Canada's Nuclear Legacy Liabilities Program – Ten Years of Progress and Achievements – 16456

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ABSTRACT

Nuclear legacy liabilities have resulted from more than 60 years of nuclear research and development carried out on behalf of Canada. The liabilities are located at Atomic Energy of Canada Limited's (AECL) Chalk River Laboratories in Ontario and Whiteshell Laboratories in Manitoba, as well as three shutdown prototype reactors in Ontario and Quebec that are being maintained in a safe storage state. Estimated at about $10.6 billion (B) (current day Canadian dollars), these liabilities consist of disused nuclear facilities and associated infrastructure, a wide variety of buried and stored waste, and contaminated lands. The Government of Canada established the Nuclear Legacy Liabilities Program (NLLP) in 2006 to implement a long-term strategy to safely and cost-effectively reduce risks and liabilities, and invested approximately $1.4B over the 10-year duration of the Program to implement the strategy. Risks and liabilities were reduced through projects and activities that decommissioned and removed out-dated facilities, remediated lands affected by past practices, and improved the management of legacy radioactive waste. The NLLP formally ended in September 2015 when the restructuring of AECL's Nuclear Laboratories was completed, and a Government-owned Contractor-operated (GoCo) management model came into effect. The nuclear decommissioning and waste management work that was previously carried out under the NLLP was transitioned into the new GoCo contract. Over the 10-year duration of the NLLP, the Program achieved good progress in addressing health, safety and environmental priorities, reducing liabilities, and providing the studies, plans and facilities that will be needed to enable subsequent phases of the strategy. The NLLP provided a strong basis for the GoCo contractor to accelerate risk and liability reduction at AECL sites.

BACKGROUND

Nuclear legacy liabilities have resulted from more than 60 years of nuclear research and development (R&D) carried out on behalf of Canada by the National Research Council and Atomic Energy of Canada Limited (AECL). About 65% of the liabilities (in terms of cost) are located at AECL's Chalk River Laboratories (CRL) in Ontario, and a further 25% are located at AECL's Whiteshell Laboratories (WL) in Manitoba, which is undergoing decommissioning. The remaining 10% relate to three shutdown prototype reactors in Ontario and Quebec that are being maintained in a safe storage state. Estimated at about $10.6B (current day Canadian dollars), these liabilities consist of disused nuclear facilities and associated infrastructure, a wide variety of buried and stored waste, and contaminated lands. The inventory of legacy waste includes used fuel, intermediate-level and low-level solid and liquid radioactive waste, and waste (largely contaminated soils) from site clean up work across Canada. More than half of the liabilities are the result of Cold War activities

during the 1940s, 50s and early 60s. The remaining liabilities stem from research and development for nuclear reactor technology, the production of medical isotopes and national science programs.

The Nuclear Legacy Liabilities Program (NLLP) was in place for ten years. In 2006, the Government of Canada adopted a long-term strategy to deal with the nuclear legacy liabilities and initiated a five-year, $520 million (M) start-up phase, thereby creating the Program. The objective of the long-term strategy was to safely and cost-effectively reduce risks and liabilities based on sound waste management and environmental principles in the best interests of Canadians. Under the strategy, disused infrastructure was safely decommissioned, contaminated lands were restored to meet regulatory requirements, and long-term solutions were advanced for managing the waste. The Government of Canada renewed the NLLP in 2011 with $439.1M in additional funding over three years, and, later, provided an additional $195M and $231.3M to extend the NLLP for fiscal years 2014-15 and 2015-16, respectively.

The NLLP was implemented through a Memorandum of Understanding between Natural Resources Canada (NRCan) and AECL whereby NRCan was responsible for policy direction and oversight, including control of funding, and AECL was responsible for implementing the program of work and holding and administering all licences, facilities and lands. A Joint NRCan-AECL Oversight Committee (JOC) chaired by NRCan made decisions on the planning, delivery, reporting and administration of the Program. The JOC took a consensus approach to decision making, recognizing the Government's interests as ultimate owner of the liabilities and funder of the work, and AECL's need to protect health, safety and the environment and meet regulatory requirements.

The restructuring of AECL's Nuclear Laboratories was launched on February 28, 2013 when the Minister of Natural Resources announced that the Government of Canada would engage in a procurement process to implement a GoCo model for the management and operation of the Laboratories.

On November 3, 2014, AECL's employees and operations were reorganized into a wholly-owned subsidiary called Canadian Nuclear Laboratories Ltd (CNL). The new business entity was created to enable the eventual takeover of the operations of the Nuclear Laboratories by a private-sector contractor. The large majority of AECL's 3400 employees became employees of CNL.

On June 26, 2015, the Minister of Natural Resources announced that the Government had selected Canadian National Energy Alliance Ltd (CNEA) as the preferred bidder to manage and operate CNL pursuant to contracts that implement the GoCo model. The transaction was completed on September 13, 2015 with the transfer of the shares of CNL from AECL to CNEA, the new operator of AECL's Nuclear Laboratories. Under this model, AECL will deliver on its mandate through contractual agreements with CNL for science and technology (S&T) and decommissioning and waste management (DWM) services.

The nuclear decommissioning and waste management work at AECL sites that was previously carried out under the NLLP was successfully transitioned into CNL's DWM Mission, and the NLLP formally ended as a NRCan Program on September 13, 2015. At the same time, a smaller and re-purposed AECL assumed responsibility for the oversight of the contract and will ensure that the Government's decommissioning and waste management responsibilities are effectively addressed at AECL sites and historic waste sites across Canada.

IMPLEMENTATION HIGHLIGHTS

Over the ten years of Program implementation, the approach taken was to reduce risks and liabilities by addressing health, safety and environmental priorities, improving waste management practices, and carrying out infrastructure decommissioning and environmental restoration projects while advancing and refining the long-term strategy. At the same time, necessary care and maintenance activities continued to maintain the liabilities in a safe state.

During the last two years of the NLLP, the program of work was realigned to prepare for a smooth transition of decommissioning and waste management work to the GoCo management model. Some of these initiatives included implementing a modern integrated waste data management system; further characterization of disused facilities, waste burials and contaminated lands; documenting progress to date and planned approaches and strategies for addressing specific aspects of the liabilities; and developing projects to the point of being "shovel-ready" for implementation. Also, strategic decisions and major new projects were deferred to avoid potential restrictions on the GoCo contractor's flexibility in implementing its vision and plan for accelerating the work during the ten-year contract period, and in particular the facilities to be constructed for waste disposal.

Waste Management

When the NLLP ended in September 2015, a number of waste management projects and initiatives had been completed, and others were underway to establish waste management facilities and capabilities, and to improve the storage conditions of certain legacy wastes. Regarding waste management facilities, waste clearance facilities were established at CRL and WL to confirm that "likely clean" waste is indeed suitable for recycling or disposal with conventional waste. Over the ten years of the NLLP, over 80,000 m^3 of waste was cleared through these two facilities, thereby providing cost-effective routes to reduce legacy waste inventories. Further, a waste handling and characterization facility consisting of two compactors and an automated gamma waste assay system was established at WL, and mobile waste characterization capabilities were established at CRL to support infrastructure decommissioning and environmental restoration projects. Also, a shielded above-ground waste storage building with a capacity of 4000 m^3 and a contaminated soil storage compound were constructed at WL to manage the waste that will be generated in decommissioning the WL site.

In terms of projects aimed at improving the storage conditions of legacy waste, a key facility constructed under the NLLP was the CRL Fuel Packaging and Storage (FPS) Project. It will be used to address older, experimental fuels from approximately 100 tile holes (in-ground vertical structures used to store all used research reactor fuel at CRL) with problematic and degraded fuel and storage conditions. The FPS Project involved the design, licensing, construction and commissioning of the equipment, systems and facility required to retrieve, dry, repackage and store the fuel waste safely for up to 50 years. This project included the fabrication and installation of the fuel retrieval system in the tile hole area, the construction of the fuel handling and storage facility, which is located in close proximity to the tile holes, and the fabrication and installation of the drying and packaging equipment in the new facility. Legacy fuel recovery operations began in December 2015 with the first transfer of fuel from the tile holes to the FPS facility. Related activities included investigations and studies to prepare for fuel recovery and sludge removal, drainage of the tile holes that had become flooded over time, and treatment of the water recovered. Figure 1 shows an external view of the FPS facility, and Figure 2 shows the fuel packaging and drying stations within the facility. Figure 3 shows a test lift being undertaken at one of the outdoor tile hole locations.

Fig. 1. FPS facility at CRL

Fig. 2. FPS Fuel Packaging and Drying Stations

Fig. 3. Test lift to retrieve degraded fuel

Opportunities to ship legacy waste to off-site facilities for treatment or management were also pursued. Most importantly, Canada and the United States (U.S.) are cooperating to repatriate U.S.-origin, highly enriched uranium (HEU) currently stored at CRL. The Prime Minister of Canada announced in April 2010 at the Nuclear Security Summit held in Washington, D.C. that used HEU fuel would be repatriated between 2010 and 2018. At the March 2012 Nuclear Security Summit in Seoul, South Korea, the Prime Minister announced that the repatriation initiative had been expanded to include other HEU-bearing materials. Two used HEU fuel shipments were completed in 2010 and 2012, and the final and largest phase of HEU fuel repatriation was initiated in August 2015 with the return of the first shipment of used HEU fuel from the NRX and NRU research reactors to the U.S. The repatriation of HEU liquids is scheduled to begin in 2016; the transport package for HEU liquids was approved for use by the U.S. Nuclear Regulatory Commission in December

2014, the U.S. Department of Transportation in January 2015, and by the Canadian Nuclear Safety Commission in July 2015.

At the outset of the NLLP in 2006, AECL had a large quantity and variety of legacy waste in storage at CRL, including radioactive-contaminated oils and solvents, and metal waste stored outdoors. The Program took advantage of off-site commercial facilities, mostly located in the U.S., to incinerate “combustible” waste and recycle lead and ferrous metal waste. Off-site management opportunities were also exploited for combustible and metal waste produced from building decommissioning and demolition activities, which reduced the need to construct additional interim storage facilities. Over the course of the NLLP, AECL’s inventory of oils and solvents with radioactive contamination (approximately 180,000 L) was shipped off site for incineration, and more than 1000 tonnes of ferrous metal and lead was sent to metal melt facilities for reuse in the nuclear industry.

Infrastructure Decommissioning

Disused, unoccupied research facilities and associated buildings, particularly the older contaminated wood-framed buildings at CRL, can present important health and safety risks. Also, the costs to monitor, maintain and repair such infrastructure to ensure that it remains in a safe and compliant state until it is demolished can be substantial. An objective of the NLLP was to accelerate building decommissioning and reduce the current inventory of disused buildings.

Examples of decommissioning projects completed at CRL and WL to meet this objective include:

- More than 15,000 m^2 of building floor area was decommissioned and removed at CRL and WL, representing the removal of more than 30 buildings;
- At CRL, a pool test reactor was decommissioned and the room it occupied was returned for reuse;
- Also at CRL, at the Heavy Water Upgrade Plant, all process systems and equipment and seven associated underground storage tanks were removed, and the building is being considered for reuse;
- At WL, certain areas of the Shielded Facilities were decommissioned, including the 1300 m^2 Immobilized Fuel Test Facility (IFTF), and its five Warm Cells. The area was repurposed for centralized waste management equipment and facilities. Figure 4 shows the Warm Cells before decommissioning, and Figure 5 shows the area after the Warm Cells were removed and the decommissioning work was completed in mid-2012; and,
- At WL’s main R&D complex, which comprises a floor area of about 17,000 m^2, approximately 170 laboratories were decontaminated and cleaned out, and all active drain lines and the active ventilation system were removed. Half of the complex will be demolished by the end of 2016, which will remove 8,600 m^2 of floor space.

Fig. 4. IFTF Warm Cells before decommissioning

Fig. 5. Area where IFTF Warm Cells were located after decommissioning

The decommissioning of the WL site included projects to reconfigure site utilities and services to consolidate the “nuclear operations” campus, and “right-size” required site infrastructure and supporting operations to reflect the reduced requirements for decommissioning. These projects were implemented to reduce the site’s “nuclear footprint”, reduce utility costs, and permit building decommissioning to proceed more efficiently. For example, the WL Waste Handling and Characterization Facility was established on the footprint of the former IFTF, and “right-sized” facilities required for decommissioning operations, including an Analytical Laboratory and laundry and decontamination services were relocated to other, reclaimed space. Further, stand-alone individual electrical heating systems were installed in all non-redundant buildings on the site’s main campus by mid-2013, enabling these buildings to be disconnected from the existing centralized oil-fired hot-water heating system. This will allow decommissioning and demolition of individual buildings to proceed without the need to reconfigure utilities for adjacent buildings, and permitted the shutdown of the oil-fired boiler prior to the fall 2013 heating season. As a result of the conversion to electrical heating systems and the progress made in decommissioning the main R&D complex, heating costs for fiscal year 2014-15 of $1.8M were almost half of the $3.5M that was incurred in fiscal year 2008-09, which is the year that the site utility reconfiguration project was initiated. Over approximately the same time period, site-wide greenhouse gas emissions were reduced by 77% from 8600 tonnes CO_2 in 2009 to 1940 tonnes CO_2 in 2014. The conversion to electrical heating throughout the site also avoided about $15M in required boiler modification and refurbishment costs.

At both CRL and WL, work continued to prepare for future infrastructure decommissioning, including radiological surveys and hazard assessments, the development of option studies, environmental assessments, detailed decommissioning work plans, storage with surveillance plans, and cost estimates, as well as cataloguing and archiving relevant records.

In addition, two large non-nuclear sites were decommissioned and restored under the NLLP over the course of the Program:

- In Glace Bay, Nova Scotia, the decommissioning and restoration of the 24-hectare site of the former Glace Bay heavy water production plant was completed in 2014. This involved removal of 6,600 m^2 of building floor area, and remediation and stabilization of 580 m of shoreline along Big Glace Bay Lake. Site improvements also included the creation of two new fish habitats. The site was transferred to Public Works and the Atlantic Canada Opportunities Agency for redevelopment in March 2014. Figures 6 and 7 show before and after aerial photographs of the site, Figure 8 shows the shoreline improvements, and Figure 9 shows one of the newly created fish habitats.

Fig. 6. Glace Bay Site before decommissioning

Fig. 7. Glace Bay Site after decommissioning

Fig. 8. Shoreline Improvements at Glace Bay

Fig. 9. Newly created fish habitat at Glace Bay

- Near Pinawa, Manitoba, the Underground Research Laboratory (URL), established to conduct a series of experiments and tests related to AECL's nuclear fuel waste management program, was also decommissioned. The URL was in operation from 1985 to 2003. In 2010, the decommissioning of the underground works of the URL was completed, and the mine openings at ground surface were sealed with concrete bulkheads. In 2014, surface facilities were demolished, and the remediation of the mine water holding

pond and other contaminated lands was completed in 2015. The URL site is expected to be returned to the Province of Manitoba in 2016.

Environmental Restoration

Clean-up was completed or environmental risks were reduced at more than twenty discrete contaminated areas at CRL and WL over the ten-year duration of the NLLP. Specific wastes were recovered from a number of historic burial areas at CRL, and cleanup activities were completed for selected affected lands. The waste recovery activities targeted higher-hazard buried wastes, including used fuel rods, glass blocks containing mixed fission products, and structures containing liquid waste. Figure 10 shows the initiation of a project to recover containers of contaminated solvents and other radioactive liquid waste that were buried in three concrete bunkers in the 1950s and 1960s. Recovery operations were completed in 2010, including the recovery of a small quantity of fissile liquid waste that was solidified for safe storage, and the removal of the concrete structures.

Fig. 10. Recovery of CRL Solvent Bunkers

Projects to reduce the environmental impacts of waste burial areas included the 2013 installation of an engineered cover over a 50,000 m^2 area at CRL containing buried solid, low-level radioactive waste in order to reduce infiltration and thereby reduce the release of contaminants, primarily tritium, to the surrounding environment. Figure 11 shows the site with the cover installed. In 2006, when the NLLP began, there were three groundwater treatment systems operating at CRL to mitigate plumes of groundwater contamination emanating from legacy waste management areas. A fourth groundwater treatment facility was installed in 2013. The new facility consists of a passive, permeable reactive barrier funnel-and-gate system to intercept and remove radioactive contamination that previously discharged to a wetland on site.

Fig. 11. Legacy waste burial area with cover installed

Environmental restoration under the NLLP also included remediation of sites used for outdoor experiments. For example, in the 1970s, AECL conducted two experiments at WL, Field Irradiation Gamma (FIG) and Zoological Environment Under Stress (ZEUS), to study the effects of long-term, low-level exposure to gamma radiation on boreal forest ecosystems and small mammals, respectively. Under the NLLP, the remaining infrastructure at the FIG and ZEUS sites was removed and the lands were restored. Also, several areas at the CRL site were remediated that were impacted by tracer test and waste burial experiments, as well as past site operations.

In 2014, the characterization phase of the Ottawa Riverbed Assessment Project was completed. The Project studied the nature and spatial extent of contamination in sediments downstream of the CRL Process Outfall to assess potential risks to human health and the environment, with the objective of recommending a safe strategy to address the contamination in the riverbed. The work completed to date suggests that the contaminated sediment adjacent to the CRL site in the Ottawa River is not currently posing an unacceptable risk to people or the environment. In addition, the contamination is not expected to pose a significant risk in the longer term, because radioactive decay and the continued accumulation of new sediment on top of the contaminated sediment will reduce the already small risk. In 2015, the remediation options assessment was updated, which took into account potential impacts to people and the environment, feasibility, benefits, uncertainties and costs.

Field investigations and the preparation of risk and option assessments and remedial action plans continued in order to support future site restoration work. Also, in-situ disposal safety cases were advanced for three legacy waste management areas (WMAs) where low-level radioactive waste and contaminated soils were buried in trenches or emplaced in low-lying areas. For one WMA, the modeling and assessment reports to support an in-situ disposal case were completed. The safety analysis demonstrated that in situ disposal of this WMA will not have significant or adverse effects on persons or the environment as a result of exposure to radiological or non-radiological contaminants, or release of any of these contaminants. Modelling and analyses are underway for the other two WMAs to

support in situ disposal safety cases. In particular, an assessment of the existing cover over one of those WMAs indicated no change in contaminant migration over the past 20 years, and no groundwater contamination associated with the site.

Support for AECL Restructuring

The NLLP permitted AECL to greatly improve the definition of the waste inventory and to increase the understanding of the nature and extent of contamination at its sites by providing the funding necessary to characterize buried waste and contaminated buildings and lands and review records and archived materials. To maximize the benefits of this work for the AECL restructuring process and the winning bidder of the GoCo procurement, areas of focus over the final two years of the NLLP included:

- Additional characterization and assessment work for the WL site and the Nuclear Power Demonstration (NPD) prototype reactor (located near CRL) to provide bidders with an improved basis for submitting competitive “target costs” for completing the decommissioning projects;
- Decommissioning planning to develop projects to the point of being “shovel-ready” for implementation; and
- The current state of aspects of the liabilities, such as the closed waste management areas and historic landfills at the CRL site, were documented, along with the data and analysis requirements for making decisions on the need for remedial actions, and developing and implementing cost-effective long-term solutions.

PROGRAM PERFORMANCE

The main measure of performance for the NLLP was project milestones. They provided objective measures of AECL’s and NRCan’s performance in implementing the NLLP and represented specific achievements to:

- Control and reduce risks and liabilities;
- Improve the management of legacy waste; and
- Complete studies and detailed plans needed to advance the long-term strategy.

During the last four full fiscal years of Program implementation (ended March 31, 2015), the NLLP achieved a 96% milestone completion rate. This represented a significant improvement in milestone completion from the five-year start-up phase of the NLLP (ended March 31, 2011), when only 67% of the planned milestones were achieved.

As with similar programs in the U.S. and the U.K., the NLLP experienced growing pains in the early years. When AECL’s challenges in completing milestones became apparent in 2008, NRCan required AECL to undertake a detailed Program review with the objective of maximizing the delivery of the five-year plan. An NRCan internal Audit (2010) and Evaluation (2011) followed. NRCan and AECL used the

results of the evaluations and audit to identify and implement measures to improve performance and milestone completion. This work also led to improvements in AECL's organization and internal processes and procedures for delivering the NLLP. For example, AECL implemented an Earned Value Management System and tracked Program progress, expenditures, and adherence to schedule using cost and schedule metrics. Also, AECL introduced an Integrated Risk Management Framework for the NLLP which included a quantitative risk assessment component to enhance project planning and budgeting. For its part, NRCan increased senior management oversight of the Program by establishing a Steering Committee to provide strategic direction, and by engaging outside experts to provide technical confirmation and third-party review of AECL's work, findings and recommendations. NRCan also increased its questioning of AECL on its approaches and alternatives, challenged cost estimates and business cases, and insisted on a Program-delivery focus.

Through the NLLP, AECL enhanced its capabilities and capacity to plan and implement decommissioning and waste management work, which will provide a strong basis for the GoCo contractor to accelerate risk and liability reduction at AECL sites.

LIABILITY ESTIMATE ON THE PUBLIC ACCOUNTS

The Government of Canada recognized the cost of a proactive, long-term strategy for dealing with the legacy liabilities in 2005 by adding a new, $2.75B Environmental Liabilities line item to the Public Accounts of Canada. This cost estimate represented the Net Present Value (NPV) of the series of projected annual expenditures over 70 years to fully implement the long-term strategy. At the outset of the NLLP, it was recognized that the NPV cost estimate would increase over time, even though the expenditures made under the Program were being used to manage and reduce risks and liabilities. The reasons for the annual increases in liability were as follows:

- To effectively "ramp up" decommissioning and waste management projects and activities, annual expenditures over the first decade of the Program were lower than those planned for future years. Consequently, the expenditures were less than the annual accretion expense associated with the NPV calculation, resulting in an annual net increase in the liability cost estimate.
- As the nature and extent of the contamination were better defined and the requirements for implementing the work were better understood, AECL revised its cost estimates and timelines for addressing aspects of the liabilities, which resulted in a net increase in the liability cost estimate over time.
- AECL continued to generate nuclear fuel and radioactive waste as part of its ongoing operations, and the future costs for managing and disposing of this new waste were added to the liability cost estimate on an annual basis.

As a consequence of these annual adjustments, the liability cost estimate increased by $0.82B over seven years to $3.57B in the 2012 Public Accounts.

During 2012 and 2013, AECL undertook a comprehensive review of the liability and the underlying long-term strategy for addressing decommissioning and radioactive waste responsibilities at its sites. This review resulted in a one-year increase of $2.12B in the liability such that the recorded liability in the 2013 Public Accounts amounted to $5.69B. While the increase reflected a number of improvements to the long-term strategy and counterbalancing increases and decreases to the estimates for specific aspects of the liability, the bulk of the increase ($1.8B) was the result of increased indirect costs attributed to the Program, which include AECL's corporate support costs and the costs to operate the CRL site. AECL determined that both the annual amount and the NLLP's share of indirect costs had increased substantially since 2005.

Over the past two years, the liability has increased by a further $0.8B – the liability cost estimate in the 2015 Public Accounts, which were issued in December 2015, is $6.49B. This increase is also largely the result of increased indirect costs being attributed to the liability to reflect the reduced mandate and missions for the CRL site after the main research reactor is shut down in March 2018.

ROLES AND RESPONSIBILITIES UNDER THE GOCO MANAGEMENT MODEL

With the completion of the AECL restructuring process and the full implementation of the GoCo management model, the following roles and responsibilities for CNL, AECL and the federal government are now in place.

Role of CNL

CNL will be responsible for managing and operating AECL's Nuclear Laboratories, including CRL, WL and the three prototype reactor sites, and implementing the DWM and S&T Missions in accordance with the GoCo contractual arrangements, approved annual programs of work and budgets, as well as strategic and ten-year plans. The contractual arrangements include target-cost contracts to complete the decommissioning and closure of the WL site and the NPD prototype reactor.

Role of AECL

To prepare for its new role, AECL was re-organized and re-focused as an expert-based Crown corporation. The "new" AECL is now a small organization with approximately 50 highly-qualified and specialized staff (many having experience in incentivized GoCo contracts for DWM, S&T and nuclear site operations) who will have close interactions with CNL and the Contractor.

AECL, among other things, will be responsible for accepting CNL's annual program of work and budget, developing performance measures and incentive mechanisms designed to compensate the Contractor for achieving prioritized objectives, and monitoring the Contractor's performance relative to the GoCo contract requirements and related plans, budgets and performance measures.

Role of Government and the Minister of Natural Resources

The Minister of Natural Resources, as the responsible Minister, will continue to be the link between AECL and the Government of Canada. The Government will continue to exercise its oversight and monitoring responsibilities, in order to ensure that AECL has properly interpreted its mandate and is aligned with government priorities, and that it is managing its budget appropriately. This will largely be accomplished through the review and approval of AECL's Corporate Plan and associated capital and operating budgets, which are submitted annually and based on a rolling five-year planning horizon.

NRCan will support the Minister of Natural Resources as the Minister responsible for AECL, and lead the process for reviewing AECL's plan and budget on an annual basis, and securing government approvals. Further, any new major policy-based initiatives or deviations compared to the terms of the GoCo contract signed in 2015, or the approved funding profile or requirements, would be reviewed by NRCan, and brought forward to Government for consideration and approval.

NRCan will maintain its lead role in nuclear energy policy across the nuclear supply chain from uranium mining to the final disposition of waste, including with respect to uranium and radioactive waste policy, international and domestic engagement, legislation and regulatory development and implementation, and nuclear liability and compensation. Within the Government of Canada, it will work with federal partners to ensure alignment of strategic direction, and will lead in the identification and development of any initiatives requiring further government approvals.

CONCLUSION

The Government of Canada established and implemented a Program to deal with nuclear legacy liabilities dating back to the Cold War and the birth of nuclear technologies and medicine in Canada, and recognized the cost to implement the required long-term strategy in the Public Accounts of Canada, which provided the necessary funding to carry out the work. The achievements realized over the 10-year duration of the NLLP in decommissioning disused infrastructure, restoring contaminated lands, and improving the management of legacy waste collectively demonstrate the good progress made in addressing health, safety and environmental priorities, reducing liabilities, and providing the studies, plans and facilities that will be needed to enable subsequent phases of the long-term strategy.

The Program learned from its early implementation experience and improved project management and delivery. It adapted to evolving requirements by integrating work to support the restructuring effort, and provided a solid baseline of information and plans for the new contractor to begin its mandate. Further, AECL (now CNL) enhanced its capabilities and capacity to plan and implement decommissioning and waste management work, which will provide a strong basis for the GoCo contractor to accelerate risk and liability reduction at AECL sites.