

Port Granby Project 2016 Annual Compliance Report Summary

The purpose of this report is to submit to the Canadian Nuclear Safety Commission (CNSC) the annual compliance report for the Port Granby Project (PGP) for the period 2016 January 1 to 2016 December 31. This report is issued in compliance with Section 2.3 of the *Port Hope Long-Term Low-Level Radioactive Waste Management Waste Nuclear Substance Licence* and Section 3.2.3 (e) of the *Port Hope Licence Conditions Handbook*.

- The Port Hope Area Initiative (PHAI) is a community-based project to develop and implement a safe, local, long-term management solution for historic low-level radioactive waste (LLRW) in the Port Hope area. The PHAI is defined by *An Agreement for the Cleanup and Long-Term Safe Management of Low-Level Radioactive Waste Situated in The Town of Port Hope, The Township of Hope and the Municipality of Clarington* (the "Legal Agreement"), which took effect on 2001 March 29, between the Government of Canada and the municipalities of Port Hope and Clarington for the management of the LLRW within each of the communities. Canadian Nuclear Laboratories (CNL) is responsible for the direction and execution of the PHAI in compliance with the Legal Agreement, licences and Environmental Assessment (EA) decisions. CNL has overall responsibility for managing the PHAI on behalf of Atomic Energy of Canada Limited, a federal Crown corporation.

The overall performance highlights for 2016 activities are outlined below.

- Port Granby Project (PGP)-related activities for enabling infrastructure:
 - Completed Culvert #3 design, procurement of contractor and construction.
 - Active commissioning of the Port Granby WWTP was completed at the end of 2016 March.
 - WWTP was declared to be in service and operating in 2016 October per approved CNL operational and maintenance procedures.
 - WWTP began discharging treated effluent to Lake Ontario on 2016 April 1.
 - Completed active commissioning of evaporator and related residuals management equipment at PG WWTP in 2016 October.
 - Submitted and updated proposed interim Action Levels for PG WWTP effluent to CNSC staff based on the draft CSA Standard N288.8.
 - Finalized the 2015 Biannual Road Condition Assessment Report and provided it to the Municipality of Clarington. Completed the field work and data collection for the 2016 assessment in 2016 October.

- Installed a temporary overland effluent discharge pipeline at the PGWMF. The pipeline remained in use until the final discharge pipeline was installed as part of the LTWMF contract work.
- Completed PGWMF electrical substation maintenance activities.
- Completed the upgrade of Bell services to fibre optic technology at the PGWMF, which will allow the construction contractor to set up the planned site services.
- Completed installation of the concrete box culverts for the Lakeshore Road overpass in 2016 July (Figure 2-3). The detour opened to public use in 2016 September.
- Completed hydro pole relocation work along Lakeshore Road, coordinating the work with the changes required to low and high-voltage lateral services to PGWMF.
- Placed the equalization Pond at LTWMF into service. New effluent discharge pipe from PG WWTP to Lake Ontario was put into service and temporary piping removed. The facility is now transferring water from the PGWMF to the Equalization Pond.
- Port Granby Project (PGP)-related activities for PG LTWMF construction and PGWMF remediation:
 - Contractor mobilized at the Port Granby site 2016 March 15 and in so doing, assumed responsibility for access and security to the site until the completion of the contract.
 - Undertook site preparation activities, including stockpiling granular materials and stripping and storing topsoil at the north end of the LTWMF site. In 2016 March, this activity was extended to topsoil stripping at the east and south mound haul roads, the Equalization Pond and containment Cell 1.
 - Cleared trees within selected areas of the PGWMF site in late 2016 March ahead of the annual bird nesting season to provide access to areas to be remediated.
 - Completed environmental drilling investigation of on-site locations (the bluffs and southwest site locations) and the associated off-site investigations and received draft report from consultant.
 - Installed dip pole for the high-voltage service to the PGWMF site. This was done in advance of the Lakeshore Road hydro pole relocation activity.
 - Awarded Quality Control/Assurance Consultant contact.
 - Excavation of Cell 1 and Cell 2 base contours (Figure 2-5) starting in 2016 June.
 - Performed well decommissioning at the PGWMF.
 - Completed off-site environmental drilling investigations within the road allowances to finalize identification and, if required, delineation of waste boundaries prior to remediation activities.

- Completed placement of the compacted clay liner and geomembrane in drainage ditches.
- Completed excavation of the equalization pond and installation the HDPE geomembrane liner for the pond.
- Completed excavation of both stormwater management ponds and installation the HDPE geomembrane liner for the ponds.
- Completed electrical leak detection of the HDPE liner in Cell 1, Cell 2, the equalization pond and the stormwater management pond.
- Completed installation of slope stability instruments as specified for the monitoring of the East Gorge during remediation activities.
- Continued site preparations and mobilized the heavy components for the weigh-bridge and vehicle portal monitor structures.
- Completed construction of the Lakeshore Road temporary underpass and detour; opened it for public use 2016 September 15.
- Completed the haul roads under Lakeshore Road and the associated roadwork to connect the PGWMF and LTWMF internally, and completed construction of the internal haul roads with the associated drainage swales and silt fencing.
- Completed horizontal directional drilling for the installation of the new water force mains to the East and West gorges at the PGWMF.
- Completed installation of force main and effluent discharge piping prior to waste movement.
- Completed final inspections, testing and commissioning of piping and pumping systems that support site drainage and the movement of groundwater and surface water to the PG WWTP for treatment.
- Completed the setup of laydown area at the PGWMF, including installation of trailers for first aid, radiation protection services and construction offices.
- Constructed the ancillary buildings, including pump stations, weigh scales, vehicle portal monitors and wheel wash station.
- Began the excavation of historic LLRW at the PGWMF and transfer of the excavated material to Cell 1 at the LTWMF 2016 November 1 and continued throughout the month of November. Approximately 80,800 tonnes or about 14% of the anticipated waste volume was safely moved and contained at the LTWMF by the end of the year.
- Cell 1 and Cell 2 - completed the excavation (Figure 2-6), placement and quality testing of the compacted clay liner (Figure 2-7) and high-density polyethylene (HDPE) geomembrane (Figure 2-8), and installation of drainage layers for the base liner.
- Suspended excavation of historic LLRW at the PGWMF and transfer to the LTWMF suspended 2016 December 1, following the detection of a strong

chemical odour at the worksite. The suspension of the excavation and transfer of LLRW remained in place throughout the month of December.

- Covered the remaining exposed portion of the liner in Cell 1 and all of the liner in Cell 2 were covered with one metre of clean overburden material.
- Completed atmospheric sampling in Cell 1 at the LTWMF and soil sampling at the PGWMF.
- All licensed activities continued to be carried out safely and securely.
- There was one failure of equipment component process systems/inappropriate procedure of human action at the Port Granby Waste Water Treatment Plant (PG WWTP), which was reportable to the CNSC. On 2016 August 4, there was an unintended discharge of 10% lime solution at the PG WWTP following a planned power outage where the discharge line from the pump became disconnected. As a result, lime solution (10%) was first pumped into the spill contaminant area around the dosing pump and then overflowed onto the chemical room floor. It then seeped out the door to the paved area outside of the PG WWTP. The lime solution then spread onto the adjacent gravel area. This was reported to the CNSC as well as the Ontario Spills Action Centre and followed up with the submission of a detailed report.
- CNL completed all required reporting as outlined in the *Licence Conditions Handbook* under Section 3.2.3.
- The annual ISO 9001 Audit took place in 2016 October and resulted in no findings and identified no further opportunities for improvement. Four compliance program self-assessments were conducted for 2016 and one self-assessment is in progress.
- Continued to operate and maintain existing PGWMF in accordance with approved CNL WMF operational and maintenance procedures.
- Contractor island established and majority of PGWMF control transferred to construction contractor on 2016 March 15
- Forty compliance oversights were conducted for the Port Granby Project. No negative trends were observed. Recommendations for improvement raised from compliance oversight activities were dispositioned or rectified prior to the next oversight inspection.
- Radiation exposures were below all regulatory dose limits.
- There were no lost time injuries.
- EA follow-up and operational monitoring continued in 2016 with no areas of concern.
 - Operational Monitoring
 - Groundwater Monitoring
 - Operational groundwater well sampling was not conducted in 2016. The operational groundwater wells were scheduled to be decommissioned in 2016 as they were located within or adjacent to the PGWMF excavation areas

- Bluff Seepage Monitoring
 - In 2016, seepage samples were collected quarterly from three locations along the Lake Ontario bluffs between the east and west gorges in the areas where active erosion is being monitored. Elevated concentrations of fluoride, arsenic, uranium and nitrates were noted in the seepage water. The elevated concentrations are in line with historic trends for bluff seepage monitoring. However, seepage flow volumes are very small throughout most of the year. As a result, the total contaminant plume to Lake Ontario remains very small. The seepage water quality is expected to improve as the project evolves.
- Water Collection and Treatment System
 - During the reporting period, none of the effluent discharge limits for the PGWMF were exceeded. No toxicity failures occurred during the reporting period.
- Geotechnical Monitoring Program
 - The geotechnical inspections in 2016 were performed by the contractor who was delegated the authority over in the site in 2016 March. This consisted of ongoing inspections and monitoring activities (including regular visual observations), per each organization's respective plans and procedures. When waste movement began on 2016 November 1, the contractor produced weekly slope stability reports, per the specification requirements.
- Port Granby Project Environmental Assessment Monitoring consists of atmospheric, geology and groundwater and aquatic monitoring. Below is a brief summary of environmental monitoring for 2016.
 - Atmospheric Monitoring
 - Thirteen filters exceeded the Overriding Limit of 120 µg/m³ from 2016 April to September. The exceedances represent approximately 6% of total samples. The summer of 2016 was challenging in terms of dust management given that the region experienced very dry and hot weather conditions. The contractor worked to continuously improve and optimize dust mitigation practices, and the number of exceedances was subsequently reduced.
 - Independent Dust Monitoring
 - During the 2016 reporting period, independent dust monitoring continuously occurred during the work hours and results were reported on a 15-minute interval.

- Noise Monitoring
 - Continuous sound level data was collected at a total of nine locations in Port Granby during the 2016 monitoring period on a quarterly basis. Several special campaigns were also conducted along the transportation route to monitor the effects of increased truck traffic to the site.
- Geology and Groundwater Monitoring
 - Groundwater samples were collected and analysed for contaminants on a quarterly basis in 2016 in conjunction with the measurement of groundwater static levels. Accessibility issues and ongoing construction made it impractical to sample every well on the PGWWMF site during each campaign, but this is not a concern as changes to groundwater are generally slow to develop. On the site of the current PGWWMF, the groundwater quality is expected to improve significantly once waste removal is completed. On the site of the PG LTWWMF, changes to groundwater quality are expected to be minimal due to the presence of an engineered containment system made from a multi-layered baseliner and cover system and leachate water collection system. Perimeter monitoring will be used at the site perimeter locations to confirm effectiveness of the containment system.
 - Soil sample results indicated that only total boron has consistently exceeded the clean-up criteria for the Contaminants of Potential Concern (COPCs) at all locations. However, it should be noted that the value is not increasing, indicating that the condition was pre-existing and that the project is not contributing to these elevated levels. All other values are below the clean-up criteria for the COPCs and are comparable to previous years.
- Aquatic Monitoring
 - Results from sediment sampling indicated there were no exceedances against the *Provincial Sediment Quality Guidelines* or the *Canadian Council of Ministers of the Environment Sediment Quality Guidelines*. The concentration of contaminants in the sediments has remained fairly stable over the past three years. It is expected to improve once remediation of the Port Granby site is complete.
 - The surface water flowing in the Port Granby Creek watershed was sampled on a quarterly basis at two locations. Water quality in the sample locations of the stream have remained stable over the last few years, notably with respect to metals and radionuclides. In 2016, the concentration of aluminum and iron exceeded the PWQO and CWQG at both upstream and downstream locations. Exceedances had also been observed in previous years. Port Granby Creek was also monitored for one storm event in 2016. The contaminant concentrations were observed to

peak as Total Suspended Solids (TSS) increased. Concentrations of fluoride, silver, aluminum, arsenic, cadmium, cobalt, chromium, copper, iron, nickel, lead, thallium, uranium, vanadium and zinc were observed to exceed the PWQOs and/or CWQGs as TSS increased. Concentrations were subsequently reduced as TSS levels declined.

- The Lake Ontario water quality at the diffuser is not affected by the current PGWMF operations, and this is also evident from results of the mixing zone samples.
- The results of the drainage water sampling campaigns were compared against the PWQO and the *Canadian Water Quality Guidelines for Protection of Aquatic Life* (CWQG). Exceedances have been observed in previous years for these compounds in drainage water (prior to emplacement of the waste at the PG LTWMF), and as such are not likely related to the operation of the facility. The rural nature of the site and the associated farming activities would likely contribute to the higher than normal phosphorus levels in the pond. It should be noted that elevated detection limits (i.e., above or at the applicable regulatory criteria) were observed for cadmium, chromium, selenium, and silver in some of the samples collected in 2016.
- The waste management Safety Control Area is not applicable to the PGP.
- There were no security events that effected the Port Granby Project.
- The safeguards and non-proliferation Safety Control Area are not applicable to the PGP.
- From 2016 January to December, there were no radioactive material transport shipments associated with the PGP.
- CNL maintained effective relationships with the local community and First Nations through its many outreach and stakeholder relations activities, in accordance with the PHAI Phase 2 Communications Plan.