

The Port Hope Area Initiative's Port Granby Project: From Planning to Execution-17451

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ABSTRACT

The Port Hope Area Initiative's Port Granby Project involves the construction of a new, secure long-term waste management facility (LTWMF) and supporting infrastructure, and the excavation and relocation of some 450,000 m³ of LLRW and marginally contaminated soil from the former Port Granby Waste Management Facility (PGWMF) to the newly constructed LTWMF. Presented is an overview of the Port Granby Project and a description of the planning needed to execute the project successfully. A comprehensive suite of approximately 40 pre-construction submittals were developed and submitted for review and approval by Canadian Nuclear Laboratories (CNL), the project authority. Importantly, comprehensive training programs were developed and implemented to ensure all project staff fully understood the scope of the planning documents (covering such things as Quality Control, Environmental Monitoring, Radiation Protection, Dust Management, Noise, Radiation Protection etc.) and possess the appropriate competencies for completing the work to which they have been assigned. The effective planning that has been invested in the Port Granby project, from initial design to project planning and implementation, has allowed this complex project to proceed with minimal difficulty.

INTRODUCTION

The Port Hope Area Initiative (PHAI) is a community-based solution for the long-term management of historic low level radioactive waste (LLRW) resulting from 60 years of uranium and radium processing operations in the Town of Port Hope, Ontario. The Eldorado refinery, on the shores of Lake Ontario, began refining radium-226 from pitchblende ore, later transitioning to the refining of uranium ore. Process residues were deposited at the Welcome Waste Management Facility in the Town of Port Hope until the mid-1950s switching to the Port Granby Waste Management Facility (PGWMF), which continued to accept waste until the late 1980s (Figure 1).



Figure 1: Port Granby, Ontario

The Port Granby Project involves the construction of a new, secure long-term waste management facility (LTWMF) and supporting infrastructure, and the excavation and relocation of some 450,000 m³ of LLRW and marginally contaminated soil from the PGWMF to the newly constructed LTWMF (1). The Project is governed under a licence, granted by the Canadian Nuclear Safety Commission (CNSC), which is founded on recommendations of an Environmental Assessment Screening Report (EA) completed between 2001 and 2009 (2). The EA involved numerous studies designed to evaluate the potential impact of the project on the natural environment and included recommendations for measures to be taken to protect health, safety, security, and the environment. These measures and the means for their implementation have been described in general terms in a series of procedural documents prepared by the Port Hope Area Initiative Management Office. However, prior to project execution, it is imperative that the policies and procedures are established by the contractor to meet the contractual obligations inclusive of the measures to be implemented to ensuring, the protection of health, safety, security, and the environment

An overview of the Port Granby Project is provided describing the planning needed to execute the project successfully. A comprehensive suite of approximately 40 pre-construction submittals, ranging from a Construction Traffic Management Plan to Health & Safety and Environmental Monitoring Plans, including detailed implementing procedures, were developed and submitted for review and approval by CNL, the project authority. Importantly, comprehensive training programs were developed and implemented to ensure all project staff fully understood the scope of the planning documents (covering such things as Quality Control, Environmental Monitoring, Radiation Protection, Dust Management, Noise, Radiation Protection etc) and possess the appropriate competencies for completing the work to which they have been assigned. Training is an ongoing obligation involving both refresher training, reinforcing key messages while introducing lessons learned as appropriate. The effective planning that has been invested in the Port Granby project, from initial

design to project planning and implementation, has allowed this complex project to proceed with minimal difficulty.

THE PORT GRANBY LONG TERM WASTE MANAGEMENT FACILITY

The Port Granby project involves the construction of an engineered containment cell setback approximately 700 metres from Lake Ontario, and the relocation of approximately 450,000 cubic metres of waste, currently buried in a series of trenches and gorges adjacent to the Lake Ontario shoreline. Supporting infrastructure includes a new wastewater treatment plant that is needed to treat contaminated run-off water generated during construction and leachate from the LTWMF, as well as significant upgrades to the only construction access road. A conceptual outline of the LTWMF is shown in Figure 2.



Figure 2: General Layout of the Port Granby LTWMF

The existing Port Granby Waste Management Facility is an 18 hectare parcel of land containing a series of trenches and gorges adjacent to the eroding bluffs of the Lake Ontario shoreline (Figure 3). The steep slopes and sandy soil conditions complicate the removal of waste material with excavations needing to be carefully staged and variously benched, dewatered and/or shored to prevent slope failure and release of waste to the lake.



Figure 3: Existing Port Granby Waste Management Facility on the Shore of Lake Ontario (insert - Layout of Burial Trenches)

The waste includes neutralized raffinate and calcium fluoride originating from the uranium processing activities at the former Eldorado refinery. Also included are several pressurized gas cylinders (containing HF, SO₂ and chlorine), miscellaneous drums, and general refuse reportedly to include such unusual items as a mixing drum from a concrete truck and possibly a car. The waste was initially dumped in two gorges (east and west) later being placed in a series of approximately eighty trenches that were excavated to a depth of 4-6 metres. Figure 4 shows the orientation of the various trenches and the approximate distribution of waste by class.

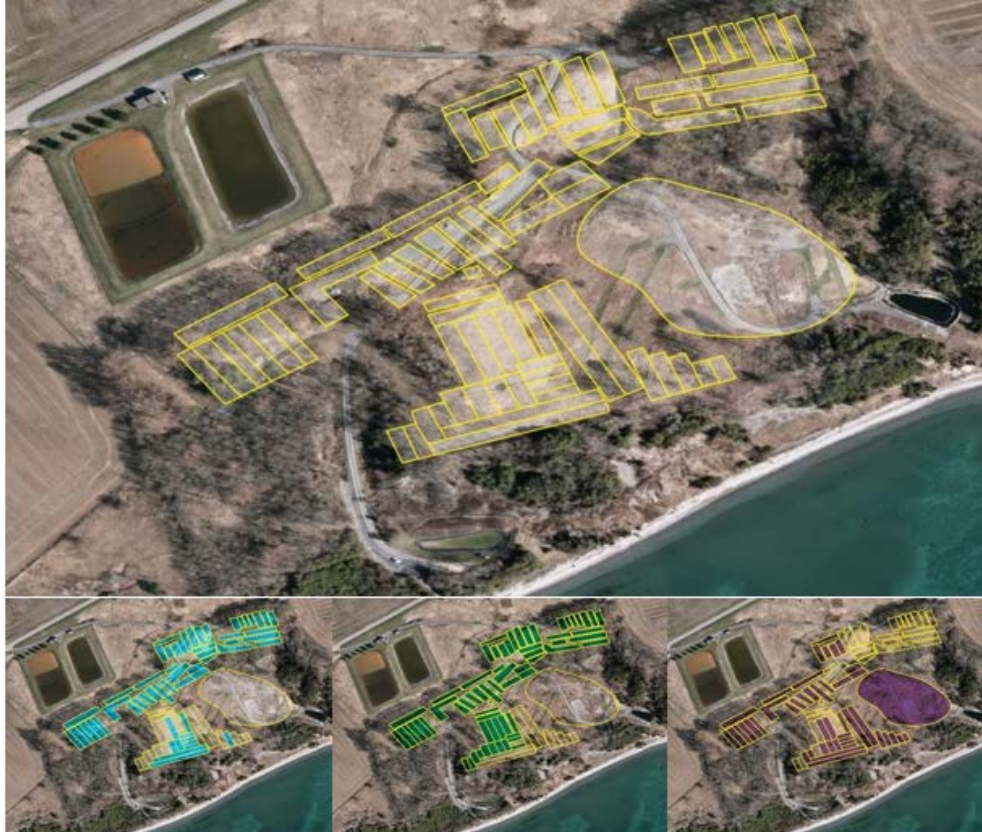


Figure 4: Depiction of Burial Trenches and Distribution of Calcium Fluoride (bottom left), Neutralized Raffinate (bottom right) and General Refuse (bottom centre)

The new containment system will consist of two adjoining cells, each approximately 4.6 hectares in size (230 x 200 m). The cells are designed with a base layer consisting of a 750 mm Compacted Clay Liner overlain by a 2 mm thick geomembrane (Figure 5). A leachate collection system, constructed on top of the composite base liner, consists of drainage layers of granular concrete sand and a geocomposite draining to sumps where leachate is removed by active pumping. Collected leachate is treated at the adjacent waste water treatment plant with the treated water being discharged to Lake Ontario. The final cover, which includes a geomembrane and geosynthetic clay liner, is designed to minimize surface infiltration and the long-term generation of leachate.

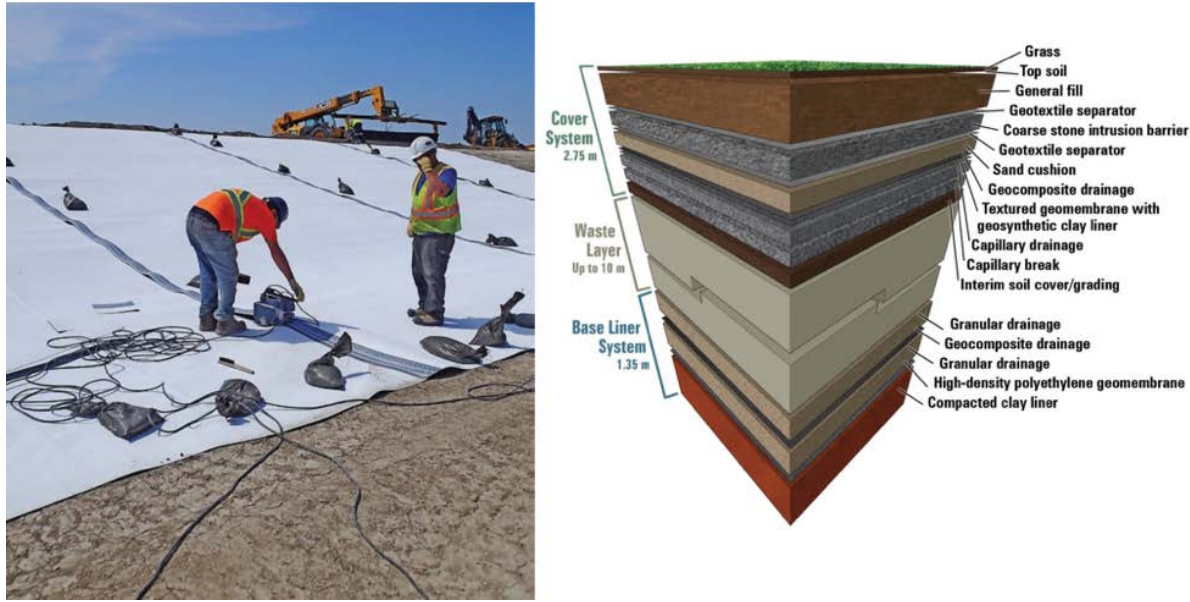


Figure 5: Composite Liner for LTWMF (right) and Installation of HDPE Geomembrane over Compacted Clay Liner (left)

PRE-CONSTRUCTION PLANNING

Pre-construction Submittals

The Port Granby Project is governed under a Waste Nuclear Substance Licence pursuant to Section 24 of the Nuclear Safety and Control Act (the "Act"), for the processing, packaging, transport, transfer, and storage of nuclear material. The terms of the license are founded on recommendations of an Environmental Assessment Screening Report (EA) completed between 2001 and 2009. The EA involved numerous studies designed to evaluate the potential impact of the project on the natural environment and included recommendations on measures to be taken to protect health, safety, security, and the environment. As such, a requirement of the Licence is the preparation by CNL of planning documents that describe the means by which measures to protect health, safety and the environment are developed and maintained. While CNL has the ultimate responsibility for ensuring compliance with the terms of the Licence, procedural documents developed by the contractor during the pre-construction planning stage of the project serve to document how the work will be undertaken in compliance with CNL planning documents, and ultimately, the terms of the License.

Prior to mobilization a comprehensive suite of approximately 40 pre-construction submittals were developed and provided to CNL for review and approval. Critical early submittals (required within 15-30 days of project award) included:

- Site Health & Safety Plan;
- Construction Traffic Management Plan;

- Proof of Training and Professional Certification;
- Environmental Awareness Training Plan;
- Contractor Environmental Protection Plan;
- Spill Prevention and Contingency Plan;
- Construction Quality Control Plan; and
- Site Plan.

Plans that needed to be submitted prior to undertaking specific activities included:

- Dust Management Plan;
- General Excavation Plan;
- Waste Excavation Plan;
- Compressed Gas Cylinder Waste Excavation Procedure;
- Waste Placement Work Plan;
- Slope Instrumentation and Monitoring Plan;
- Test Pad Construction and Testing Plan; and
- Radiation Protection Plan (which is the subject of paper #17446 being presented by David Cole).

These planning documents provide a blueprint for executing the project effectively, safely, and in full compliance with licensing requirements.

Worker Training

While project planning documents provide the foundation for completing the work safely, an effective training program is needed to ensure all project staff fully understand the scope of the planning documents and possess the appropriate competencies for completing the work to which they have been assigned. Training is an ongoing obligation involving both initial project orientation training and refresher training that reinforces key messages while introducing lessons learned as appropriate.

In support of the Port Granby project a comprehensive Training Matrix was developed which is used to document and track all relevant training received by direct project staff, remote support staff, subcontractors, key suppliers and those contractors conducting oversight on behalf of CNL. The matrix currently tracks some 800 workers with direct or indirect involvement in the project, documenting the mandatory, project-specific training received (e.g. PHAI Orientation Training, CNL Step-up to Safety, Community Awareness Training etc); legislated training requirements (e.g. Ontario Ministry of Labour); role specific training (e.g. spill prevention/response); and required licenses/diplomas/certifications. Coupled with course-content that covers information essential to the appropriate conduct of the work, the tracking matrix allows the Project Manager to understand the competencies required to conduct the work safely and effectively; provides a means to demonstrate those competencies; and finally, provides a means of tracking such that training certificates remain current.

INITIAL CONSTRUCTION ACTIVITIES

As of October 31, 2016 over 125,000 hours were worked on the project moving from project planning, through site preparation and set-up, to the construction of the two containment cells and associated infrastructure. On October 31, 2016 an important milestone was reached with the start of excavation and relocation of LLRW from the PGWMF to the newly-constructed LTWMF north of Lakeshore Road (Figure 6). While waste excavation and relocation will continue for up to three years, the ability to reach this milestone was predicated on detailed planning and the establishment of a well-trained and engaged workforce, all of which have allowed this complex project to proceed with minimal difficulty.



Figure 6: Transfer of Waste to the Newly Constructed LTWMF on Dedicated Haul Road

SUMMARY

The Port Granby project is a complex undertaking involving the excavation and relocation of some 450,000 m³ of LLRW and marginally contaminated soil from a series of historical disposal trenches located along the shores of Lake Ontario to a newly constructed, secure long-term waste management facility. The project is governed under a licence, granted by the Canadian Nuclear Safety Commission,

which requires strict compliance with applicable legislation as well as the recommendations of the Environmental Assessment completed in support of the project. Accordingly, the pre-construction planning documents developed both by CNL as general guidance documents, as well as the contractor as project-specific plans serves as critical blueprints that outline how the project will be planned, implemented and monitored to ensure compliance to not only design specifications but also the term of the CNSC licence. Such plans can only be implemented effectively through an informed and engaged workforce who have a full understanding of the complete range of project objectives and their individual role in achieving those objectives. While still early in the process, through careful planning and an effective training program a number of critical milestones have been achieved in the Port Granby project.

REFERENCES

1. An Agreement for the Clean-up and Long-Term Safe Management of Low-Level Radioactive Waste Situate in the Town of Port Hope the township of Hope and the Municipality of Clarington 2001 (as amended 2006, 2009)
2. Government of Canada, Environmental Assessment Screening Report for the Port Granby Long-Term Low-Level Radioactive Waste Management Project, 2009 August.