Implementation of a Comprehensive Program to Deal with Canada's Nuclear Legacy Liabilities: A Progress Report

J. Miller, S. Halpenny, S. Brooks, G. Dolinar, P.J. Ingham, S. Kenny, G. Koroll and A. Melnyk
Atomic Energy of Canada Limited, Chalk River, Ontario and Pinawa, Manitoba

D. Metcalfe and M. Blanchette
Natural Resources Canada, 580 Booth Street, Ottawa, Ontario

Abstract

In 2006, the Government of Canada adopted a long-term strategy to deal with the nuclear legacy liabilities that have resulted from 60 years of nuclear research and development in Canada. These liabilities are largely located at Atomic Energy of Canada Limited's (AECL) sites and consist of shutdown research buildings, prototype and research reactors, a variety of buried and stored wastes, and contaminated lands. Implementation of the program is being coordinated with on-going operations. Key accomplishments during the first two years of a five-year funded program will be presented, highlighting the progress in addressing health, safety and environmental priorities and in laying the groundwork for the upcoming phases of the strategy.

1. Introduction

The Government of Canada's nuclear legacy liabilities have resulted from 60 years of nuclear research and development (R&D) carried out on behalf of Canada by the National Research Council (1944 to 1952) and Atomic Energy of Canada Limited (AECL, 1952 to present). These liabilities are largely located at AECL sites and consist of shutdown research buildings, prototype and research reactors, a variety of buried and stored wastes, and contaminated lands. The shutdown buildings and contaminated lands need to be safely decommissioned to meet federal regulatory requirements, and long-term solutions need to be developed and implemented for management of the wastes. More than half of the liabilities are the result of Cold War activities during the 1940's, 1950's and early 1960's. The remaining liabilities stem from R&D related to medical isotopes and nuclear reactor technology, as well as national science programs.

About 70 percent of the liabilities are located at AECL's Chalk River Laboratories (CRL) in Ontario, and a further 20 percent are located at AECL's Whiteshell Laboratories (WL) in Manitoba. The remaining 10 percent relate largely to three shutdown prototype reactors in Ontario and Quebec, which were key to the developmental stage of Canada's CANDU®[1] reactor technology.

[1] CANDU is a registered trademark of Atomic Energy of Canada Ltd. (AECL)

The inventory of legacy waste includes spent fuel, high-level, intermediate-level and low-level solid and liquid radioactive wastes, and wastes (largely contaminated soils) from site clean-up work across Canada. In many cases, due to past practices of limited waste conditioning and characterization, unique and potentially costly solutions will be required to recover, handle and process the wastes.

In 2006, the Government of Canada adopted a new long-term strategy to deal with the nuclear legacy liabilities over a 70-year period, at an estimated cost of $6.8B (2005 Canadian dollars). The objective of the Nuclear Legacy Liabilities Program (NLLP) is to safely and cost-effectively reduce the nuclear legacy liabilities, and associated risks, based on sound waste management and environmental principles. The program was initiated in 2006 April with a 5-year, $520 million plan, and is being implemented through a Memorandum of Understanding (MOU) between Natural Resources Canada (NRCan) and AECL. Under the MOU, NRCan is responsible for policy direction and oversight, including control of funding, and AECL is responsible for managing the NLLP and executing the work. A Performance Measurement Strategy is in place to assess program performance against the objectives and goals for the 5-year plan.

2. Five-Year Implementation Plan

AECL had been performing decommissioning activities on its sites since the early 1990's, but the slow rate of progress, and the increasing requirements, as structures continued to age and remediation needs were identified, meant that a more structured approach, and increased levels of funding, would be required. The long-term strategy was initiated in 2006 with a 5-year start-up phase that focuses on:

- addressing immediate health, safety, and environmental (HSE) priorities;
- accelerating the decommissioning of shutdown buildings; and
- laying the groundwork for subsequent phases of the strategy,

while continuing necessary care and maintenance activities to maintain the liabilities in a safe state until they can be fully addressed in subsequent phases of the program.

The five-year implementation plan was developed to be consistent with the regulatory commitments and priorities embodied in the CRL Comprehensive Preliminary Decommissioning Plan (CPDP) [1] and the WL Comprehensive Study Report (CSR) [2].

Implicit in developing the long-term strategy and the five-year plan were the following considerations:

- The need to comply with regulatory requirements, which include, for example, Canadian Nuclear Safety Commission (CNSC) licenses, the Nuclear Safety and Control Act (NSCA), the Canadian Environmental Assessment Act (CEAA), and the Fisheries Act. This would include commitments on reporting results from environmental monitoring programs, maintaining CNSC license commitments, and meeting the requirements of existing AECL Nuclear Compliance Programs (Environmental Protection, Radiation Protection, Occupational Safety and Health, Security, etc.).
- The need to address immediate HSE priorities while maintaining flexibility to manage emerging issues. A significant portion of the liability in the NLLP resides with wastes that were buried and stored over the last six decades at the CRL. These wastes include both liquid and solid wastes that do not meet present day standards for their management. During the 5-year start-up phase, significant priority is being placed on addressing the liquid wastes. Liquid wastes are a high priority because of the risk they pose from a leak potential.
- The need to assess, early in the strategy, wastes which require recovery versus those that can remain in situ. In particular, large volumes of very low-level radioactive wastes had been buried at CRL. If they require recovery, processing and long-term management, facilities would need to be sized accordingly.
- The generally long timeframes (5-10 years) associated with the definition of requirements, design, licensing, construction and commissioning of new facilities required to process, characterize and store the wastes from building decommissioning and waste recoveries, required that these activities be initiated early in the strategy. The NLLP facilitated several of these “enabling” facilities to be initiated in parallel.

In addition to detailed milestones associated with the objectives given above, high-level program outcomes have been established. These include achieving reductions in uncertainties, risks and liabilities, improved on-site safety and environmental conditions and, increased stakeholder awareness and understanding. The longer-term strategy (beyond the approved 5-year plan) is also being refined and further developed, incorporating the lessons learned from implementation of this first 5-year part of the strategy, changing priorities and other pertinent information from this program and other relevant international programs.

A Joint NRCan – AECL Oversight Committee, chaired by NRCan, plans, reports and delivers the 5-year plan. NRCan represents the interests of the Federal Government, providing policy direction, overseeing implementation, ensuring value for money, transparency and accountability, and providing for public consultations to inform the further development of the long-term strategy. AECL identifies priorities, develops annual plans, implements the work and reports on approved activities. As part of its responsibilities, AECL ensures regulatory compliance and safety, and holds and administers licences, facilities, lands, materials and other asset responsibilities, related to the nuclear legacy liabilities.

Recognizing its importance, and to ensure a sound basis for decision-making on future phases of the strategy, public consultations are an important component of the 5-year start-up phase. Consultations will be conducted in local communities, in parallel with the waste management

and decommissioning work being conducted. Consultation plans, and tools, focused on the integrated program, are being developed to inform the public on the long-term strategy and next steps.

3. Progress to Date

3.1 Chalk River Laboratories

3.1.1 Waste Management – Enabling Facilities

In order to execute the program strategy, a number of new facilities are needed to allow the decommissioning activities themselves to proceed. These "enabling facilities" include those needed for waste characterization, processing, conditioning, treatment, packaging and storage—for both existing waste already in storage and waste produced as a result of the decommissioning and remediation activities.

Projects associated with the design and construction of two major enabling facilities are underway to address *immediate health, safety and environmental (HSE) priorities* and reduce risks at AECL's Chalk River Laboratories site. These enabling facilities will provide modern replacement storage facilities, and meet current-day standards for high-hazard wastes currently stored in facilities close to the end of their useful life.

The Liquid Waste Transfer and Storage (LWTS) Project involves the design, licensing, construction and commissioning of a new liquid waste storage facility for approximately 300,000 litres of legacy liquid waste, which includes high-level radioactive waste from medical isotope production and fuel reprocessing experiments. These liquids are currently stored in 21 tanks built in the 1940's, 1950's and 1960's. The Project scope is divided into two major engineered systems: a Waste Storage System (WSS), and a Retrieval and Transfer (R&T) System. Conceptual design activities, and an Environmental Assessment Screening Report, have been completed. The design of the WSS will be completed in early 2008. Related activities include preparing the existing tanks for the transfer process, addressing tank specific details on access for liquid, and sludge recovery and tank rinsing.

The Fuel Packaging and Storage (FPS) Project involves the design, licensing, construction and commissioning of a facility to store used research reactor fuel, and the associated fuel drying and repackaging equipment and operations. The facility is designed to store the older, experimental fuels from approximately 100 tile holes (existing structures used to store all used research reactor fuel at CRL) with the most problematic and degraded fuel and storage conditions.

The Environmental Assessment Study Report was completed and submitted to the CNSC in 2006, and the detailed design of the storage system and transfer equipment is well underway. A safety analysis is being prepared to support the licence-to-construct application. Field investigations continue to be carried out on the tile holes to support future transfer operations. Remediation activities, such as tile hole dewatering, weather shields and seal maintenance

continue for the oldest tile holes with failed seals, to ensure the safety of the stored fuel until it can be transferred.

In terms of *laying the groundwork for subsequent phases of the strategy*, a key accomplishment of the program has been the construction of the Waste Analysis Facility (WAF). The WAF will play a major role in the effective segregation of building decommissioning and remediation materials into radioactive and non-radioactive waste streams. The WAF, a large warehouse-like structure designed to receive the wide variety of expected decommissioning wastes, provides confirmation that 'likely clean' waste, designated as ready for clearance as non-radioactive waste, is below the acceptable waste release limits and safe to leave AECL property.

3.1.2 Decommissioning of Shutdown Buildings

Over the past two decades, AECL undertook a modest program of removing redundant, unoccupied buildings, as funding allowed.

During this time, it continued to monitor, maintain and repair shutdown buildings as their hazards and risks required. The costs to ensure that these buildings remain in a safe and compliant state, long after their useful life cycle, and until they are demolished, can be substantial. The older, wood-framed buildings can also present substantial risks, particularly those used in the 1940's – 1950's for programs related to fuel reprocessing.

At the time of initiating the NLLP, twenty buildings were in various stages of decommissioning. Work is in progress to transfer an additional 27 buildings from active use to decommissioning over the five-year NLLP program, as AECL implements its site renewal program to move staff and equipment to newer facilities. There is a formal transfer process of an active, in-use building to decommissioning, involving safe shutdown, preparation for storage-with-surveillance, dismantling or demolition, and then completion of the decommissioning process, either returning the building or the site for reuse.

Within the past two years, two major buildings were demolished: one the former "plant hospital" and the other a 12,000 m^2 radioisotope laboratory building in use since the late 1940's (see Figure 1). Demolition can produce a large amount of construction materials as waste. Building and equipment surveys, and treatment of some materials to remove the contamination, resulted in significant quantities of waste cleared for recycling and reuse, or sent to local landfills. These activities help to minimize the quantity of waste requiring long-term management within the radioactive waste management areas on site.

Before

After

Figure 1: Photos showing Building 107 Radiochemical Laboratory (before) at the CRL site, and the footprint to be returned for reuse (after) for other site operational activities.

Current decommissioning activities include the removal of a large radioactive liquid storage tank and a section of the National Research Experimental (NRX) reactor fuel pond superstructure. The large storage tank decommissioning work includes the safe shutdown of the tank, which involves the removal of residual material remaining in the tank, and the removal of its liner. A second work program is the decommissioning and removal of two small buildings, and a portion of another, to create a fire-break between old, wooden buildings and the NRX reactor. Activities include the removal of contaminated water from a portion of the NRX reactor fuel bays that contributed to a source of groundwater contamination, and covering of the emptied bays, prior to the actual demolition of the portion of the wooden building.

Surveillance and monitoring of the ~20 buildings in the "storage with surveillance" mode, including the NRX reactor building, also continues to ensure safety and compliance with approved requirements. While these care and maintenance costs, and those associated with site monitoring, are a significant portion of the program costs at all sites, they are essential to ensuring the protection of the health and safety of employees, the public and the environment.

3.1.3 Environmental Remediation

Another component of the program *addressing immediate health, safety, and environmental priorities* is to reduce risks associated with environmental contamination of CRL lands. Over six decades of operation at CRL have left environmental footprints on the wetlands and forests of the 3,700 ha of AECL property, from the original construction campsite, experimental programs and waste burials. Various activities have been undertaken to reduce both risks and liabilities, ranging from recovery of discrete historic waste burials, waste removal and treatment, groundwater treatment, and improved groundwater monitoring. In particular, field activities and analyses have allowed completion of the following:

- Disposal of legacy liquid isotope production wastes. This activity involved the disposal of ~ 2,000 separate containers of mixed liquid wastes (oils and solvents with radioactive contamination) that were being stored on the surface of one of the closed waste management sites. Approximately 70,000 litres were analyzed, re-bulked, and shipped offsite for incineration in the United States.

- Remediation of the Glass Block Test Sites. Fifty-two glass blocks were recovered from two experimental sites and transferred to the secured storage of the CRL's Waste Management Areas. These blocks were part of an experiment dating back to 1958 to study fission product leaching rates into the water table from vitrified fuel reprocessing waste.
- Removal of the Field Scale Lysimeter Test Facility. This was an underground installation used to research radioactive contamination migration from buried waste packages through different buffer materials. The lysimeter waste packages were removed, analyzed and shipped offsite for disposal.
- Recovery of NRX fuel rods from Waste Management Area A. Thirty-three irradiated NRX fuel rods and pieces buried in wooden crates following the NRX accident in 1952 were recovered. The fuel was re-packaged in fuel cans and moved to modern tile holes for storage.
- Remediation of the Solvent Bunkers. These 40-year old concrete bunkers located in one of CRL's waste management areas housed 30 drums containing mixed contaminated waste solutions generated from tank rinses. To date, 24 drums have been fully assessed and disposed of offsite.

(a) **(b)** **(c)**

Figure 2: Removal of the Lysimeter Test Facility (a) excavation of the lysimeters (b) waste bales removed, and (c) site remediation following decommissioning activities.

Groundwater treatment systems have been in operation at the CRL site for the past decade, removing radionuclide contaminates such as Sr^{90} from plumes originating from the waste management areas. As part of the NLLP, these systems are being upgraded and design of a fourth groundwater treatment system has been started, to help ensure continued mitigation of potential environmental impacts for the longer-term.

The groundwater monitoring program conducted on the CRL site has been enhanced over the past two years, with an increase from 100 to 160 boreholes, and sampling for non-radiological contaminants as well as radiological contaminants [3]. The enhanced program, in conjunction with other existing environmental monitoring programs on site, will result in improved identification of contaminant plumes, and aid in the development of more effective remediation strategies. The monitoring of environmental performance will also ensure that the detailed strategy for remediating the affected areas of the CRL are carried out in a risk-prioritized manner, and that any changes in performance are reflected in periodic updates of the priority-sequenced activities within the long-term strategy.

Enhanced environmental monitoring and remediation activities have extended to the Ottawa River. The shoreline and river bed sediments downstream of the CRL site are being sampled and analyzed as part of an increased monitoring program. This information is being used to develop strategies to minimize any potential ecological impact on the Ottawa River as a result of early operations of the CRL site.

3.2 Whiteshell Laboratories

Whiteshell Laboratories (WL) is a Nuclear Research and Test Establishment in Eastern Manitoba, operated by AECL since the early 1960s, which is now under decommissioning. WL occupies approximately 7,000 ha of land and employed more than 1000 staff up to the mid-1990s. Nuclear operations carried out at WL included a research reactor (WR-1), hot cell facilities, waste management, reactor safety research, nuclear materials research, accelerator technology, biophysics, and industrial radiation applications. In preparation for the execution of the WL Decommissioning Project (WLDP), an environmental assessment was successfully completed at the Comprehensive Study level [2]. In 2002, the Canadian Nuclear Safety Commission issued a decommissioning license for WL - the first decommissioning license issued for a Nuclear Research and Test Establishment in Canada. Decommissioning is now well underway, focusing on decontamination of nuclear facilities, laboratories and associated service systems, removal of redundant non-nuclear buildings and preparation of redundant nuclear buildings for full decommissioning. An aggressive decommissioning strategy is in place, with decommissioning of all site facilities and infrastructure, with the exception of the reactor and the Waste Management Area (WMA), and construction and operation of the enabling facilities to facilitate decommissioning, scheduled to occur in the period leading up to 2024.

The photographs in Figure 3 illustrate the buildings planned for decommissioning and demolition by 2008 and 2015. Red circles signify non-nuclear buildings which will be demolished by end of 2008, the yellow circles identify operating nuclear facilities slated to complete decommissioning and demolition by 2015. Post 2015, decommissioning activities will be focused on WMA upgrades and remediation and planning for WR-1 final decommissioning. Decommissioning the WR-1 reactor, WMA storage structures, and the Shielded and Enabling Facilities, will start in about 2024, with a completion schedule dependant on the availability of approved disposal facilities for the stored wastes.

2008 **2015**

Figure 3: Photographic illustration highlighting the buildings planned to be decommissioned at the Whiteshell Laboratories by 2008 and 2015.

3.2.1 Decommissioning of Shutdown Buildings and Facilities

A number of redundant buildings and building systems have been decommissioned, or are scheduled for decommissioning, as per Table 1 below. A significant activity is the decommissioning of a major portion of the Building 300 R&D Complex, which comprises, in total, five-hundred and sixty-seven (567) rooms, offices, radioisotope laboratories, hallways, crawl spaces, stairways and penthouses and the Shielded Facilities.

Building	Description	Footprint Area	Status
500 / 530	Internal Friction Vibration Studies Lab	~ 50 m^2 ea.	Removed & site remediated
406	Cafeteria	~ 860 m^2	Demolition complete – site remediation remains to be done
400	Administration & Engineering	~ 915 m^2	Demolition underway
300	Radioisotope Laboratory	~ 4600 m^2	Dismantlement / decontamination of internal laboratories underway
300 – Shielded Facilities	Hot / Warm Cells and Associated Support	~ 2500 m^2	6 of 13 Hot Cells stripped and out of service, Warm Cells decommissioning underway, decommissioning of selected equipment complete
200	Active Liquid Waste Treatment Centre	~ 420 m^2	Currently in operation
411	Decontamination Centre	~ 600 m^2	Currently in operation

Table 1: List of WL Buildings Currently Under or Scheduled for Near Term (<10 years) Decommissioning.

The general work plan being followed for decommissioning the radioisotope laboratories is described as follows:

- Operational Shutdown – removal of all loose materials not attached to the building structure;
- Active Drain System Removal – removal of all active drain collection piping from the labs and work areas down to the point they leave the building;
- Dismantle & Decontaminate – removal of all counters, cabinetry, ceiling tiles, floor tiles and ventilation devices such as fume hoods (not including the ventilation header ducts or fan systems);
- Active Ventilation System – removal of all active exhaust ventilation system components;
- Release Survey – confirmatory radiological survey demonstrating the building shell is free of detectable contamination and ready for demolition;
- Demolition – removal of the now radiologically clean building shell; and
- Site Remediation – remediation of the former building site to make it match with the surrounding natural environment.

Buildings with no history of use of radioactive materials are treated much the same as those with a known radiological history, less the steps to clean up and remove the contaminated materials.

A wing of the Building 300 R&D complex is designated as the Shielded Facilities (SF). The SF includes a suite of 12 hot cells, previously used for a variety of fuel and material testing experimental programs. Of these, Cells 1 through 5 will remain operational, particularly for anticipated Waste Management Area remediation activities. Cell 12 has been decommissioned and physically removed. Cells 6 through 11 have been partially decontaminated and external services and manipulators removed (see Figure 4). The hot cells are currently anticipated to be dismantled following WR-1 final decommissioning.

Before **After**

Figure 4: Decommissioning of Hot Cells #6-10 (Before & After) in the WL Shielded Facilities.

3.2.2 Environmental Assessment Follow-Up Program (EAFP)

During the Environmental Assessment, several areas for follow-up monitoring were identified to verify the validity of the CSR conclusions. These included fitness-for-service assessments for the radioactive and non-radioactive material storage and disposal facilities and environmental monitoring of key areas to verify there is no impact from the decommissioning activities. Under the EAFP for the WLDP, the following activities have been recently carried out. A Fitness-for-Service assessment methodology has been developed for application to the Waste Management Area, lagoon and landfill. In parallel with this initiative, fitness assessments have been carried out on the structural integrity of the Waste Management Area storage bunkers and the lagoon system components. Over one hundred new ground-water monitoring wells were drilled and monitoring instrumentation was installed. Baseline radiological data has been collected and analyzed for assessment of the radiological conditions in river bottom sediments at three target areas on the Winnipeg River. The communication initiative has been continued with Manitoba Stakeholders, as part of the ongoing public consultation program.

3.2.3 Waste Management – Enabling Facilities

As the initial decommissioning activities take place, facilities are being constructed to enable later stages of decommissioning, particularly to deal effectively with the wastes generated from those activities. Enabling facilities include the Waste Handling Facility (WHF), the Waste Clearance Facility (WCF), and new waste storage structures in the existing Waste Management Area based on the Shielded Modular Above Ground Storage (SMAGS) concept used by Ontario Power Generation and CRL. Planning is also underway on waste management improvements for wastes already in storage.

Figure 5 provides a flow sheet that captures the WL waste management strategy. The WHF, which is currently being established, is designed to allow crews to minimize the volume of radiologically contaminated waste generated as part of decommissioning activities, and destined for the Waste Management Area. The WCF, already established in an existing building at WL, is set up to facilitate the clearance monitoring of “likely clean” waste for unrestricted release. Decommissioning wastes are radiologically screened and segregated at the source into “Likely Clean” and “Presumed Active” (contaminated) categories.

- Likely Clean waste is monitored for clearance either at the source or at the WCF. Cleared materials are segregated and dispositioned as either recyclable, reusable, landfill or hazardous materials after final confirmation monitoring with a bulk material freight/cargo monitor at the material handling building. Materials identified as contaminated during clearance monitoring are sent to the WHF for processing.
- Presumed Active materials are inventoried and sent to the WHF for decontamination, volume reduction, packaging and radiological characterization. Decontaminated materials are sent to the WCF for clearance monitoring. Contaminated materials are sent to the WMA for storage.

Over the next 15 years, material processed by the WCF is estimated to be up to 5000 m^3 per annum. Material processed by the WHF, over the same time period is averaged at approximately 700 m^3 per year.

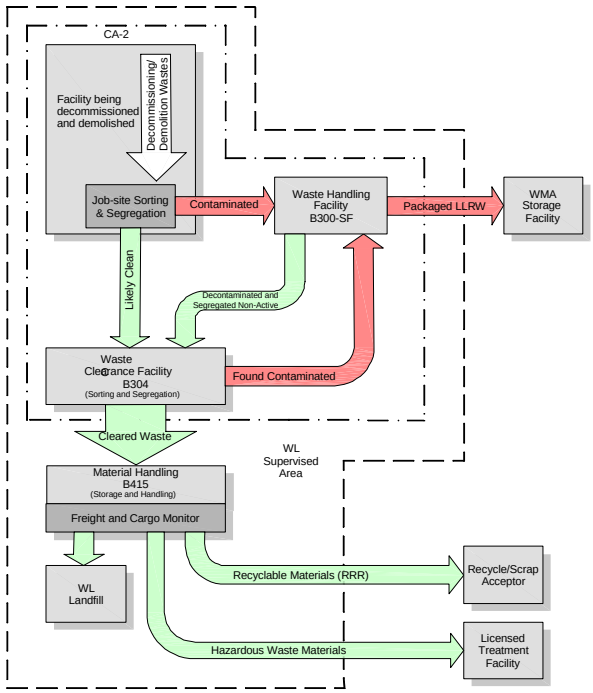

Figure 5: Waste management flow sheet used for decommissioning/demolition wastes at WL.

3.2.4 Underground Research Laboratory (URL) Decommissioning

The NLLP activities at WL include a closure project for the URL, which was used to research and investigate the technical feasibility, techniques and methodologies for deep geological disposal of nuclear wastes. The URL was closed in 2003 and, following removal of experimental equipment was put into a safe shutdown state in 2005 December. With the funding provided through the NLLP, the URL final closure activities commenced, following standard provincial mine closure requirements. For this work, NRCan is conducting a screening-level Environmental Assessment under the CEAA. Closure of the URL surface overburden borehole network was completed in 2006 November, packer system removal and sealing of the underground borehole network is near completion, and surface bedrock borehole packer system removal and sealing operations are planned to commence in 2008. The removal of furnishings and services on the 240 and 420 Levels will be completed in the summer of 2008, prior to commencing removal of furnishings and services from the main shaft in the fall of 2008. Bulkheads will be placed on the main shaft and ventilation raise surface openings by 2010, completing the permanent closure of the URL.

3.3 Prototype Reactors

Storage with surveillance activities associated with three, shutdown prototype reactors are part of the NLLP: the NPD (Nuclear Power Demonstration) and Douglas Point in Ontario, and Gentilly-1 in Quebec. Gentilly-1 was the first facility to be put into a safe shutdown state in the 1980s—the fuel, heavy water and most other hazardous liquids were removed. Similar activities were conducted for Douglas Point and NPD and both reactors placed in the "storage with surveillance" phase in the early 1990s.

The primary activities at the three reactors are regular inspection and monitoring, in accordance with the main purpose of the storage with surveillance phase which is to control hazards. Operating systems such as sump pumps and fire alarm systems are inspected, tested and maintained. Structural components of the facilities are also inspected and maintained. Necessary activities, such as roof repair and updating of remote monitoring systems, are carried out to ensure adequate control of the hazards still inherent in the facilities. As these facilities contain radioactive materials, they are presently licensed by the CNSC as waste management facilities. The storage with surveillance phase is currently envisaged to be ~30 years or longer. A major factor influencing the length of the storage with surveillance phase is the availability of long-term waste management facilities for all of the waste types, including that of the used fuel.

3.4 Laying the Groundwork for Future Phases of the Strategy

The objective "*laying the groundwork for future phases of the strategy*" is incorporated into many of the activities discussed above for both the CRL and WL sites, particularly as they relate to the construction of improved waste handling and characterization facilities, and additional waste storage facilities, to deal effectively with the wastes that are generated during building decommissioning and environmental remediation activities and, importantly, those wastes requiring long-term management.

In addition to these activities, a number of studies and design work are being initiated to better define the waste processing, treatment and long-term management facilities necessary to deal with the wide variety of legacy waste types that exist at all AECL sites. These studies will help define the shielded facility requirements for waste handling, the volume reduction and waste immobilization techniques, the extent to which buried wastes can be managed in place over the long-term, and the options for the long-term management of the wastes that need to be recovered and treated. Of note, is the initiation of a feasibility study to evaluate the potential suitability of the CRL site geology for a deep repository for the long-term management of AECL's inventory of low-level and intermediate-level solid radioactive waste. To support this study, existing geological information has been compiled, a monitoring network for micro-seismic activity installed and the first of five planned boreholes drilled to obtain new data on fractures and groundwater salinity with depth (to 900 m) and other geochemical data to assess the local geology.

The next phase of the strategy will be developed based on the results of this current 5-year program, utilizing the results of field activities, design/feasibility studies and program costs and schedules, to identify priorities in concert with risks and begin implementation of those activities focused on providing long-term security of the environment.

4. Summary

The establishment and implementation of the NLLP by the Government of Canada is allowing significant progress to be made on nuclear legacy liabilities. The current 5-year start-up phase is addressing immediate health, safety and environmental priorities, as well as providing the facilities, studies and plans required to advance the program in the following years.

5. References

[1] Dolinar, G.M., "Comprehensive Preliminary Decommissioning Plan for AECL's Chalk River Laboratories", CPDP-01600-PDP-002, 2006 February.

[2] "Whiteshell Laboratories Decommissioning Project - Comprehensive Study Report", Volume 1-3, 2001.

[3] Audet M.C., R. Silke, C.A. Wills, R.W.D. Killey, S.J. Welch and A. Denby, "CRL Groundwater Monitoring Program Annual Report for 2006, AECL Annual Report", 3611-01612-REPT-005, 2007 December.