

Finally Underway: Implementation of the Port Hope Area Initiative – 13151

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ABSTRACT

Two distinct yet closely related waste remediation projects are finally underway in Canada under the Port Hope Area Initiative (PHAI) which aims to clean up 1.7 million cubic metres (m³) of low-level radioactive waste (LLRW) arising from 60 years of uranium and radium operations. Under the PHAI, the Port Hope Project and the smaller Port Granby Project will result in the consolidation of the LLRW within two highly engineered, above-ground mounds, to be constructed within the municipalities of Port Hope and Clarington. These projects will fulfill the federal government commitment to the safe, long-term management of the LLRW, as set out in the legal agreement signed by the government and the host municipalities in 2001.

The federal authorization to commence PHAI Remediation & Construction Phase 2 was received in late 2011 and several enabling infrastructure construction and radiological survey contracts were awarded in 2012. The contracts to remediate the waste sites and construct the new engineered mounds will be tendered in 2013. At the end of Phase 2, environmental risks will be substantially mitigated, land development restrictions lifted, and an honourable legacy left for future generations.

LOCAL SOLUTIONS AND FEDERAL PROGRAM OBJECTIVE

Waste Generation and Local Solutions

Eldorado Nuclear Limited, a former federal Crown corporation, and its private sector predecessors operated a plant in Port Hope [1], refining and processing radium and uranium from 1932 to 1988. Over nearly seven decades, residues and wastes containing extraction and leaching chemicals as well as elements contained in the native ores, such as arsenic, silver, cobalt and antimony, were taken by the truckload from the Eldorado plant and dumped in locations that were deemed appropriate at the time. From 1932 – 1948, the Port Hope locations included several ravines, the municipal landfill, an unused sand pit, numerous private properties and the harbour.

Subsequently, the residues were taken to the village of Welcome, on the outskirts of Port Hope, where a waste site was established. Then, from 1956 – 1988, residues and industrial wastes were transported to a newly established waste site on the shore of Lake Ontario in the neighbouring rural hamlet of Port Granby, which is now part of the Municipality of Clarington (Figure 1). All residue and waste depositions ceased in 1988 when the Eldorado was dissolved as part of a merger that created the private-sector company, Cameco Corporation.

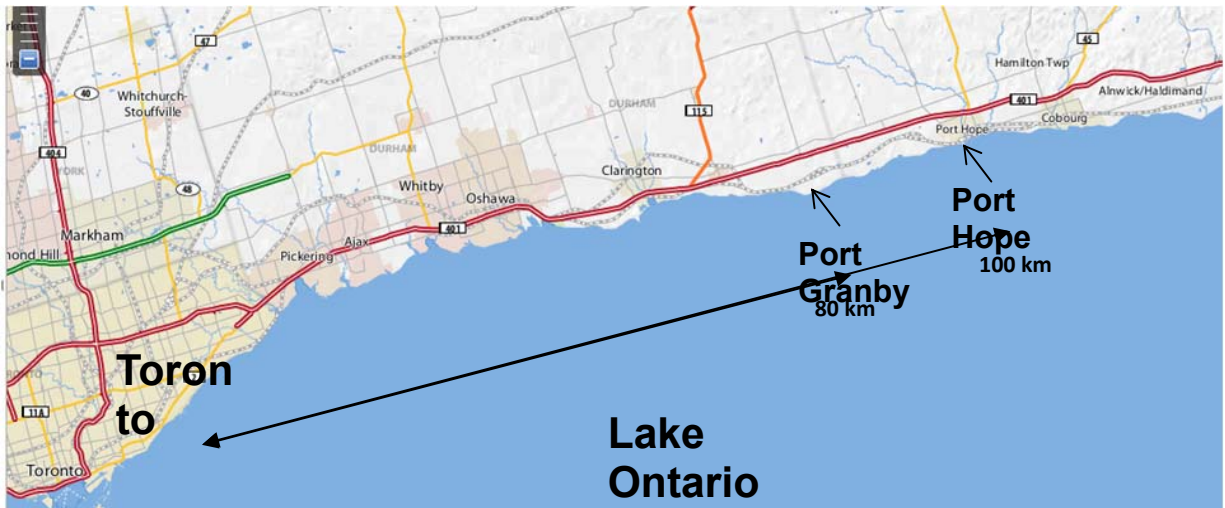


Figure 1: Locations of the Port Hope and Port Granby Projects, East of Toronto, Ontario

The need for a solution to the long-standing waste management practices was first identified in 1975 when elevated levels of radon gas were measured within the basements of several hundred homes in Port Hope. From 1976 – 1981, a Federal-Provincial Task Force on Radioactivity conducted radiological investigations on some 3500 properties within Port Hope and subsequently oversaw the remediation of more than 400 residential and commercial properties and the transport of 100,000 m³ of soil for storage at Atomic Energy of Canada Limited's (AECL's) Chalk River Laboratories. In addition, the Task Force investigations identified over 500,000 m³ of Eldorado process wastes on large, urban, municipally-owned properties that could not be accommodated at AECL's storage facility.

This space restriction led to the start of the search for an acceptable long-term solution for the remaining wastes in urban Port Hope, as well as the waste stored in the Welcome and Port Granby waste management sites. From 1982 – 1987, Eldorado, the municipalities and the federal government pursued a buried waste option within local limestone caverns; however, technical and social concerns put a halt to this. From 1988 – 1996, efforts to ship the material for storage in another community were undertaken; one willing host municipality came forward – Deep River, Ontario – but acceptable terms could not be negotiated with the federal government. Finally, in 1997-1998, the individual municipalities within which the waste was situated came forth with proposals to build local LLRW facilities. A memorandum of understanding was signed by the municipal and federal parties in 2000, followed by a legal agreement [2] in 2001, which formalized the federal acceptance of the local solutions and established the PHAI.

Federal Program Objective

The PHAI is sponsored by Natural Resources Canada and is being implemented in accordance with the Government of Canada's program objective for responsible natural resource management and clean environments. The program aims to engage government departments, regulatory bodies and industry to assess the impacts of natural resource practices on the environment and to

develop, monitor and maintain resources or clean up wastes responsibly. One of the ways success is measured on this program is the number of contaminated sites where the environmental impact is reduced. Because the sites in the Port Hope area contain > 90% of the federal historic LLRW inventory, the PHAI substantially advances the federal government's goal of ensuring the safe management of radioactive waste, in particular for cases such as Eldorado, when the waste owner no longer exists.

SCOPE AND STATUS OVERVIEW OF THE PHAI

Federal Commitment

As set out in the legal agreement, Canada and the host municipalities agree to work cooperatively to build the local waste management facilities and restore remediated sites (within a federal environmental and licensing framework) and to consult regularly. In Port Hope, the scope of the project entails the remediation of 13 large-scale sites, hundreds of small-scale sites and 5 industrial sites, and the consolidation of 1.2 million m³ of waste from these sites within a new engineered mound at a Long-Term Waste Management Facility (LTWMF). In Port Granby, the task requires the remediation of one large-scale site (the Port Granby Waste Management Facility, Figure 2) and the consolidation of 0.45 million m³ of waste, now buried in gorges and plateau trenches, within a new engineered mound to be built 700 metres back from the Lake Ontario shoreline.

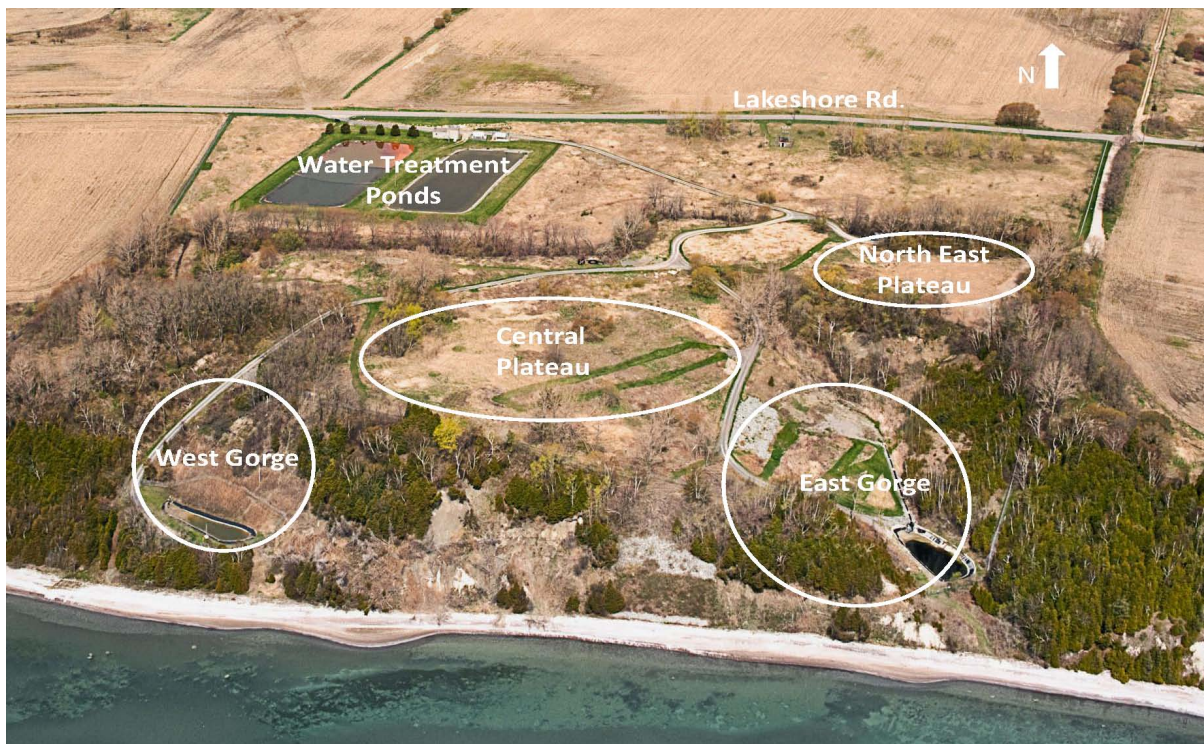


Figure 2: Current Port Granby Waste Management Facility, to be Remediated

In addition to the engineering solutions, the federal government agreed to provide various programs to address municipal and community concerns as part of the PHAI legal agreement. These programs offer municipal administration cost recovery, a complaints resolution process, payments in lieu of taxes, public communications and stakeholder relations and property value protection. The scope and experience delivering the last two of these programs are described in papers authored by Herod et al [3] and Faught [4].

Phasing

The PHAI is being implemented in phases with federal approval required for each (Figure 3):



Figure 3: Phasing of the Port Hope Area Initiative Implementation

- Phase 1: Environmental assessment;
- Phase 1A: Detailed design and licensing;
- Phase 2: Remediation and construction; and,
- Phase 3: Long-term monitoring and maintenance.

Phases 1 and 1A have been completed. The main outcomes from these phases were:

- The environmental screening report decisions, rendered by the federal Responsible Authorities [5, 6], which concluded both projects were unlikely to cause significant effects with mitigation measures considered;
- The engineering drawings and specifications for the construction and remediation work, as produced by a joint venture of the MMM Group and Conestoga Rovers & Associates (Port Hope) and AECOM (Port Granby);
- Acquisition of lands required to complete the projects by the federal government and execution of various temporary land and road use agreements with property owners and municipalities; and,
- The waste nuclear substance licences issued by the Canadian Nuclear Safety Commission, addressing both operation of the existing Welcome and Port Granby waste facilities as well as the regulated remediation and construction works for the LTWMFs.

Both the Port Hope and Port Granby projects entered Phase 2 in early 2012, when \$1.282 billion (Canadian) in federal funding was announced by the Minister of Natural Resources Canada. The Port Hope Project is estimated to cost \$1.009 billion and the Port Granby Project, \$0.273 billion. PHAI Phase 2 is anticipated to take 10 years to complete. Phase 3 will require a new federal authorization and waste storage licences addressing long-term institutional control provisions.

Plans

Details of the Phase 2 implementation plans for each of the two projects are discussed in the papers by Van Veen et al [7] and Smith et al [8]. In summary, each of the projects entails the construction of enabling infrastructure including civil works to access the sites of the new LTWMFs and new waste water treatment plants (WWTPs), followed by the large-scale site remedial activities, waste transfer and emplacement and mound construction. For both projects, the mounds will feature multi-component base liner and cover systems, comprising numerous layers of man-made and natural materials that will fully encapsulate the wastes, collect leachate, and shield radiation so that exposures at the surface of the mounds will be at or below natural background levels (Figure 4).

Because of the history of Eldorado’s residue management and waste disposal, the Port Hope Project also involves the radiological survey and/or delineation and remediation of many small-scale sites. The survey work includes 4800 urban residential and commercial properties, approximately 10% of which are expected to require delineation and remediation. The other small-scale site work involves the delineation of approximately 150 municipal road bed sites as well as four known sites that contain relatively small quantities of contaminated material, based on past practices or the interim waste consolidation decisions taken in the 1980s and 1990s when a long-term solution was still being sought.

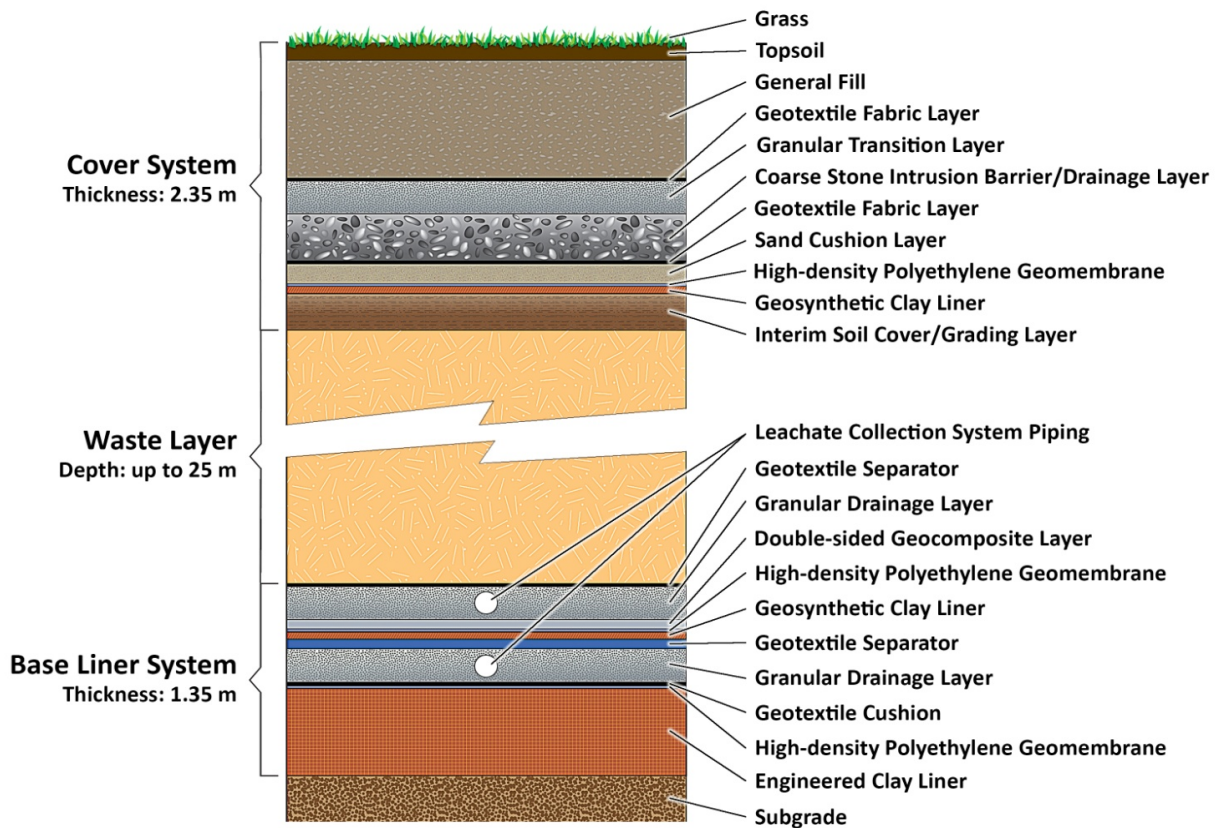


Figure 4: Cross-section of Engineered Mound for the Port Hope Project_____

Status and Forecast

To date, road construction contracts have been completed for each project and WWTP contracts with two-year construction and commissioning timelines were recently awarded. Various small-scale site file review, property survey and waste delineation contracts are underway in Port Hope with many more to be awarded in 2013 and completed within 1-2 years. The very large contracts for the Port Hope and Port Granby large-scale site remediation and mound construction works will be tendered in 2013. The final contracts to remediate the small-scale sites are scheduled to start in 2015. The key schedule milestones for Phase 2 appear in Table I below.

Table I: Key Phase 2 Schedule Milestones for Port Hope and Port Granby Projects

Phase 2 Milestone	Port Hope Project	Port Granby Project
Start Phase 2	2012 January	2012 January
Award Road Construction Contracts	Not applicable	2012 April, September
Award WWTP Construction Contracts	2012 September	2012 December
Award LTWMF Construction / Major Site Remediation Contracts	2014 June	2013 September
Start Waste Emplacement in Mound	2015 June	2014 August
Complete Small-Scale Remediation	2019 September	Not applicable
Complete Large-Scale Remediation	2020 November	2019 October
Close and Cap Mound	2021 June	2020 June
Complete End Use Features & Phase 2	2022 December	2021 May

End-Use Features

Following closure of the mounds near the end of Phase 2, end-use features will be established at each of the LTWMFs in accordance with municipal suggestions. In Port Hope, the plan calls for passive recreation features such as walking trails on top of and surrounding the mound to demonstrate its inherent safety (Figure 5). In Port Granby, the mound will be shaped and oriented to resemble a drumlin, a prevalent local geological feature and surrounded by trees to blend in with the natural surroundings. Both LTWMFs will be monitored and maintained under institutional control for hundreds of years during Phase 3 in accordance with industry best practices.



Figure 5: Artist's rendering of the future Port Hope Long-Term Waste Management Facility

MANAGEMENT STRUCTURE

The PHAI Management Office was created in 2008 as a dedicated project management organization, responsible for leading Phases 1A and 2. Phase 1 had been led by AECL's Low-Level Radioactive Waste Management Office (LLRWMO), as one of many of its historic LLRW cleanup initiatives across Canada.

Based in Port Hope, Ontario and comprising 100 full-time staff, the PHAI Management Office is a partnership of three federal agencies with the following lead roles and responsibilities:

Natural Resources Canada	Project Sponsor; provides funding and policy direction; acquires properties and enters into road and infrastructure use agreements with municipalities;
Atomic Energy of Canada Limited	Project Manager; manages the overall PHAI execution, secures regulatory approvals and holds licences for facilities, and delivers legal agreement program commitments;
Public Works & Government Services Canada	Contract Authority; tenders and manages major design and construction contracts

Following completion of Phase 2, the PHAI Management Office will be dissolved and the responsibility for ongoing operation and maintenance of the LTWMFs in Phase 3 is expected to be assigned to the LLRWMO.

ENVIRONMENTAL FOLLOW-UP PROGRAM

The Environmental Screening Reports for both projects concluded each was unlikely to cause significant effects with mitigation measures taken into consideration. As such, an extensive environmental follow-up program is being implemented that has monitoring and mitigation dimensions as well as adaptive management provisions, for the biophysical and socioeconomic components of the environment where the two projects will take place. The biophysical components include atmospheric, aquatic, terrestrial, and geology and groundwater while the socioeconomic ones include traffic, traditional land uses by First Nations, population and real estate and local business and tourism economies.

Many mitigation measures have been incorporated into the detailed designs and contractual specifications to reduce negative project effects. For example, trucks transporting waste from remediation sites to the new mound are required to use routes that were determined in consultation with the communities. In Port Granby, a temporary underpass will be constructed beneath Lakeshore Road (Figure 6) – an important route for tourism and local citizens – to directly connect the existing Port Granby waste facility on the south side with the site of the new LTWMF on the north side and keep all waste-laden traffic off public roads. This private haul route will provide separate lanes for the oversized dump trucks involved in waste haulage and other project vehicles.

In Port Hope, where the movement of waste on municipal roads cannot be avoided, restrictions have been placed on the routes used by trucks, the hours of work, and GPS tracking systems are mandatory in waste haulage vehicles. Additionally, upgrades are planned to municipal roads to facilitate traffic flow and improve safety for drivers and pedestrians.

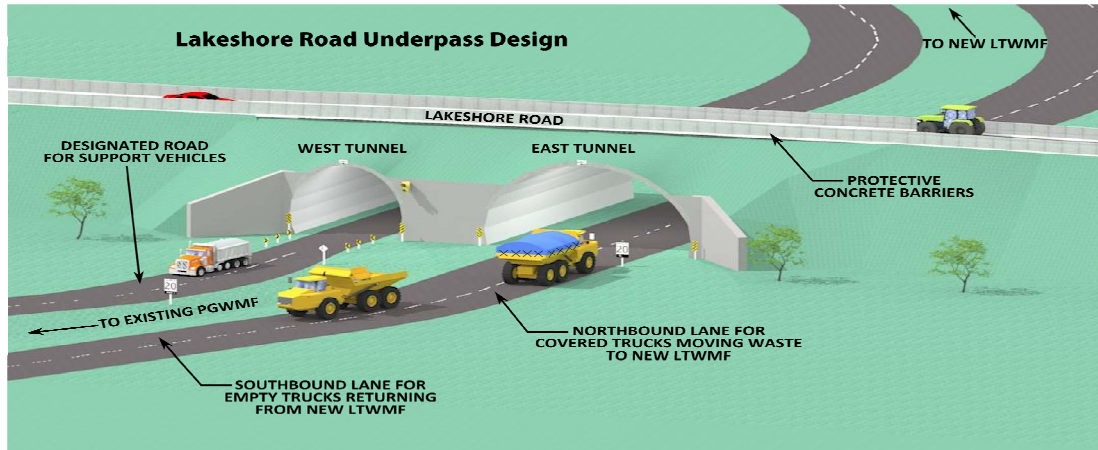


Figure 6: Temporary Route for Waste Shipment to the Port Granby LTWMF

Prior to starting Phase 2, the pre-project biophysical and socioeconomic conditions that were first measured for environmental assessment purposes, were re-examined and updated to ensure a current baseline was established for measuring the actual effects of the Port Hope and Port Granby Projects and enabling timely and effective mitigation. The process of updating the baseline conditions for effects monitoring is discussed in a paper authored by Baba, et al [9]. For effects that are expected to be significant, a number of actions have been taken (or are planned) to either accentuate positive impacts or to avoid or limit anticipated negative ones. For example, to ensure dust levels are kept below regulatory limits, a comprehensive dust monitoring plan has been developed and incorporated within contractual documents to mandate daily weather monitoring, three levels of dust monitoring and reporting while work is ongoing, as well as various control measures if either dust is observed or if wind speeds are sustained above pre-determined thresholds. On the socio-economic side, to help realize a high-level of local contractor and supplier involvement in the projects, more than 20 seminars have been held in the past two years to make businesses aware of the significant contract opportunities and the ways to participate in the federal tendering processes. Also, in cooperation with the local Chamber of Commerce (Port Hope) and Board of Trade (Clarington), prime contractors are being provided with the names and capabilities of municipal and county businesses who have expressed interest in providing them with goods and services.

Throughout the course of the project, environmental monitoring data of primary interest to the public will be posted on the PHAI website, www.phai.ca, so that it is readily accessible. To date, this has focused on dust levels measured during construction of enabling infrastructure as well as annual reports summarizing the environmental follow-up program activities.

COMMUNITY INVOLVMENT

The PHAI is a response to community proposals for local solutions to the need for safe, long-term management of the historic LLRW from the Eldorado operation. Residents and municipal officials were actively involved in developing the original ideas (1997 - 1998) and throughout Phases 1 / 1A of the PHAI projects, they participated in the many opportunities made for community involvement, such as open houses, workshops and monitoring forums. As such, local values and preferences are substantially reflected in the engineering solutions planned or already underway in Phase 2.

Maintaining the social licence to carry out the Port Hope and Port Granby Projects is a top priority for the PHAI Management Office. Accordingly, dialogue frameworks for Phase 2 have been formally established by the Management Office with each host municipality to ensure that progress, plans, and issues on strategy, technical, and program fronts are addressed on a timely basis. Additionally, an extensive outreach program has been developed that builds on the successes of Phases 1/1A, factors in feedback provided in regular public attitude surveys, and reflects the highly-visible, construction-focused nature of Phase 2. New for Phase 2 are Citizen Liaison Groups (one for each project) that are comprised of representatives of diverse community groups (business, environment, health, education, youth, seniors, etc) who will act as conduits for sharing information and perspectives between the project and the groups represented. Also for Phase 2, the complaints resolution process employed in Phases 1 / 1A when the main PHAI outcomes were paper-based (e.g. plans, reports, designs, etc.) and complaints were few, has been adjusted to reflect a two-tier process. The first tier – where the vast majority of complaints are expected to land – provides for quick resolution of simple and easily validated concerns. The second tier offers a more formal assessment process to both clearly establish the root causes of more complicated complaints and to develop the solutions to effectively deal with the effect, as perceived by the complainant. The second tier process also provides for the optional involvement of third parties, mediators, etc where the parties agree that such action is likely to help resolve the complaint. The courts remain an alternative option for those who wish to pursue redress outside the complaint resolution process.

CONCLUSIONS

The PHAI, the federal undertaking to address the radium and uranium LLRW liabilities of the former Eldorado Nuclear Limited, located in the Port Hope area has finally reached Phase 2: remediation and construction. Following the comprehensive planning, design and regulatory phases, completed over 11 years, implementation of the solutions to address the long-standing community need began in 2012 and will last for 10 years. Two projects - the Port Hope Project and the Port Granby Project – have been authorized to excavate, transfer and consolidate 1.7 million m³ of waste within two highly engineered, above-ground mounds to be constructed in the municipalities of Port Hope and neighbouring Clarington. Prior to excavating and transferring the wastes, civil infrastructure (roads) and new WWTPs are required and construction is in progress. The movement of LLRW to the new mounds will commence in 2014 -2015 and conclude in 2019-2020.

All PHAI activities will be carried out within a regulatory framework that includes environmental monitoring and mitigation obligations and measures stipulated in licences issued by the Canadian Nuclear Safety Commission. Together these aim to safeguard the health and safety of workers and the public and to assure the protection of the environment. Further, in recognition of the fact that the Port Hope and Port Granby projects are taking place within municipalities and are a top concern for citizens, extensive and ongoing community involvement is a central part of the Phase 2 execution plan. A comprehensive engagement program has been developed to ensure awareness, share perspectives, address complaints and realize positive outcomes for business and residents, all with the aim of meeting the overriding social objective of the PHAI: leaving an honourable legacy for future generations.

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