



**Canadian Nuclear
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**Commission canadienne
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**CANADIAN APPROACH TO LONG-TERM MANAGEMENT OF HISTORIC
LOW-LEVEL RADIOACTIVE WASTES IN PORT HOPE, ONTARIO**

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CANADIAN APPROACH TO LONG-TERM MANAGEMENT OF HISTORIC LOW-LEVEL RADIOACTIVE WASTES IN PORT HOPE, ONTARIO

This paper provides specific information on the development and implementation and long-term management of historic low-level radioactive wastes (LLRW), the clean-up criteria and the CNSC's regulatory process for the approval to construct and operate the proposed LLRW management facility in the Municipality of Port Hope, Ontario.

1.0 INTRODUCTION

The Canadian Nuclear Safety Commission (CNSC) is the regulatory body that was created by an Act of the Parliament of Canada to regulate the use of nuclear energy and materials to protect health, safety, security and the environment and to respect Canada's international commitments on the peaceful use of nuclear energy. The Processing and Research Facilities Division (PRFD) of the Directorate of Nuclear Cycle and Facilities Regulation (DNCFR) is responsible for the licensing and compliance oversight of Nuclear Fuel Facilities operating in Canada.

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. The Canadian federal government has proposed a project that will include the remediation of sites containing low-level radioactive waste (with a radium-226 activity greater than 0.29 Bq/g or uranium concentrations in excess of 35 parts per million) and marginally contaminated soils (with a radium-226 activity less than 0.29 Bq/g but with contaminant concentrations that exceed certain low-level radionuclide activity or chemical concentration cut-off values) and specified industrial wastes located in the former Town of Port Hope, including the Port Hope Harbour, and in the former Township of Hope. It also includes the management of the wastes in a long-term low-level radioactive waste management facility. Physical clean-up efforts are expected to begin sometime in 2008/2009 and be completed by 2015.

Under the Canadian Environmental Assessment Act (CEAA), any project funded by the federal government is required to be assessed to ensure that the proposed project would not cause any significant adverse environmental effects.

2.0 PORT HOPE AREA INITIATIVE PROJECT - BACKGROUND

The purpose and need for the project has been considered within the context of the history of the local radioactive waste contamination problem, the efforts to resolve it, and the sustainability of the current situation.

2.1 History of Radioactive Waste in the Port Hope Area

Low-level radioactive waste and marginally contaminated soils in the Municipality of Port Hope resulted from industrial activities associated with radium production by Eldorado Gold Mines Ltd. (Eldorado) dating back to 1933. During the early years of refinery operations, the need to exercise care in the management of process wastes was not recognized as it is today. Process residues and wastes were placed at various locations in the community, including at the local municipal landfill, and used as a source of fill material for construction and landscaping activities. The focus of ore processing shifted to uranium in the 1940s. By 1948, Eldorado, now a federal Crown corporation, began placing wastes at the Welcome Waste Management Facility (WMF) in the Township of Hope, Ontario. The Welcome WMF operated until 1955, at which time a new waste management site was established near the hamlet of Port Granby in Clarington, Ontario (see Figure 1).

The Welcome WMF

The wastes placed at the Welcome WMF (see Figure 2) originally consisted of iron and carbonate residues with trace amounts of other metals (e.g., uranium, radium, arsenic, cobalt, copper, nickel, zinc) and ore rejected as too low-grade for processing.

Today the wastes are largely soil type materials that contain elevated levels of uranium, arsenic and radium. Drainage ditches and dikes were constructed in the mid-1950s because of contaminant migration off-site.

The system was only partially successful in managing the runoff and in 1956, a collection pond, pumphouse and discharge lines were added. Later, in 1978, a system was installed to treat the collected water prior to its discharge to Lake Ontario. In 1979, Eldorado initiated a program of remedial actions at the inactive site. During the mid-1980s, projects to recover contamination that had migrated beyond the original burial area were carried out. The cleanup was generally on-site but also included private property, creek beds to the north and west of the site, as well as property to the east of the facility.

In the mid-1970s, investigations by the AECB and Eldorado identified radioactive contamination in the Town of Port Hope (now Ward 1 of the Municipality of the Port Hope). A Federal-Provincial Task Force on Radioactivity was established to address the issue and conduct cleanup work. Preliminary radiological surveys were performed throughout the town in 1976 and remediation of affected sites continued until the end of 1981. Remedial actions were performed at over 400 residential and commercial properties and approximately 100,000 tonnes of radioactively contaminated soil were transported to a management facility operated by Atomic Energy of Canada Limited (AECL) at its research facility near Chalk River, Ontario. The larger volumes of lesser contaminated soils and the Port Hope Harbour sediments were left in place for cleanup at a later date.

In 1980, the Atomic Energy Control Board (AECB), the precursor to the CNSC, directed Eldorado to present decommissioning plans for both the Welcome WMF and the Port Granby WMF. Feasibility studies were initiated to develop a single waste disposal facility in the area for the wastes of both WMFs. An environmental assessment (EA) review panel was initiated but in the fall of 1986, largely in response to public opposition in the local area, Eldorado was directed by the federal government to cease work on the new disposal facility concepts. In 1988, Eldorado was combined with the provincially owned Saskatchewan Mining and Development Corporation to form the Cameco Corporation. The Welcome WMF has remained closed to new deliveries and the site maintained by Cameco in accordance with the terms and conditions of a CNSC licence.

The Low-Level Radioactive Waste Management Office (LLRWMO)

In 1982, the Canadian government established the LLRWMO to carry out the government's responsibilities for the management of "historic" low-level radioactive wastes (LLRW). Since its creation, it has provided monitoring and maintenance of the known inventories of historic LLRW and contaminated soils in the Port Hope area. Specific waste management programs in the area currently administered by the LLRWMO include the Environmental Monitoring Program, the Property Compliance Program and the Construction Monitoring Program for new construction or expansion of existing residential or commercial properties and/or any road construction work in Port Hope.

The Siting Task Force Process

In 1986, the Canadian government established the Siting Process Task Force on Low-Level Radioactive Waste Management to design a process for siting a disposal facility for LLRW in Ontario. A disposal facility was one in which there was no intent to retrieve the waste or carry out long-term monitoring. It concluded its work in 1987 and recommended a co-operative siting process. From 1988 to 1996, the Siting Task Force carried out an Ontario-wide co-operative siting process to seek a volunteer host community for a disposal facility for the Port Hope area wastes. The process concluded with a Community Agreement-in-Principle between the Siting Task Force and the Town of Deep River. A subsequent legal agreement, however, was not reached between the Municipality and the federal government and the initiative did not proceed.

2.3 The Port Hope Project

In the late 1990's, the municipalities where the wastes were located - the (then) Township of Hope, the Town of Port Hope and the Municipality of Clarington - each passed resolutions supporting a local solution to the radioactive waste problem and formed citizens' committees to consider options for the long-term management of

the wastes within their respective communities. With support from the federal government, and technical assistance from consultants, each committee developed its own proposal for the local long-term management of LLRW and contaminated soils in its respective municipality.

Subsequent discussions between the federal government and the municipalities resulted in the development of Principles of Understanding that established the framework for further progress and decision-making on the long-term management of the local wastes, based on three community proposals. Two of the three proposals – those of the Town of Port Hope and the Township of Hope - address wastes within the current boundaries of the Municipality of Port Hope.

The Legal Agreement

The Principles of Understanding led to the negotiation of an Agreement for the Cleanup and Long-term Safe Management of Low-Level Radioactive Waste Situated in the Town of Port Hope, the Township of Hope and the Municipality of Clarington (the Agreement). The Agreement was signed by the municipalities in December 2000 and the Minister of Natural Resources Canada in March 2001, thereby launching the Port Hope Area Initiative (PHAI). The Agreement is based on the implementation of the three community waste management concepts, together forming the basis of a potential long-term solution to the historic waste management problem. Through the Legal Agreement, the Government accepted responsibility for advancing a long-term management solution for historic waste in Port Hope and Clarington, certain wastes produced by Eldorado Nuclear Limited – Cameco's predecessor – and certain industrial wastes in the Municipality of Port Hope. It commits the parties to implementing the community concepts, subject to EA and regulatory processes, in three phases:

- Phase 1 consists of work related to the EA and regulatory review of the project;
- Phase 2 consists of work related to the development of the facilities, the cleanup and consolidation of the wastes and the closure of the facilities; and
- Phase 3 consists of the maintenance and monitoring of the facilities in accordance with the terms and conditions of the operating licence(s).

The Agreement also contains key provisions specific to the EA process that contemplates that alternative ways of carrying out the project may be assessed, and requires that the relevant municipality be consulted on these alternatives. It requires that the documentation (i.e., Environmental Assessment Study Report) prepared by the proponent be submitted to the responsible authorities only after consulting with the affected municipality. In addition, it specifies that a preferred option for the project can only be submitted after receiving the written consent of the municipalities. If the preferred option involves moving wastes from the geographic areas of one municipality into another, or involves an alternative technology to above ground storage technology, an amendment to the Agreement is required. If, through the EA, the project changes from the preferred option agreed to by the municipality, the municipality will have 90 days to notify the Government of Canada if it does not wish to proceed with the project.

The preferred option for implementing the Port Hope Project was determined to be the consolidation of all wastes in one WMF at the site of the present Welcome WMF. This option will require that wastes be moved to the former Township of Hope from the former Town of Port Hope. Consequently, an amendment to the Agreement was required to implement the project.

Project Funding

The Port Hope Area Initiative (PHAI) addresses the cleanup and long-term management of historic wastes in both the Municipality of Port Hope (Port Hope Project) and in the Municipality of Clarington (Port Granby Project). The budget for the Initiative was established in 2001 based on the concepts described in the Legal Agreement. Government of Canada funding of \$260 million was budgeted and allocated as follows: \$50 million for the completion of Phase 1 – the environmental assessment and regulatory review phase; \$170 million for the completion of Phase 2 – the implementation phase; \$10 million for long-term maintenance and monitoring; and, \$30 million that was paid to the municipalities in 2001 as host community grants to address long-term impacts.

As of March 31, 2006, expenditures under the Initiative have amounted to \$66 million, which included the \$30 million of community grants paid in 2001. Currently, the costing studies for the Port Hope and the Port Granby projects are under review to determine whether the original budget estimate for Phase 2 and Phase 3 of \$180 million remains adequate.

The new costing studies will address, among other things, commitments in the Legal Agreement, the evolution of the proposed projects from the time of the Legal Agreement, the greater understanding of the costs that would be associated with implementation, the requirements of the environmental assessment, and the time value of money. The Government will be consulted on the re-evaluation of the costs necessary to carry out the Initiative.

2.2 Sustainability of the Current Situation

As shown in Figure 3, currently, there are several CNSC licensed LLRW consolidation sites in the Town of Port Hope (now Ward 1 of the Municipality of Port Hope) where interim consolidation of wastes have occurred. In addition, there are unlicensed sites where administrative controls are in place by the LLRWMO to oversee the management of the unconsolidated wastes. The LLRWMO and the Municipality of Port Hope jointly operate the Construction Monitoring Program to minimize the spread, during construction activities within the Town of Port Hope, of soil that is contaminated with historic low-level radioactive waste as a result of construction activities in the community. The Welcome WMF is owned by Cameco and is actively managed under the terms of a CNSC licence.

The LLRW materials under such management do not pose an immediate unreasonable risk to human health and the environment. There is general consensus in the local community, as well as in professional and regulatory communities, however, that the in-situ management systems as they are presently being implemented are not suitable as a long-term solution. Maintaining the condition of these sites indefinitely may present potential longer-term risks from contaminants being transferred to the surrounding environment. The administrative and technical burden of maintaining this high degree of active institutional control necessary to maintain the current situation would continue. Development pressures would continue to grow, and demands for cleanup of the wastes to end land use restrictions would increase. Concerns would remain about a stigma related to the presence of the waste in Port Hope and the associated constraints on the future development of the Municipality.

The unacceptability of the current situation has been the primary motivation of efforts aimed at managing all the LLRW in a suitably constructed, environmentally safe, socially acceptable and appropriately controlled storage facility over the long term.

2.3 Purpose of the Port Hope Project

The principal objective of the project is to clean up and provide appropriate local, long-term (at least 500 years from the completion), consolidation and storage of the low-level radioactive wastes, marginally contaminated soils and specified industrial wastes currently located in the Municipality of Port Hope. The principal objective is to relocate wastes from contaminated areas and licensed interim low-level radioactive waste facilities and to manage the wastes in a suitably constructed, environmentally safe, socially acceptable and appropriately controlled storage facility for the long term.

3.0 CURRENT STATUS OF THE PROJECT

3.1 Application for Approval of the Waste Management Facility

In 2001, the LLRWMO submitted an application to the CNSC for a licence to construct and operate a proposed long-term low level radioactive waste management facility in the Municipality of Port Hope. The LLRWMO has yet to submit some required safety program documents in support of its application. These documents are expected to be received by CNSC staff in early 2008.

3.2 Decision on Environmental Assessment for the Proposed Long-Term LLRW Management Facility

Following a hearing held on January 24, 2007, in Ottawa, Ontario, the Canadian Nuclear Safety Commission (CNSC) announced on March 15, 2007, its conclusion that the LLRWMO proposal to construct and operate a long-term low-level radioactive waste management facility, is not likely to cause significant adverse environmental effects, taking into account mitigation measures identified in the Environmental Assessment Screening Report.

Natural Resources Canada was the lead Responsible Authority for the purposes of this environmental assessment. The CNSC and Fisheries and Oceans Canada are also Responsible Authorities. The Commission's decision was based on its consideration of a screening environmental assessment of the project that was prepared in accordance with the requirements of the *Canadian Environmental Assessment Act* (CEAA). Further, with respect to the CEAA, the Commission decided not to refer the project to the federal Minister of the Environment for referral to a review panel or mediator.

During the public hearing on the environmental assessment screening, the Commission considered the Environmental Assessment Screening Report and written submissions and oral presentations from the LLRWMO and CNSC staff.

The Commission therefore can proceed, under the *Nuclear Safety and Control Act*, with its consideration of a licence application from the LLRWMO for the proposed facility.

4.0 FUTURE PHASES OF THE PLANNED FACILITY

4.1 Construction and Operation of the Facility (Phase 1)

Following the CNSC's decision on the environmental assessment, the planned actions to clean up contaminated soil in the Municipality of Port Hope may now proceed to the next phase of obtaining a regulatory approval from the CNSC for the construction and operation of the WMF.

As shown in Figure 4, the proposed facility will:

- Be an above-ground engineered mound with low-permeability base liner and cover;
- Be located at the existing Welcome Waste Management Facility;
- Have a capacity of 1.9 million cubic metres (m³) of waste;
- Have on-site surface water and ground water management systems;
- Be surrounded by visual and sound buffering soil berms; and
- While being constructed, it will be protected by a security fence with a controlled access.

The new facility will involve excavation and relocation of 1.39 million cubic metres of:

- Radioactive wastes (1.19 million m³) from Welcome Waste Facility, the Port Hope Harbour, the Highland Drive Landfill, large-scale CNSC-licensed and unlicensed sites and miscellaneous sites in Port Hope;
- Industrial wastes (51,250 m³) from Centre Pier, Chemetron Lagoon, former Coal Gasification Plant, Lions Centre Recreation Park and Sewage Treatment Plant;
- Pre-1988 wastes and decommissioning material (150,000 m³) from Cameco's Port Hope Facility.

Clean-up criteria for radioactive and non-radioactive contaminants or constituents of potential concerns in LLRW and soil, in harbour sediments, in water and groundwater, and in air including radon (Rn) levels in houses have been developed by the LLRWMO and reviewed by the CNSC, the Ontario Ministry of the Environment and Environment Canada. The clean-up criteria are found LLRWMO's document titled "Port Hope Area Initiative Clean-up Criteria: LLRWMO-01611-TE-11004 Revision 4d2 dated June 2006".

The proposed clean-up criteria are yet to be considered by the Commission (the CNSC) at a public hearing to be held in relation to the LLRWMO's licence application.

Subject to the LLRWMO's timely and complete submission of licensing program documents, the CNSC's process of licensing is expected to be complete in 2008. The completion of the proposed WMF in accordance with the terms and conditions of the regulatory approvals is expected to be in 2015.

4.2 Operation and Closure of the Port Hope WMF (Phase 2)

When the construction is complete, the LLRWMO will operate the Port Hope WMF in accordance with the monitoring, mitigation measures and follow-up programs proposed in the environmental assessment and subject to the relevant conditions in the (future) CNSC approved operating licence.

In addition, the licensee will:

- Continue Public Consultation, Communications, Property Value Protection and complaints resolution as required by the Legal Agreement;
- Conduct work related to the development of the facilities, the cleanup and consolidation of the wastes; and
- Ultimately, close the facility in accordance with requirements of regulatory approvals and the CNSC approved community recommendations for safe long-term use of facility site after the closure.

4.3 On-going Monitoring and Maintenance of Facility (Phase 3)

Post closure, the LLRWMO will carry out the following on-going monitoring and maintenance activities for hundreds of years as authorized by the terms and conditions of the operating licences:

- Monitor, inspect and maintain the facility in a safe closure state;
- Maintain contingency plans for potential malfunctions; and
- Comply with the reporting requirements to the regulatory bodies.

This ends my presentation and I will be happy to answer any questions that you may have.

Thank you.



Figure 1



Figure 2

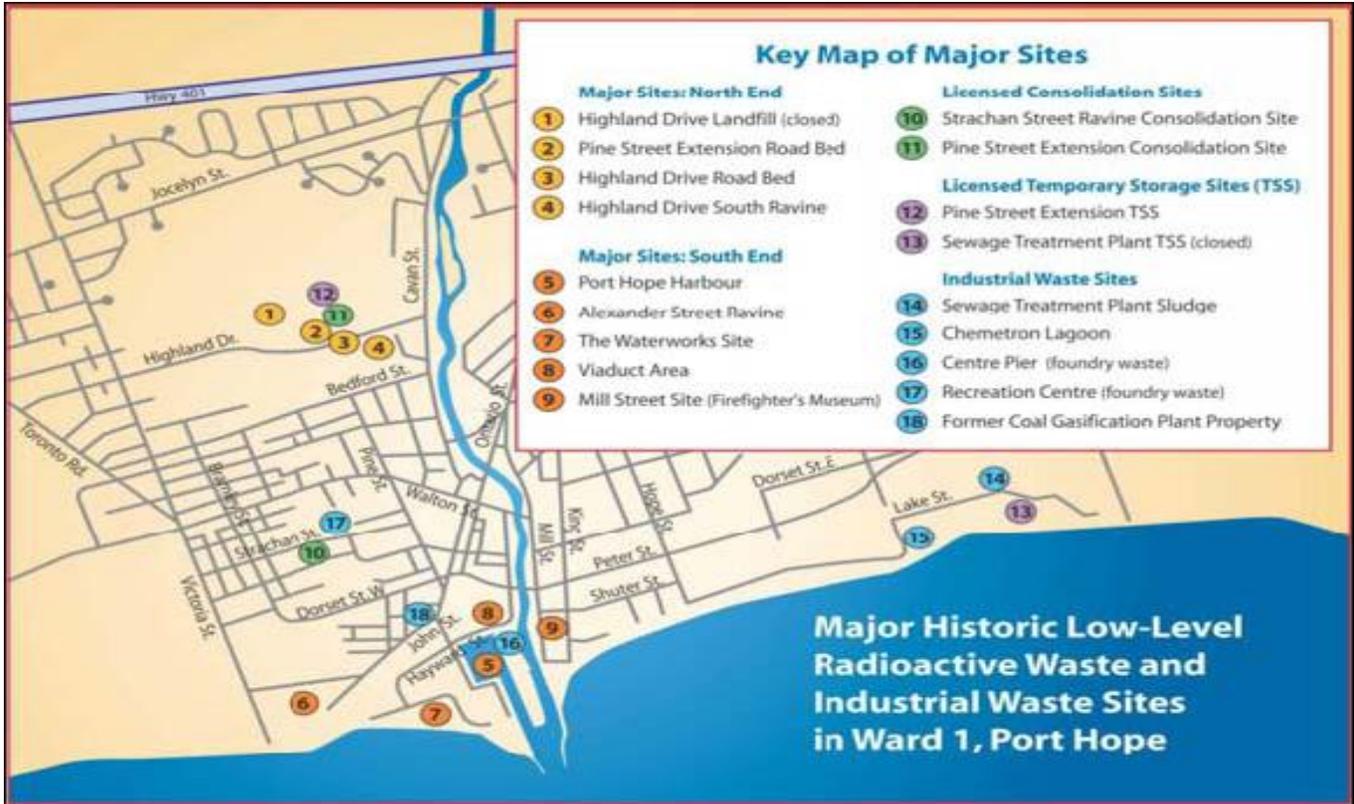


Figure 3

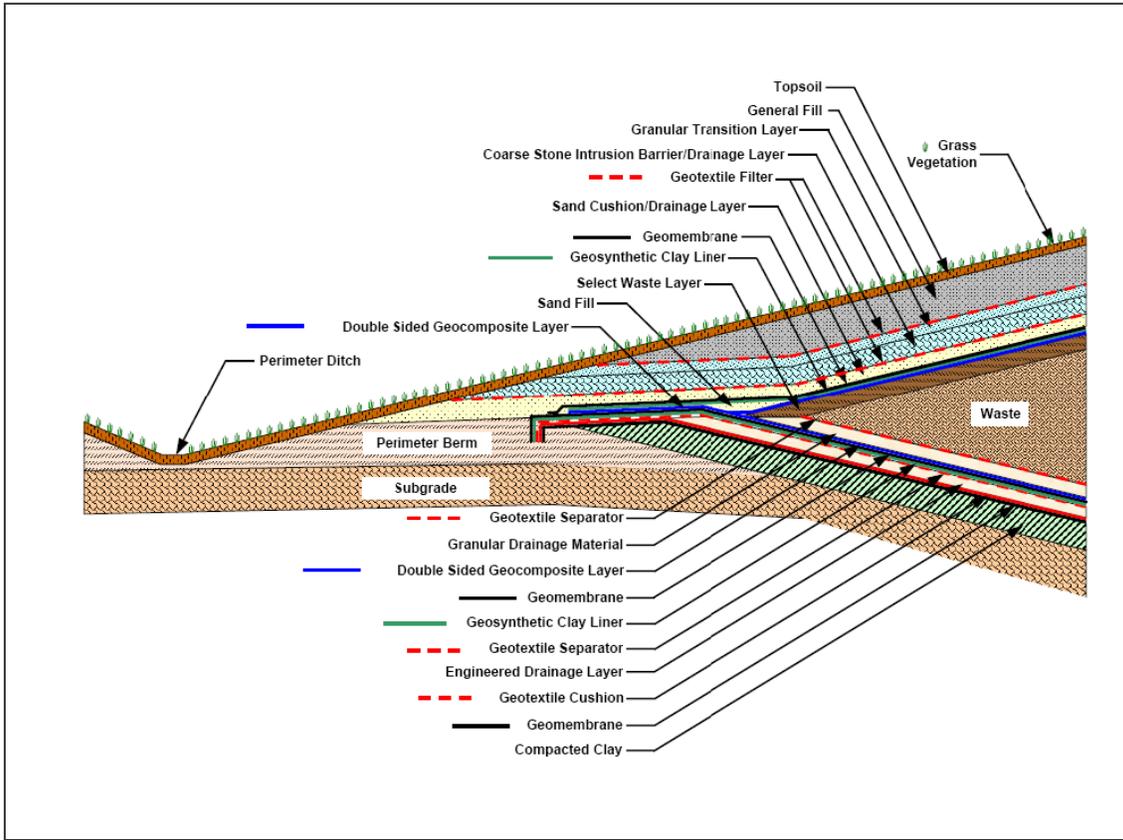


Figure 4