

Government of Canada Initiatives in Support of the Joint Convention

P.A. Brown, D.E. Metcalfe
Natural Resources Canada
580 Booth Street, Ottawa, Ontario K1A 0E4
Canada

R. Lojk
Canadian Nuclear Safety Commission
280 Slater Street, P.O. Box 1046, Station B
Ottawa, Ontario K1P 5S9
Canada

ABSTRACT

The Government of Canada strongly supported international efforts to bring into force the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention), and was the second country to ratify it. The Joint Convention places a number of obligations on Contracting Parties aimed at achieving and maintaining a high level of safety worldwide in spent fuel and radioactive waste management, ensuring that effective defenses against potential hazards are in place during all management stages, preventing accidents with radiological consequences and mitigating their consequences should they occur. In addition to establishing and maintaining a modern regulatory framework and an independent regulatory body through the 2000 *Nuclear Safety and Control Act*, the Government of Canada has implemented a number of initiatives that address its responsibilities and serve to further enhance Canada's compliance with the Joint Convention.

For nuclear fuel waste, the Government of Canada brought into force the *Nuclear Fuel Waste Act* in 2002 to require waste owners to develop, fund, organize and implement a long-term solution for Canada's nuclear fuel waste. The *Act* clearly reserves for Government the decision on the solution to be implemented in the best interests of Canadians, as well as oversight to ensure that waste owners are fulfilling their responsibilities. In the case of low-level radioactive waste, long-term solutions are being developed to ensure the protection of health, safety, and the environment, both now and in the future. Regarding uranium mine and mill tailings, current operators have state-of-the-art waste management facilities in place. The Government of Canada works with provincial governments to ensure that any potential abandoned or legacy mines sites where no owner can be held responsible are safely decommissioned and managed over the long term.

INTRODUCTION

The Government of Canada strongly supported international efforts to bring into force the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (the Joint Convention), and was the second country to ratify it. The Joint Convention places a number of obligations on Contracting Parties aimed at achieving and maintaining a high level of safety worldwide in spent fuel and radioactive waste management, ensuring that effective defenses against potential hazards are in place during all management stages, preventing accidents with radiological consequences and mitigating their consequences should they occur. Key requirements under the Joint Convention are the establishment and maintenance of a regulatory framework to govern the safety of spent fuel and radioactive waste management, and an independent regulatory body to implement the framework. Canada's regulatory framework is set out in the *Nuclear Safety and Control Act (NSC Act)* - modern, up-to-date legislation that came into force on May 31, 2000. With the coming into force of the *NSC Act*, a modernized national nuclear regulatory body, the Canadian Nuclear Safety Commission (CNSC), was created. The CNSC continues to develop and enhance its regulatory regime to better serve Canadians in keeping with international best practices.

The Joint Convention also requires each Contracting Party to take, within the framework of its national law, other legislative and administrative measures to implement its obligations under the Convention. Further, obligations are placed directly on Contracting Parties where national governments or their agents have direct operational or financial responsibilities for the safe management of spent fuel or radioactive wastes. This paper describes Government of Canada initiatives that address these responsibilities and serve to further enhance Canada's compliance with the Joint Convention.

RADIOACTIVE WASTE POLICY FRAMEWORK

The Government of Canada issued the *Policy Framework for Radioactive Waste* in 1996 to provide a national context for radioactive waste management and a set of principles governing institutional and financial arrangements to ensure that the management of radioactive waste is carried out in a safe, environmentally sound, comprehensive, cost-effective and integrated manner. The *Policy Framework* states that the federal government has the responsibility to develop policy, regulate, and oversee owners to ensure that they comply with legal requirements and meet their funding and operational responsibilities in accordance with approved waste management plans. Waste owners are responsible, in accordance with the "polluter pays" principle, for the funding, organization, management, and operation of long-term waste management facilities and other facilities required for their wastes. The *Policy Framework* recognizes that arrangements may be different for the three categories of radioactive waste in Canada: nuclear fuel waste, low-level radioactive waste, and uranium mine and mill tailings.

The *Policy Framework* also provides the basis for Canada to meet its obligations as a Contracting Party to the Joint Convention, in that it clearly defines the roles and responsibilities of the Government of Canada and waste owners in radioactive waste management. Canada's nuclear regulatory body, the CNSC, carries out the Government's regulatory responsibilities. The CNSC reports to Parliament through the Minister of Natural Resources, but remains an

independent agency. This independence is critical to ensure that the CNSC is able to maintain an arm's length relationship from government in making legally binding regulatory decisions.

Natural Resources Canada (NRCan) is the lead government department for the development and implementation of Government of Canada policy on radioactive waste management and oversight to ensure obligations under the *Policy Framework* are met. In keeping with the *Policy Framework* and as described below, the Government of Canada has taken different approaches to fulfill its policy and oversight responsibilities for nuclear fuel waste, low-level radioactive waste and uranium mine and mill tailings.

REGULATORY PERSPECTIVE

Canada's nuclear regulator, the CNSC, actively promotes and regulates safety within the nuclear industry. Canada's approach to safety is based on Canadian legislation and supporting regulations, Government policy, international standards and recommendations, and CNSC policies, standards and guides. In July 2004, the CNSC published Regulatory Policy P-290, "*Managing Radioactive Waste*," which describes the philosophy that underlies the CNSC's approach to regulating the management of radioactive waste and the principles that are taken into account when making a regulatory decision concerning radioactive waste management. The Government of Canada's *NSC Act* and CNSC Regulations also impose requirements for decommissioning plans and financial guarantees. This ensures that adequate financial resources are available to support the safety of radioactive waste management facilities during their operating lifetime and for decommissioning.

It is the policy of the CNSC to consider the extent to which owners of radioactive waste have addressed waste minimization; the radiological, chemical and biological management of the radioactive waste; the predicted impacts on the health and safety of persons and the environment; the measures needed to prevent unreasonable risk to both present and future generations; and the trans-border effects on the health and safety of persons and the environment.

The CNSC is committed to consulting and cooperating with provincial, national and international agencies, on matters concerning harmonization of the regulation of radioactive waste management in Canada and to achieve conformity with the measures of control and international obligations, to which the Government of Canada has agreed concerning radioactive waste. Furthermore, the CNSC also recognizes that open, transparent and timely communications with the public are central to the work and management of Canada's regulatory regime. This approach ensures that the views and concerns of all stakeholders are taken into account in the formulation, implementation and evaluation of CNSC policies, programs, services and initiatives.

Canada's thorough regulatory regime provides the regulatory basis for meeting Canada's obligations under the Joint Convention.

NUCLEAR FUEL WASTE

Three provincial nuclear utilities, namely Ontario Power Generation (OPG), Hydro-Québec and New Brunswick Power, own 98% of the nuclear fuel waste in Canada, and most of the remainder is owned by Atomic Energy of Canada Limited (AECL), a federal government Crown Corporation. Following a decade-long environmental assessment of a deep geological disposal concept for nuclear fuel waste that ended in 1998, it became clear that the Government of Canada needed to put in place a process to ensure that a long-term management approach for Canada's nuclear fuel waste would be developed and implemented. In keeping with the *Policy Framework*, owners of nuclear fuel waste would be responsible for developing, proposing, financing, and implementing long-term management strategies. Government would oversee the owners' efforts, evaluate the strategies, and select a general, sound approach for Canada. The CNSC would be responsible for regulatory matters pursuant to the *NSC Act*.

On November 15, 2002, the Government brought into force the *Nuclear Fuel Waste Act (NFW Act)*. The *NFW Act* advances the principles of the *Policy Framework* for nuclear fuel waste, and is in keeping with the Joint Convention requirement that Contracting Parties establish and maintain a legislative framework that provides for a clear allocation of responsibilities of the organizations involved in radioactive waste management.

The *NFW Act* makes owners of nuclear fuel waste clearly responsible for the development of long-term waste management approaches. It requires that they establish a waste management organization as a separate legal entity to manage the full range of long-term nuclear fuel waste management activities. It also requires them to establish trust funds with independent third-party trust companies to finance their long-term waste management responsibilities. The owners, through the waste management organization, must prepare and submit a study of proposed approaches for the long-term management of the waste to the Government of Canada, along with a recommendation on which of the proposed approaches should be adopted. The analysis must include feedback from comprehensive public consultation, including aboriginal peoples, and must be evaluated in terms of social and ethical considerations.

The *NFW Act* also places the federal government in the role contemplated by the *Policy Framework*. The Government of Canada will review the study prepared by the waste management organization, select a long-term management option from those proposed, and provide oversight during implementation.

As required by the *NFW Act*, the waste owners established the Nuclear Waste Management Organization (NWMO) and trust funds to finance the implementation of long-term waste management activities. Following extensive studies and public consultation, the NWMO submitted its study of options to the Government of Canada on November 3, 2005. The NWMO presented four options, including those listed in the *NFW Act*, namely long-term storage at the reactor sites, central shallow or below ground storage and deep geological disposal, and a fourth option called the Adaptive Phased Management Approach which essentially combines the three listed options within a flexible adaptive management decision-making process. As required by the *Nuclear Fuel Waste Act*, the Minister of Natural Resources will develop a ministerial recommendation for decision by the Governor in Council. A decision is expected in 2006. The NWMO will then begin to implement the government-approved approach, including the

development of the site selection process in consultation with the public. When the NWMO is ready to apply for a licence from the CNSC, the formal environmental assessment and regulatory approval process will be initiated.

LOW-LEVEL RADIOACTIVE WASTE

In Canada, low-level radioactive waste (LLRW) comprises all forms of radioactive waste except for nuclear fuel waste and waste derived from uranium and thorium mining and milling. LLRW is grouped into two broad categories:

- **Ongoing Waste:** LLRW that is generated by the ongoing activities of companies currently in operation, such as nuclear electricity generators. Owners are responsible for the safe management of the waste in keeping with the *Policy Framework*, and are licensed by the CNSC as required by the *NSC Act* and the Joint Convention.
- **Historic Waste:** LLRW that was managed in the past in a manner that is no longer considered acceptable and for which the current owner cannot be reasonably held responsible. Canada's historic waste inventory consists largely of radium and uranium contaminated soils. As required by the Joint Convention, the Government of Canada has accepted responsibility for this waste.

In addition, legacy radioactive wastes that date back to the cold war and the birth of nuclear technologies in Canada are located at AECL sites. These include shutdown contaminated buildings and contaminated lands, and are managed by AECL on behalf of the Government of Canada.

Historic Waste

The bulk of Canada's historic LLRW is located in the southern Ontario communities of Port Hope and Clarington. These wastes and contaminated soils amount to roughly 2 million cubic metres and relate to the historic operations of a radium and uranium refinery in the Municipality of Port Hope dating back to the 1930s.

While there are no urgent health or environmental risks, the Government of Canada determined that intervention measures are required to deal with the impacts of past waste management practices in the Port Hope area. This is in keeping with the requirements of the Joint Convention.

In March 2001, the Government of Canada and the local municipalities entered into an agreement on community-developed proposals to address the clean up and long-term management of these wastes, thereby launching the Port Hope Area Initiative (PHAI). The proponent for the PHAI, on behalf of the Government of Canada, is the Low-Level Radioactive Waste Management Office, which was established, in 1982, as the federal agent for the clean up and management of historic waste in Canada.

The PHAI will involve the long-term management of these historic wastes in two above-ground mounds to be constructed in the local communities. The \$260 million project will take about 12 years to complete. The current phase of the PHAI involves environmental assessment and regulatory review, and is expected to be completed in 2008. Ongoing public consultation

remains a priority and municipal consent is required to complete this phase, which is well advanced. The proposal for one of the new waste management facilities has received the necessary municipal consent, and the environmental assessment underway is expected to be completed in 2006. The other waste management project is undergoing further studies at the request of the local municipality. Licensing decisions will take place after the environmental assessment process is complete. Clean up, waste facility construction and waste emplacement would take place in the following years, after which the facilities would continue to be monitored and maintained for the long-term.

Most of the remaining historic waste to be dealt with in Canada is located along the Northern Transportation Route between Port Radium, Northwest Territories and Fort McMurray, Alberta. The waste results from the past transport of radium and uranium bearing ore and concentrates from the Northwest Territories to a railway terminal in Fort McMurray. In 2003, the Government of Canada completed the clean up in the Fort McMurray area, and the resulting contaminated soils have been safely stored in a long-term, above-ground mound at the site of a local municipal landfill. Strategies are currently being reviewed for the clean up of the remaining contamination along the Northern Transportation Route, which is estimated to consist of about 5,000 cubic metres of contaminated soils.

Legacy Nuclear Liabilities on AECL Sites

The Government of Canada legacy radioactive waste and decommissioning liabilities at AECL sites have resulted from 60 years of past activities. About 55% of the legacy liabilities are from cold war activities, and a further 20% from medical isotope production and national science policy work. The remaining 25% relates to CANDU technology development dating back to 1952. With the exception of Chalk River Laboratories (CRL), all of AECL's R&D sites are shutdown. AECL's waste inventories include nuclear fuel waste, high-level liquid waste, and low-level solid and liquid waste. Waste management practices have varied through the years, ranging from burial of solid wastes directly in the ground and the release of liquid wastes in pits, to the current day practice of storing wastes in structures that provide for containment and isolation. At CRL, a number of plumes of contaminated groundwater are emanating from the older waste management areas.

NRCan and AECL have jointly compiled the inventory of legacy liabilities and developed a comprehensive and proactive strategy to decommission and restore AECL's research sites over the long term. The strategy includes the construction and operation of the infrastructure required to characterize, treat and dispose of all of AECL's low-level radioactive waste. AECL submitted the CRL component of the long-term strategy, which constitutes more than 70% of the overall strategy in terms of cost, to the CNSC in March 2005, and has committed to submitting a 5-year implementation plan for the start-up phase of the long-term strategy in early 2006.

The Government of Canada has recognized the net present value of the estimated cost of implementing the strategy (\$2.75 billion) in the Public Accounts of Canada. It is now considering how best to implement the strategy in keeping with Canada's Joint Convention commitments.

URANIUM MINE AND MILL TAILINGS

Canadian government policy and CNSC regulatory requirements on the management of uranium mine and mill tailings are in keeping with the requirements of the Joint Convention. Owners are responsible for the funding, organization, management, and operation of the facilities required for their wastes. Canadian uranium mining companies have responded accordingly. These companies are not only leaders in uranium production, but they also are leading in the development of environmentally sustainable uranium mining practices. They have developed new technologies to manage uranium mill tailings and set the standard for decommissioning uranium-mining sites.

For example, Cameco Corporation has developed state-of-the-art, high-tech methods to safely mine the large, high-grade uranium deposits at McArthur River and Cigar Lake. Cogema Resources' mill at McClean Lake is a state-of-the-art facility that is setting new standards for the entire spectrum of mine waste management, in particular the treatment and underground disposal of uranium mill tailings. In addition to the new technologies employed to improve safety and reduce environmental impacts, the volumes of tailings generated are significantly less than from past mining operations in Canada due to the high grades of the ore bodies.

Owners of closed uranium mines are also required to ensure that their sites are properly decommissioned. In this regard, Rio Algom and Denison Mines have successfully decommissioned and remediated the extensive Elliot Lake uranium-mining facilities that were the centre of Canada's uranium mining industry from the 1950s through to the early 1980s.

In instances where remedial actions are required at uranium-mine and mill-tailings facilities where the owner no longer exists, the Government of Canada and provincial governments ensure that the sites are safely decommissioned in keeping with Canada's commitments under the Joint Convention. In Ontario, home of the former Elliot Lake uranium mining complex, the governments of Canada and Ontario have entered into a Memorandum of Agreement outlining their roles in the management of "abandoned" uranium mine and mill tailings. In keeping with the *Policy Framework*, best efforts are made to identify the uranium producer or property owner of the site. Where such an owner cannot be identified, the governments have agreed to share costs, including a 50/50 sharing of costs associated with any necessary remediation. To date, these arrangements have not been necessary as all Ontario sites have owners that are complying with their responsibilities.

In June 2005, the Government of Canada announced that it would share the costs of remediating certain cold war era uranium mine sites, principally Gunnar and Lorado, in northern Saskatchewan with the Government of Saskatchewan. These sites were active in the 1950s and 1960s, and the regulatory framework in place at the time they were closed was not sufficient to ensure adequate treatment and containment of the waste. As a consequence, soils and water bodies surrounding the tailings areas have been adversely affected. Although the private sector companies that operated the mines no longer exist, a private land owner of a portion of the Lorado site will contribute to the clean-up costs. A Memorandum of Agreement is being developed between the two governments to define roles and responsibilities in the remediation of these legacy uranium mining and milling sites.

CONCLUSION

Canada's approach to waste management is embodied in its commitments under the Joint Convention. The Joint Convention provides the Government of Canada, as a Contracting Party, with a tool to benchmark Canada against its international peers. In keeping with both the *Policy Framework* and the Joint Convention, the Government of Canada has clearly acted on its responsibilities. Regarding regulatory matters, a modern, up-to-date regulatory framework is set out in the 2000 *Nuclear Safety and Control Act* and the policies, programs and practices of Canada's national nuclear regulatory body, the CNSC. The CNSC continues to develop and enhance its regulatory regime to better serve Canadians in keeping with international best practices. With regard to nuclear fuel waste, the Government brought into force the *Nuclear Fuel Waste Act* in 2002 to provide a process for the selection and implementation of a long-term management approach that is in the best interests of Canadians, now and in the future. Regarding low-level radioactive waste and uranium mine and mill tailings, the Government of Canada ensures that appropriate long-term solutions are implemented in cases where the owner of the waste no longer exists.

The Canadian nuclear industry takes its responsibilities seriously, including the safe handling and storage of radioactive waste, public consultation, and putting in place financial resources and guarantees for the long term management of the waste. This is in keeping with Canadian government policy and CNSC regulatory requirements, and the requirements of the Joint Convention.

The Government of Canada will continue to strongly support and promote the objectives of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. As a Contracting Party to the Joint Convention, Canada has put in place legislative, policy, and regulatory frameworks and programs that fully satisfy its obligations under the Joint Convention.