in the areas of technical and social research will allow the NWMO to be ready to start the technical and socio-economic assessment of a site as an informed willing host community comes forward.

Figure 3 **CANDU Fuel Bundle**



Strategic Objectives

» The principal objectives of the NWMO engagement program:

1. Build trusting relationships with communities, Aboriginal people, non-governmental organizations, citizens, and other interested parties.
2. Develop a communication program to report the work of the NWMO and promote awareness and understanding of nuclear waste management in Canada and emerging innovations and issues in easy-to-understand language.
3. Seek multiple perspectives to review, adjust and validate plans.
4. Seek to sustain engagement of interested individuals and organizations, including youth, throughout the implementation of APM.
5. Ensure that communities have the information and resources necessary for making informed decisions and working collaboratively with the NWMO at a pace and in a manner that responds to the needs of their citizens.
6. Design and implement a siting process that is responsive to Canadians' expectations for implementing APM.
7. Maintain skilled engagement personnel by developing in-house expertise and effective working relationships with academic institutions and practitioners in the consulting community.

Building Relationships

The NWMO will continue to build long-term relationships with interested Canadians and Aboriginal people and involve them in setting future direction.

The goal of the engagement program is to build awareness, understanding and support among Canadians and particularly in the four nuclear provinces of Saskatchewan, Ontario, Québec and New Brunswick for Canada's approach for the long-term management of used nuclear fuel. The study phase began a process of collaboration, dialogue and engagement with specialists and citizens that Canadians have now set as an expectation for the decision-making and implementation stages of Adaptive Phased Management.

Our relationships with Canadians, including Aboriginal people, will define the success with which we are able to reach out and obtain a broad spectrum of perspectives and factor these into our plans. These perspectives will influence all our work, including planning, technical and social research programs, and decision-making.

Engagement will contribute to an informed citizenry and a culture of watchful vigilance. We expect that only through successful engagement and collaborative decision-making will we continue to maintain trust and build confidence in the process.

Over the next five years, the engagement program will focus on supporting activities in four areas:

- » Building knowledge;
- » Building an implementing organization;
- » Adapting to change; and
- » Designing and implementing a socially responsible process for selecting a site.

Our engagement activities will provide Canadians with the opportunity to get involved. A continuum of engagement activities from information sessions to partnerships will be needed to support decisions at each stage of the process.

Preparatory work will include raising awareness about the NWMO, APM and the project, and making available information and other resources necessary for meaningful participation in the dialogues and decision-making related to this complex issue. We must begin now to provide information to assist the understanding of the technical, social and economic issues of used nuclear fuel management, including topics of particular interest such as transportation.

We will develop a process by which communities can express an interest and think through the extent to which this project might contribute to their well-being. As knowledge about the project increases, interest in issues and by specific groups will become more focused. It is our expectation that some communities will come forward to declare an interest in learning more about the project.

As we seek input, we will seek a diversity of perspectives. The NWMO will reach out to citizens, community and municipal organizations, non-governmental organizations (including environmental groups), provincial and national agencies and governments, with an initial focus in the four nuclear provinces. The Final Study Report *Choosing a Way Forward (2005)* proposed that the process of implementation begin in the provinces that have benefited from the nuclear fuel cycle. This includes Ontario, New Brunswick and Québec, as well as Saskatchewan, which has benefited economically from mining uranium to make nuclear fuel. The NWMO recognizes that communities in other regions and provinces may come forward with an interest in hosting a facility for the long-term care of used nuclear fuel. Provided that a site is shown to meet the established safety and other regulatory requirements, it would not be denied the opportunity to be considered as a potential host. Given the intergenerational nature of the care of used nuclear fuel, the NWMO will engage youth to seek their views on the implementation of APM and to identify generational differences in values, social norms, evolving issues or concerns. We will identify indicators to gauge the value of our engagement and communication initiatives.

The NWMO acknowledges the unique status and rights of Aboriginal people as recognized and affirmed in s.35 of the *Constitution Act (1982)*. We will continue our work to meet the NWMO's statutory obligation and will work with the Crown with respect to the Crown's duty to consult and will develop a plan to fulfill our responsibility. We will continue to work with the Elders' Forum and seek advice from the NWMO Aboriginal Working Group, Niigani, as well as Aboriginal organizations, communities and leaders. An Aboriginal Policy will be developed to guide our work. We recognize that Aboriginal communities will want to understand this project from their own perspective and will need to have information and the opportunity to hold their own dialogue. We will work with them to ensure that resources and the best expertise are available for this dialogue process and that they are supported at each stage. In collaboration with Aboriginal groups and advisors, communication materials will be developed that most appropriately meet the cultural needs of Aboriginal peoples.

As we seek multiple perspectives, the engagement program and communication will take many forms. We will strive to overcome barriers to participation and address the unique needs of different organizations and regions. We will use a variety of dialogue and collaboration techniques in keeping with best practices, including but not limited to multi-party dialogues, new media, public attitude research and deliberative surveys on the NWMO website.

Importantly, we want to know how people wish to be involved. Many organizations have cautioned that our requests for their participation must be reasonable. They are tracking many issues with competing demands for time and resources. We will attempt to recognize these constraints as we plan our engagement activities.

The engagement program will be evaluated and revised annually to reflect emerging issues and feedback from participants in our dialogues and other events.

In 2008, we will:

- » Review and improve the effectiveness and accessibility of NWMO communications, e.g. the NWMO web site, undertake a communications audit, update the communications strategy;
- » Establish a youth roundtable to seek advice to develop and implement a strategy to engage youth;
- » Work with national, provincial and regional Aboriginal organizations to establish protocols to support Aboriginal involvement in engagement; and
- » Establish a program through which the NWMO will support worthwhile community initiatives, a corporate citizenship program.

In the period 2008-2012, we will:

- » Continue to identify speaking engagements, community-based presentations and media opportunities to develop awareness about NWMO activities;
- » Develop communications materials about NWMO, APM, the project and other issues as required;
- » Use many tools, including multi-party dialogues, citizen panels, topical workshops and web-based surveys, to invite input from Canadians in regional and community-based associations, environmental and other interest groups, researchers, industry, governments and the general public;

- » Broaden NWMO's relationships in the four nuclear provinces to include municipal, regional and provincial associations;
- » Seek advice on engagement of Aboriginal people from the Elders' Forum and Niigani, the working group established by the NWMO Elders' Forum;
- » Seek meetings with editorial boards and other media;
- » Continue to provide regular updates to provincial and federal government ministers, departments and agencies;
- » Maintain protocols with interested organizations, including Aboriginal Peoples; and
- » Develop strategies to address knowledge-building as the needs are identified.

Building Knowledge – Technical and Social Research

The NWMO will advance research to broaden its foundation of technical and social knowledge, bringing to bear the most advanced Canadian and international expertise to support implementation of Adaptive Phased Management.

A program that will evolve over a long period of time will have many opportunities to improve performance, enhance effectiveness, build understanding, and address societal concerns. A vibrant and robust research and development program will aid the realization of these benefits. Citizens and specialists alike have told us of the need for significant and

ongoing investment in building knowledge so that Canadians will have the benefit of leading technological innovation and assurance that institutional memory and the technical capacity of the workforce to manage used fuel are not eroded.

The technical and social research programs are designed to meet the objectives described below:

- » Enhance understanding to improve confidence in predictions, reduce uncertainty, and evaluate potential program improvements;
- » Confirm performance during and after program operations;
- » Demonstrate capacity to respond to citizens' concerns and desires;
- » Support mid-course corrections in response to new information or societal decisions;
- » Prepare for facility siting, design, licensing, development, and operations, and transportation of the used fuel; and
- » Assure human capacity to manage the implementation of APM.

The NWMO understands the importance of involving external parties in identifying research of relevance and interest. In addition to maintaining our in-house staff capability, the NWMO strives to develop effective working relationships with universities and the specialist consulting community within Canada. We also take advantage of opportunities for collaboration and participation in joint research, development and demonstration programs internationally.



The principal objectives of the NWMO technical research and development program:

1. Maintain skilled technical capability by developing in-house expertise and effective working relationships with Canadian universities and the consulting community.
2. Enhance scientific understanding of the technology for central storage and long-term containment and isolation of used fuel in a deep geological repository.
3. Further develop capability to evaluate potential sites from a technical perspective.
4. Seek opportunities for international collaboration and participation in joint technical research, development and demonstration programs, to bring the best international knowledge and practices into the technical work of the NWMO.
5. Build understanding of monitoring and retrievability during the various stages of implementation.
6. Maintain awareness of alternative means for the long-term management of used nuclear fuel.
7. Revise and update the cost estimate for long-term management of Canada's used nuclear fuel.
8. Incorporate Aboriginal Traditional Knowledge into technical research and development.

Technical Research

A strong technical research and development program will ensure that NWMO will benefit from technological innovation in radioactive waste management developed in Canada and abroad, and will ensure that it maintains adequate human resource capacity to manage the various phases of implementation. Over the next five years, the NWMO will focus on building human capacity, developing the means to evaluate sites from a technical perspective, strengthening our understanding of the safety case for a geologic repository and the optional shallow underground storage facility and developing conceptual designs.

Specific milestones have been established in each of the four areas of geoscience, safety assessment and licensing, engineering and emerging technologies.

During 2008-2012, we will:

- » For the purpose of assessing potential candidate sites, develop the capability to conduct geoscientific aspects of site feasibility assessments, including sub-surface investigations and evaluations, in both crystalline and sedimentary settings;
- » Maintain safety assessment system models and data suitable for supporting site feasibility studies;
- » Continue to monitor developments in Canada and internationally related to regulatory aspects of used fuel management facilities;
- » Prepare an annual report documenting alternative technologies for long-term management of used fuel including reprocessing, partitioning and transmutation; and
- » Continue to participate in cooperation agreements with national radioactive waste management organizations around the world, specifically, SKB (Sweden), Posiva (Finland), Nagra (Switzerland) and ANDRA (France). These agreements provide the framework for sharing research information and participating in joint research and development programs in underground facilities such as the Äspö Hard Rock Laboratory in Sweden. We also support research initiatives through Canada's participation in the Nuclear Energy Agency of the Organization for Economic Cooperation and Development.

By the end of 2008, we will:

- » In the area of geosciences, develop generic geo-scientific siting criteria; and
- » In engineering, complete evaluation of container placement methods for the conceptual design of a deep geological repository in crystalline or sedimentary rock; and
- » Appoint members to an Independent Technical Review Group and convene the inaugural meeting.

By June 2009 we will develop the capability to review transportation options to a used fuel long-term management facility on a conceptual basis.

By the end of 2010 we will evaluate conceptual designs for optional centralized underground storage of used fuel.

By 2011 we will support safety assessment and licensing, through the completion of two updated safety cases, one for a deep geological repository in crystalline rock and one in sedimentary rock.

By December 2011 we will maintain a program to provide assurance of integrity of used fuel while in storage.

Social Research

Citizens have told us that implementing APM must be responsive to citizen expectations, priorities and concerns, even as these evolve over time. This will require the use of processes and techniques to effectively engage interested people and organizations to understand and respond to these issues and concerns.

The social research work plan will be reviewed annually and adjusted as required to meet the needs of citizens identified through external scans and engagement processes.

In the period 2008-2012, we will:

- » Complete telephone surveys for input on design of the process to select a site and other implementation issues;
 - » Conduct internet-based deliberative surveys;
 - » Collaborate with interested academics in Canada and internationally to bring the best knowledge and practices of social and community-based process to NWMO's work; and
 - » Apply the ethical and social framework developed for the study phase to guide implementation and report regularly on activities against this framework.
- » Commission background papers to support the collaborative design and implementation of the process to select a site, drawing on experiences in Canada and abroad;
 - » Convene knowledge-building workshops on selected implementation issues;
 - » Convene Citizen Panels and multiparty dialogues in each of the four nuclear provinces;
 - » Convene workshops on Aboriginal Traditional Knowledge, the knowledge that is held by and unique to Aboriginal people about the local environment, how it functions and its characteristic ecological relationships;



The principal objectives of the NWMO social research program:

1. Improve NWMO understanding of the expectations of citizens and Aboriginal people of NWMO as an implementing organization, including its policies and processes, priorities and concerns;
2. Improve NWMO understanding of the needs of citizens and Aboriginal people with respect to communication of NWMO's plans and activities;
3. Contribute to the identification of the capacity-building needs of interested individuals and organizations in order to engage in NWMO dialogue and decision-making activities;
4. Contribute to the identification of best practices for engaging citizens and Aboriginal peoples in dialogue and decision-making;
5. Through review of best practices, assemble a library of information to assist communities and citizens at large understand the potential impacts of becoming a host community;
6. Contribute to capacity-building both within the NWMO and among interested individuals and organizations by commissioning of expert comment and perspective on topics identified during dialogues;
7. Continue to develop social research networks by engaging experts on APM implementation issues; and
8. Begin to identify the needs of communities with respect to the understanding of transportation issues.

Financial Surety

The NWMO will propose a funding formula and trust fund deposit schedules that address financial surety and long-term program funding.

Canadians expect that the necessary money will be available to pay for the long-term care of used nuclear fuel when it is needed.

Financial surety has the objective of determining what costs can reasonably be expected to occur over the life of the project, along with a contingency for unexpected events, and then designing a system that collects and protects enough money to ensure that the entire cost can be covered under a variety of social and economic circumstances, and within a required timeframe.

The *Nuclear Fuel Waste Act* assigns responsibility to the major owners of used nuclear fuel to make financial provisions for its long-term management. The Act required each of the four waste owners to make annual deposits to the trust funds established for this purpose.

The waste owners will share the cost of development, licensing, construction and operation of the facility. The cost to each waste owner will generally be proportional to the number of fuel bundles to be stored in the facility, with special adjustments for factors such as differences in timing of shipping, transportation, fuel characteristics, etc. In its 2005 final study report, the NWMO estimated the cost of APM to be in the range of \$5 to \$6 billion (stated in present value as

of January 1, 2004) assuming 3.6 million used fuel bundles are produced over the life of Canada's nuclear reactors. In 2008, the member companies and the NWMO proposed to the Minister of Natural Resources a funding formula to ensure that the money will be available when it is required.

As APM is implemented, the NWMO has ongoing responsibility for ensuring that the cost estimates remain updated and that the funding formula will support financing of all aspects of APM. Contributions will be adjusted periodically to reflect updated projections of overall costs of APM and the number of fuel bundles to be produced by each used fuel owner.

Annually in the period 2008-2012, we will:

- » Publish on the web site the audited financial statements of the Members' nuclear fuel waste trust funds when provided by the financial institutions; and
- » Provide updates to confirm that the waste owners are meeting their financial obligations, deposit schedules and other commitments. The NWMO will apprise the government and waste owners of up-to-date implementation cost estimates and funding requirements.

Annually in the period 2009-2012, we will report updated cost information and the amount of the deposit required to be paid during the next fiscal year by each of the members and AECL.

No later than 2012, we will update the total cost estimate for APM.

» The Funding Principles:

The principles and approach used by the NWMO for calculating costs and trust fund deposits are consistent with the intent of the *NFWA*, the approach used by the Canadian Nuclear Safety Commission (CNSC) for financial guarantees under the *Nuclear Safety and Control Act*, and the approaches used in other member countries of the Organization for Economic Co-operation and Development (OECD). These funding principles used to develop the funding formula are:

Producer Pays: Each waste owner pays based on the quantity of waste produced and usage of the repository.

Financial Conservatism: The highest cost option for implementing Adaptive Phased Management is used.

Uncertainty Analysis: Provide for reasonably foreseeable and unforeseen events; contingencies are provided in the cost estimates.

Intergenerational Fairness: Funds will be collected over the assumed economic life of the nuclear reactors producing the used fuel bundles.

Fund Growth: Reasonable assumptions are used for real growth of funds to manage the used fuel over the long term.

Review, Adjust and Validate Plans

The NWMO will continually review, adjust and validate plans against factors such as advances in technical learning, evolving societal expectations and values, and changes in energy and environmental policies.

A fundamental tenet of APM is the ongoing incorporation of new learning and knowledge to guide decision-making. We are committed to re-evaluating decisions where warranted, maintaining the option to change course and being prepared to act on new knowledge. New developments will occur throughout the implementation of APM. These changes may pose technical and ethical challenges and how we consider, discuss and respond to these challenges will be critical to the success of APM.

The NWMO suggests that the implementation of APM must adapt to changing circumstances and include new scenarios. Consistent with the principles of APM, the nature of this adaptation needs to be the subject of ongoing dialogue with citizens and collaborative planning throughout implementation.

Recent developments in environmental and energy policies are particularly relevant to the implementation of APM at this time. Since APM was proposed in 2005, energy policy in Canada has evolved to include nuclear reactor refurbishment and new nuclear generation plants. Discussions are underway in New Brunswick, Ontario and Alberta about adding to Canada's existing fleet of nuclear reactors. These new initiatives are considering a broad range of nuclear reactor types, in addition to the CANDU reactor design which has been built and operated in Canada over the past 40 years. These other nuclear reactor designs (e.g., Advanced CANDU Reactor, Pressurized Water Reactor and Boiling Water Reactor) have uranium fuel with varying degrees of enrichment and produce a used fuel waste with characteristics different than the used CANDU fuel which is being produced and managed in Canada to date. Most commercial nuclear reactors in the world are designed to use enriched uranium fuel.

Decisions about reactor refurbishment, new nuclear build, used fuel reprocessing or other changes in Canada's nuclear energy choices will not be made by NWMO. The NWMO must however recognize the potential for decisions that may impact the amount, characteristics and location of nuclear fuel waste to be managed and put in place an active process for ongoing monitoring, review and discussion about new developments so that our implementation plan is adjusted as may be required.

In order to facilitate the process of dialogue and adaptation in response to the changes in projected fuel quantities and types, we will:

- » Publish on an annual basis information on current and future potential inventories of used fuel volumes and types;
- » Seek input from Canadians on how NWMO's plans should be amended to accommodate current and projected inventories; and
- » Adapt and develop plans on how to go forward against the framework of the Strategic Objectives and with the guidance of Canadians and our many advisors including ethicists. Specifically, we will consider the implications of used fuel from new nuclear reactors in our engagement program, in our technical and social research programs, in our financing formula, on the size and structure of the organization and governance, and on the design of a process for site selection.

We are committed to reporting on developments in technology, societal expectations and energy and environmental policy on an ongoing basis through many communication routes, including:

- » Posting research papers and the results of engagement activities on the NWMO web site;
- » NWMO Triennial Report to Minister of Natural Resources and public, to be submitted in 2011 and every third fiscal year after that as required under the *Nuclear Fuel Waste Act (2002)*;
- » NWMO Annual Report to Minister of Natural Resources and the public; and
- » Annual update to the NWMO five-year implementation plan.

Transparency and Collaboration

In demonstrating the integrity of our program, it is important that we provide transparency in both the advice we have received from specialists and citizens and how the organization has reviewed and adjusted its plans in response to this advice and the changing external environment.

On an ongoing basis, we will:

- » Seek multiple opportunities, formal and informal, to engage citizens, specialists and affected communities to continually confirm the social acceptability of our plan; and
- » Seek opportunities at key milestone and decision points to bring plans to formal venues (e.g., Standing Committees of the House of Commons) to further invite open and transparent review of the proposed way forward.

Governance Structure

The NWMO will develop and maintain a governance structure that provides Government, Members, Board, NWMO management and the public with greater assurance, oversight, advice, and guidance about NWMO activities during the implementation phase.

The NWMO's governance comprises the Member organizations, the Board of Directors and its Advisory Council. The NWMO is subject to the requirements of the *Nuclear Fuel Waste Act (NFWA)*, including oversight by the Minister of Natural Resources. As implementation proceeds, the NWMO's activities will also be subject to external organizations' oversight through the *Nuclear and Safety Control Act* and the *Canadian Environmental Assessment Act* for the protection of the health, safety and security of Canadians and protection of the environment. The NWMO is accountable to the Canadian public for meeting its obligations set out under the *Nuclear Fuel Waste Act*, reporting out to the government and public, and complying with all relevant legislation and regulations.

Members

In 2002, consistent with their obligations under the *NFWA*, Ontario Power Generation, New Brunswick Power Corporation² and Hydro-Québec became the founding Members of the NWMO. Members are responsible for appointing the Board of Directors. In 2007, to support the implementation phase, the companies confirmed a new Membership Agreement and General By-law clarifying their roles and responsibilities in furthering the objectives of the *NFWA* and the NWMO's implementation mandate.

² In 2004, through a transfer order, the Government of New Brunswick assigned responsibility for all aspects of the provincially-owned nuclear generating assets to a new subsidiary corporation, NB Power Nuclear.

Board of Directors

The Board of Directors of the NWMO is responsible for oversight of the organization and taking a leadership role in the development of the corporation's strategic direction. Since the NWMO's establishment in 2002, its Member organizations have strengthened the Board to add perspectives from outside the nuclear industry and capabilities in ethics, Aboriginal culture and finance. The membership of the Board is profiled on the NWMO web site together with the process by which Directors were appointed.

Policies and Procedures

The NWMO established a number of corporate and financial policies and procedures during its study phase. In 2007, we developed a framework for review, update and expansion of policies and procedures as appropriate for an implementing organization with an expanded budget, a significant technical program and increased staffing levels. This work will continue through 2008 and 2009, and include a review of best practices to ensure that our policies and procedures achieve the highest standards.

The Advisory Council

The *Nuclear Fuel Waste Act* requires that the governing body of the NWMO appoint an Advisory Council to review and comment on its study and its triennial reports following the Government's selection of a long-term management approach for used nuclear fuel. An Advisory Council was established in 2002, and in addition to meeting its statutory obligations, it provides independent guidance and advice to the NWMO. In 2008 three new members were appointed to the Advisory Council to extend its competence in the areas of geosciences, strategic communications and Aboriginal Traditional Knowledge. The current membership of the Advisory Council is profiled on the NWMO website.

Technical Review Group

In 2007, in light of the NWMO's new expanded responsibilities for managing and directing the established technical research program on used nuclear fuel in Canada, the Board of Directors sought to establish a means by which the program would be reviewed by an independent group of technical specialists on an ongoing basis. A proposal was made to establish a standing Independent Technical Review Group. The Group will conduct reviews to regularly inform the Board and the Advisory Council on whether the NWMO technical program is based on credible scientific and technical approaches and methodologies; is consistent with international practices; and will advance NWMO's technical knowledge to adequately support implementation of Adaptive Phased Management.

Peer Reviews

The NWMO will continue to seek opportunities for peer review of its work and to invite independent comment. This will benefit program design and delivery, and help to enhance public confidence in NWMO's implementation and decision-making.

The Technical Review Group is an important step in providing for independent review.

In addition, the NWMO has sought and will continue to seek external parties involvement and review in the design and implementation of its work programs.

In 2008 and through 2012, the NWMO will annually:

- » Convene annually, at a minimum four meetings of the Board of Directors, four meetings of the Advisory Council, and one meeting of the Technical Review Group and make their minutes and any reports publicly available;
- » Convene sub-committees of the Board of Directors as needed, including the Audit, Finance and Risk Committee, Siting Committee, and Human Resources and Compensation Committee; and
- » Interact with the Canadian Nuclear Safety Commission to ensure that safety requirements are fully understood and conceptual designs being developed will be acceptable.

Building an Implementing Organization

The NWMO will build an implementing organization with a full range of capabilities to implement the government decision, including social, environmental, technical and financial.

The NWMO must ensure that as an organization it is capable and competent to fulfil its mandate. In conducting our study, we were a small organization mainly focusing on social research and engagement activities. With the Government of Canada's decision in June 2007, the NWMO began making the transition to the agency responsible for implementing Adaptive Phased Management.

We began building a sustainable corporation with the skills and capacity that will be needed to meet the challenges of managing Canada's used nuclear fuel over the long term. By year-end 2007, our staffing levels had increased to 27, including additional capabilities in the areas of engagement, technical research, engineering, licensing, finance and administration.

Management of used nuclear fuel is a very long-term mandate and the NWMO must be steady, stable and long term in its outlook and actions. This will require investment in the organization to ensure resource capacity, expertise and sound administrative and management policies and practices that provide a foundation for operations. Recognition of the resources needed to fulfil NWMO's implementation mandate calls for decisions about the balance between building internal expertise and continuing to contract external resources.

For the NWMO to build an organization that is fully competent to carry out its mandate will require ongoing strengthening and broadening of our capabilities.

In 2008, we will:

- » Further increase our staffing levels to almost 50 full-time equivalents; and
- » Establish new employee orientation, staff training and succession planning programs.

In the period 2008 to 2012, we will:

- » Further increase staffing levels as needed;
- » Implement a graduate intern program and succession planning to ensure institutional memory and transfer of lessons to future generations; and
- » Monitor, evaluate and update skill and capacity requirements with ongoing recruitment, retention, skill upgrading and training programs according to a multi-year human resources plan.

Collaborative Design and Initiation of a Siting Process

The NWMO will proceed with the collaborative design of a siting process, supported by a public engagement program, and subsequent initiation of a siting process.

The NWMO will work to ensure that both the development of the site selection process and the process itself are judged to be inclusive, fair and transparent.

NWMO committed in the Final Study Report *Choosing a Way Forward, The Future Management of Canada's Used Nuclear Fuel* to develop the process to select the site for the long-term management of used nuclear fuel and the associated engagement program with a collaborative process. The design of the site selection process will build on the NWMO's principles for seeking an informed and willing community to host the long-term management facility. The design of the process will integrate technical, social, environmental and economic considerations, the lessons learned from our engagement programs to date and the lessons from international experience.

The site selection process that emerges must meet the expectations of Canadians and address their key issues, such as the transportation of used fuel, and continue to build trust and confidence in the NWMO and its operations. Attention will also be given to developing institutional policies, practices, structures and arrangements to support implementation of the site selection process. This is important foundation work required in advance of NWMO considering the initiation of a site selection process.

In 2008, we will:

- » Prepare a discussion document to initiate and facilitate conversations with Canadians on the design of the process for selecting a site. The document will, among other things, present an initial framework of objectives and principles and key issues that people will likely wish to consider; and
- » Prepare information materials, such as fact sheets and background papers, to support a public dialogue on the design of a process for site selection.

In 2008-2012, subject to confirmation of readiness to proceed with each step, we will:

- » Engage interested individuals (the general public and specialists) and organizations in a dialogue on the design of a process for selecting a site to invite diverse perspectives;
- » Draft a proposal for selecting a site, including preliminary criteria, based on input from the previous round of dialogue;
- » Test and validate the draft proposal using a public engagement process;
- » Develop supporting information and an education and awareness program; and
- » Initiate the process for selecting a site.

» The NWMO has made four important commitments as to how a site selection process must work:

1. The decision by a community to host the site must be informed and made willingly;
2. The site selected must meet strict, scientifically-determined safety requirements;
3. In the interest of fairness, the process should focus on the provinces directly involved in the nuclear fuel cycle: New Brunswick, Québec, Ontario and Saskatchewan. Communities in other regions that express an interest will also be considered; and
4. Communities that decide to engage in the process for selecting a site, as potential hosts, shall have the right to withdraw consistent with any agreements between themselves and the NWMO.

The Road Ahead

The Implementation Plan will derive its strength and acceptance from a shared vision of where the NWMO is headed.

It must be adopted at the highest level and across the organization. Commitment to its implementation requires that the Plan be formally considered as part of the annual planning cycle. Each year, NWMO will invite input on its five-year plan to help shape and direct our approach to implementation activities.

It is intended that the Implementation Plan be a rolling five-year plan, reviewed and updated annually to offer guidance for the five-year planning period ahead. As such, it is a living document, regularly assessed, strengthened and redirected as may be appropriate in the face of new information and shifts in the internal or external operating landscape.

In our annual reports, we will report on our progress against the objectives outlined in this Plan.

There is much work to be done. APM will proceed as quickly as Canadians, successful technology demonstration and the regulator authorities allow. This Implementation Plan represents the start of the process.

Glossary

Centralized facility means a facility used for the extended storage or geological placement of used nuclear fuel. The facility would be located at a single, central location and would accept used nuclear fuel from all reactor sites in Canada.

Deliberative survey is a public opinion research tool that provides people with background information and multiple perspectives to help inform the views they express.

Dialogue brings people from all walks of life together and encourages them to work through difficult issues, learning from each other as they listen to and understand perspectives that are different from their own. Participants examine their own thinking, and through talking with each other, identify areas on which they can agree, while acknowledging differences.

Disposal is to manage used nuclear fuel in a manner that is conclusive, without the intention of retrieval or further use.

Flexibility refers to a ready capability to adapt to new, different or changing requirements.

Repository is nuclear facility where used fuel is placed deep underground.

Retrievability is the ability to remove waste from where it has been placed.

Safety is the protection of individuals, society and the environment, from the harmful or dangerous effects of used nuclear fuel, now and in the future.

Security is the protection of facilities and processes against harmful acts, events and situations. This would include threat, vulnerability and consequence assessments, and mitigation activities.

Storage is a method of maintaining used nuclear fuel in a manner that allows access, under controlled conditions, for retrieval or future activities.

Used nuclear fuel means the irradiated fuel bundles removed from a commercial or research nuclear fission reactor.

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