EXECUTIVE SUMMARY

Introduction

Low-level radioactive waste and associated marginally contaminated soils at Port Granby are part of historical industrial activities in the Port Hope area. Since the 1930s, radioactive materials have been shipped to Port Hope for processing, beginning with radium ores from the Northwest Territories. Processing of uranium ores began in the 1940s and more recently focussed on production of uranium oxide and uranium hexafluoride for nuclear power reactors in Canada and around the world. Disposal of process wastes took place at various locations throughout the area, including at a site on the Lake Ontario shoreline near the hamlet of Port Granby in the Municipality of Clarington. This site, which is known as the Port Granby waste management facility, commenced operations in 1955 and continued to receive wastes until 1988. The Port Granby waste management facility remains as an inactive waste management facility operated under a licence issued by the Canadian Nuclear Safety Commission to Cameco Corporation.

Initiatives and studies to find suitable solutions for managing the Port Granby wastes over the long term have been ongoing since 1980. All previous attempts were unsuccessful, and in June 2001, the Port Hope Area Initiative was started, guided by an agreement between the federal government and the affected communities in Port Hope and Port Granby.

The Port Hope Area Initiative is a community-based program directed at the development and implementation of a safe, long-term management solution for historic low-level radioactive waste that have existed in the Port Hope area. It is the result of an agreement between the Government of Canada and the affected municipalities for the management of contaminated materials within the communities in above-ground facilities designed to last for several hundred years. Among other activities and programs, the Port Hope Area Initiative includes two primary physical undertakings: i) the Port Granby Long-term Low-level Radioactive Waste Management Project (the Port Granby Project); and ii) the Port Hope Long-term Low-level Radioactive Waste Management Project (the Port Hope Project).

This document constitutes the Environmental Assessment (EA) Study Report for the Port Granby Project. The purpose of the Port Granby Project is to clean up and provide appropriate local, long-term management for low-level radioactive waste and marginally contaminated soils currently located in the Municipality of Clarington and associated with the existing licensed Port Granby waste management facility. The waste materials are to be managed in a suitably constructed, environmentally safe, socially acceptable and appropriately controlled state for the long term (i.e., hundreds of years).

The Port Granby Project will take place entirely within the Municipality of Clarington, Region of Durham in the Province of Ontario. The Municipality of Clarington is located on the north shore of Lake Ontario, approximately 80 km east of the City of Toronto.

The proponent for the Port Granby Project is the Low-level Radioactive Waste Management Office of Atomic Energy of Canada Limited, on behalf of the Government of Canada. The environmental assessment is being conducted under the *Canadian Environmental Assessment Act*. There are three Responsible Authorities for the Project. Natural Resources Canada is a Responsible Authority for the purposes of the environmental assessment because it will need to make a decision on whether to provide funds to the Port Granby Project as part of its oversight responsibilities for the Port Hope Area Initiative. The Canadian Nuclear Safety Commission is also a Responsible Authority because the proponent will require a Nuclear Waste Substance Licence for the possession, management and storage of a nuclear waste substance. Fisheries and Oceans Canada is also a Responsible Authority because an authorization under the *Fisheries Act* is required for the harmful alteration, disruption or destruction of fish habitat, and such an authorization may be necessary to implement the Project. Natural Resources Canada has assumed the lead for the conduct of the environmental assessment.

Scope of the Environmental Assessment

The scope of the environmental assessment, which was established by Natural Resources Canada and the other Responsible Authorities, requires that a screening assessment be completed, which includes a broad assessment of several factors such as:

- The need and purpose of the Port Granby Project;
- Consideration of comments and input from the public and key stakeholders;
- Assessment of alternative means of implementing the Project;
- Description of existing environmental conditions;
- Assessment of environmental effects of the Project, including any effects that may occur because of malfunctions or accidents, the cumulative environmental effects likely to result from the Project in combination with other projects;
- Identification and evaluation of mitigation measures to reduce or avoid adverse environmental effects of the Project;
- Determination of significance of the residual adverse effects;
- Assessment of effects of the environment on the Project; and
- Development of a plan for follow-up monitoring.

The scope of the environmental assessment is presented in Section 2 of the EA Study Report. The methods used to conduct the assessment are presented in Section 4 of the EA Study Report.

The environmental assessment of the Port Granby Project was considered in the context of three study areas, which were modified to meet the specific needs of the individual environmental components. The study areas were:

- The Regional Study Area, which comprises the Municipality of Clarington, Municipality of Port Hope and Township of Hamilton, and extends approximately 5 km into Lake Ontario;
- The Local Study Area, which comprises the southern portion of the Municipality of Clarington, the southwestern portion of the Municipality of Port Hope, and extends approximately 1 km into Lake Ontario; and
- The Site Study Area, which comprises the Port Granby property owned by Cameco Corporation, including the existing waste management facility and the long-term waste management facility sites, and extends approximately 20 m into Lake Ontario.

The time frames for the assessment of effects were categorized into two main phases: the construction and development phase (2007 to 2012) and the maintenance and monitoring phase (2012 to 2500+).

Historical Context and Need for the Project

The historical context and need for the Project is discussed in Section 3 of the EA Study Report. As noted, low-level radioactive waste and associated marginally contaminated soil at Port Granby are part of a broader historical radioactive waste presence. Specifically, the wastes present within the Municipality of Port Hope and at Port Granby are the result of industrial activity related to the processing of uranium ores for use as fuel for nuclear power reactors in Canada and around the world. The Port Granby waste management facility received process and industrial wastes from 1955 to 1988. Natural leaking and erosion processes resulted in the contamination of the native soils surrounding and beneath the burial trenches where the wastes were disposed. Initiatives and studies to find suitable long-term solutions for managing the wastes have been ongoing since 1980.

A general consensus has emerged in the local, professional and regulatory communities that the in-situ management systems at the existing waste management facilities are acceptable only in the near-term; there is also a clear consensus that the current situation is not suitable as a long-term solution. Specifically, should the status quo continue, the following would be likely or possible:

- Leaching of contaminants will continue and the elevated concentrations of contaminants will increase with a potential effect on the natural environment;
- The erosion of the Lake Ontario bluffs and instability of the East Gorge will continue and potentially lead to situations where there could be significant health and/or environmental effects as a result of failure of the current management systems;
- Municipal development pressures in the decades to come could erode the degree of institutional controls necessary to manage the existing WMF; and
- The administrative and technical burden associated with managing status quo will eventually reach the point at which the quality of the management control could be compromised simply as a result of loss or erosion of institutional records and memory.

Therefore, the administrative burden for maintaining the existing waste management facility may be expected to increase with time. The establishment of the Legal Agreement between the parties acknowledges that the status quo would not be acceptable as a long-term solution for management of low-level radioactive waste and marginally contaminated soil at Port Granby.

Stakeholder Consultation

Consultation with the public and other stakeholders occurred throughout the EA process and contributed significantly to the decision making process. The consultation program, which is a requirement of the EA, and the results are presented in Section 5 of the EA Study Report.

Stakeholders were identified using a systematic, inclusive process. The outreach study area was divided into two regions, corresponding to the Regional and Local Study Areas for the environmental assessment. A wide variety of methods were used to inform and obtain input from the stakeholders. These included: newsletters, use of news and press releases, an interactive web site, information booths at community events, facility tours, presentations to schools, presentations and meetings with the municipality, roundtable meetings with the community, open houses and workshops. In light of Aboriginal peoples' constitutionally recognized Aboriginal and treaty rights, their traditional use of the lands and resources in the area for centuries and First Nation status as governments, discussions with the Aboriginal community were conducted as part of the Port Granby Project. The groups contacted included local First Nations, Métis organizations and Aboriginal government agencies.

Issues raised by the public and other stakeholders were noted, considered and tracked in an issues management database (included in Section 5 of this Report).

Consultation with the Municipality occurred throughout the environmental assessment process. The Municipality engaged an independent team of experts, coordinated by municipal staff, to review various aspects of the environmental assessment – from planning through to this Report. The review, deliberation and disposition of comments from the Municipal Peer Review Team became an essential element of the Port Granby Project, strengthening both the technical and community confidence in the environmental assessment process and the reliability of the conclusions of the environmental assessment studies. Comment disposition tables identifying the issues raised by the Municipal Peer Review Team and their resolution are included in this Report and relevant technical support documents.

Alternative Means of Carrying Out the Project

The scope of the environmental assessment included a requirement to consider the various ways that the Port Granby Project could be implemented. Examples of alternative means include different ways of excavating and transporting wastes, different ways of stabilizing the wastes and different site restoration methods. Alternative means are addressed in Section 6 of this Report.

The assessment of alternative means included consideration of input and preferences from the public. Feasible concepts were identified which included an evaluation of numerous alternative methods. Three feasible concepts for the long-term management of wastes were identified:

- Feasible Concept IA: Onsite Management of Wastes – Excavation of East Gorge Wastes;
- Feasible Concept IB: Onsite Management of Wastes – No Waste Excavation; and
- Feasible Concept II: Relocation of Low-level Radioactive Waste and Marginally Contaminated Soil to a Long-term Waste Management Facility.

The three feasible concepts were then assessed in more detail, again using input from the public and other stakeholders. The result was the identification of a qualified concept, which subsequently formed the basis for the environmental assessment.

Feasible Concept II was identified as the qualified concept in the environmental assessment. This concept entails the relocation of wastes to a new long-term waste management facility located north of Lakeshore Road. The alternative means assessment also resulted in the identification of a preferred route for transportation of construction materials to the facility.

Description of the Project

The Port Granby Project is based on a community proposal developed by the Municipality of Clarington and subsequently incorporated into the agreement between the municipality and the Government of Canada. The Project, which is described in Section 7 of the EA Study Report, is based on the outcome of the alternative means assessment and community input and can be summarized as follows:

- Excavation of approximately 204,400 m^3 of historic low-level radioactive waste and approximately 101,000 m^3 of associated marginally contaminated soils currently located at the existing waste management facility;
- Construction of a new long-term waste management facility immediately north of the existing facility, including the necessary infrastructure;
- Transfer and placement of low-level radioactive waste and marginally contaminated soils into the long-term waste management facility;
- Reinstatement (or restoration) of the existing waste management facility;
- Monitoring and maintenance of the long-term waste management facility confirming its ability to provide effective containment; and
- The upgrading and/or development, operations and maintenance of physical systems, buildings and infrastructure required to support the above activities.

During the environmental assessment process the design of the Project was refined as a result of municipal review. Enhancements to the design included the addition of a capillary barrier

system in the cover system and a dedicated inter-site haul route using a Lakeshore Road underpass.

Description of the Existing Environment

Section 8 of the EA Study Report presents a summary description of the existing environment provided by the environment component Baseline Characterization Study Reports and Addendum Studies as follows:

- **Atmospheric Environment**, which includes noise and air quality;
- **Geology and Groundwater Environment**, which includes groundwater flow, groundwater/surface water interactions, groundwater quality, drainage water quality and soil quality;
- **Aquatic Environment**, which includes surface water quality, sediment quality, metals and radionuclides in aquatic biota, fish communities and habitats, benthic invertebrate communities, aquatic plant communities and hydrology and coastal processes;
- **Terrestrial Environment**, which includes vegetation communities, wildlife habitat, wildlife communities and radioactivity in the Terrestrial Environment;
- **Socio-economic Environment**, which includes population and economic base, land use and visual settings, community infrastructure, community services, traffic and transportation, municipal finance and administration, residents and community, heritage and archaeology and Aboriginal interests; and
- **Human Health and Safety Considerations**, which includes the radiological health of workers, radiological health of members of the public, conventional occupational health and safety of workers and conventional health and well-being of members of the public.

The description of the environment is divided into two major sections: the Biophysical Environment, comprising of Atmospheric, Geology and Groundwater, Aquatic and Terrestrial Environments and the Human Environment, comprising of Socio-economic Environment and Human Health and Safety Considerations. The information in Section 8 of this Report serves as the baseline against which incremental changes and likely environmental effects associated with the Port Granby Project are predicted and assessed.

Assessment of Likely Effects of the Project

Section 9 of the EA Study Report presents an assessment of the likely environmental effects of the Port Granby Project on the six environmental components; identifies mitigation measures to eliminate, reduce or control those effects that are adverse; and describes the residual adverse effects that remain after mitigation. Quantitative and qualitative methods, including professional judgement, were used to predict and assess the likely effects and need for mitigation. Malfunction and accident scenarios were also assessed.

Over 560 potential Port Granby Project-environment interactions were identified and evaluated for likely environmental effects. Most of the interactions were identified for the Socio-economic Environment followed by the Aquatic Environment, Terrestrial Environment and Human Health and Safety Considerations. The Atmospheric Environment and Geology and Groundwater Environment had the fewest interactions.

Over 280 measurable changes were identified for all environmental components (again most of these for the Socio-economic Environment and Human Health and Safety Considerations).

Where measurable changes were identified, further detailed assessment was undertaken to describe and assess adverse effects. Where adverse effects were expected, further mitigation measures were identified to avoid or reduce the adverse effect. The effects were then re-evaluated to determine whether an adverse effect still remained (i.e., residual adverse effects).

The analysis identified no residual adverse effects for the Atmospheric Environment, Geology and Groundwater Environment, Aquatic Environment and Terrestrial Environment. Residual adverse effects were identified for several of the sub-components of the Socio-economic Environment and Human Health and Safety Considerations. The 13 residual adverse effects identified for the Socio-economic Environment were:

- Displacement of one tenant farming business;
- Increased potential for out-migration of residents living in the Port Granby area prior to and during the construction and development phase;
- Disruption to farm operations within the zones of influence[1] and along transportation routes during the construction and development phase;
- Changes in the quality of existing views from locations within the viewshed of the long-term waste management facility;
- Reduced residential property values in the order of 2 to 8% within the zone of influence for the long-term waste management facility[1] during the construction and development phase and into the maintenance and monitoring phase. Port Granby Project-generated effects on existing farm properties nearest the long-term waste management facility are anticipated to be of lower magnitude, if any;
- Reduced residential property values along transportation routes where nuisance effects from increased traffic noise are expected during the construction and development phase and into the maintenance and monitoring phase;
- Increased turnover of residential properties within the zone of influence for the long-term waste management facility during the construction and development phase and into the maintenance and monitoring phase;

[1] For the purposes of the Socio-economic Environment EEA, the likely zones of influence are considered to be the areas surrounding the site within which people may notice a change in the environment, and therefore, whose activities may be disrupted. These likely zones of influence were defined based on conservative assumptions.

- Increased difficulties in marketing properties resulting in a greater number of days on the market during the construction and development phase and into the maintenance and monitoring phase;
- Disruption to some road users, pedestrians and non-motorized traffic along the recommended transportation routes and local roads due to perceived hazards, detours and road closures during the construction and development phase;
- Changes in the use of property and reduced enjoyment of property among some residents living within the zone of influence for the long-term waste management facility, existing waste management facility and along transportation routes during the construction and development phase;
- Disruption of community and recreational activities undertaken within the likely zone of influence for the long-term waste management facility, or along transportation routes during the construction and development phase;
- Changes to community character or image of the rural areas nearest the long-term waste management facility during the construction and development phase; and
- Increased potential for adverse effects on the ability of current and future generations to exercise inherent Aboriginal and Treaty rights.

The assessment also considered a number of mitigation measures to address the likely effects in the Socio-economic Environment, including continued implementation of the Property Value Protection Program. Mitigation will be continually developed through further participation and/or approval by community stakeholders, including the Municipality of Clarington and the Project proponent.

One residual adverse effect was identified for Human Health and Safety Considerations:

- Increased stress and adverse effects to health and general well-being resulting from negative changes to people's feelings of health and sense of well-being, feelings of personal security and feelings of satisfaction with living in the community.

The Port Granby Project is also expected to result in seven beneficial effects, as follows:

- Increased direct, indirect and induced employment opportunities during the construction and development phase;
- Increased business activity related to the Port Granby Project-related expenditures and income spending by persons associated with the Project during the construction and development phase;
- Increased attractiveness of the waterfront and enhancement of tourism opportunities associated with Clarington's waterfront during the maintenance and monitoring phase;

- Enhanced potential for increased property values in the vicinity of the Clarington waterfront following the successful completion of the Project and implementation of a recreational end use;
- Enhanced public access to natural areas and trails in the immediate vicinity of the existing waste management facility following successful remediation;
- Improved transportation system and infrastructure resulting from pre-Project upgrades and maintenance activities; and
- Increased revenue resulting from securing the $10 million hosting fee from the Government of Canada following the issuance of a licence to construct and operate the long-term waste management facility by the Canadian Nuclear Safety Commission.

Assessment of the Effects of the Environment on the Project

Section 10 of the EA Study Report presents the assessment of potential effects of the environment on the Port Granby Project. The assessment considers how severe weather conditions and other environmental events may interact with and alter the condition and function of the Project resulting in a consequential effect on the environment, including human health and safety. The assessment considered the following:

- Inherent design features and implementation protocols intended to prevent or resist effects of the environment; and
- Consideration of climate change, including potential changes in weather patterns and severe weather events associated with it, because the maintenance and monitoring phase extends over several hundred years.

Potential interactions of the environment with the Port Granby Project were identified as: severe weather (including thunderstorms and hail storms, ice storms, tornados, hurricanes, high winds and extreme temperature and precipitation), seismic events and changes to lake levels. These potential interactions occur with or without climate change.

The environment may have limited potential for consequential effects on the Geology and Groundwater Environment, and as a result, the Aquatic Environment due to the potential increase in infiltration into the long-term waste management facility as the result of climate change. The increased volume of leachate could possibly result in the alteration of groundwater quality beneath the long-term waste management facility. The results of the Geology and Groundwater assessment indicated that there would not be a significant effect from the long-term waste management facility even in the event of a failure of the cover system or as a result of climate change-induced increased levels of infiltration. The assessment was completed using a bounding scenario that does not consider the beneficial effects of the capillary barrier system; therefore, effects will be even less significant. There will be no potential lasting and measurable effects on the Port Granby Project's Terrestrial Environment sub-components, nor will there be any predicted changes in the Atmospheric Environment that could have consequential effects on this Project.

From a Human Health and Safety Considerations and Socio-economic Environment perspective, there are no potential effects of the environment on the Port Granby Project that require consideration.

The assessment found that the identified effects of the environment on the Port Granby Project are not likely to result in residual adverse effects, taking the existing mitigation measures into account. Consequently, there are no residual adverse effects advanced for further consideration of their significance.

Assessment of Cumulative Effects of the Project

Section 11 of the EA Study Report presents an assessment of cumulative effects in relation to the Port Granby Project. The assessment considered the combined effects of the Port Granby Project and other projects, which might overlap in both time and space. A total of 26 other projects were identified for assessment. Ten of these were identified as likely to overlap with the Port Granby Project in the Atmospheric Environment, Socio-economic Environment and/or Human Health and Safety Considerations.

These projects were assessed further to determine if cumulative effects are likely to occur. The assessment found that there were no cumulative effects identified for the Socio-economic Environment or the Atmospheric Environment, therefore no mitigation measures were warranted and no residual effects are expected.

The assessment identified one residual cumulative effect in Human Health and Safety Considerations, specifically increased stress and adverse effects to health and general well-being resulting from negative changes to people's feelings of health and sense of well-being, feelings of personal security; and feelings of satisfaction with living in the community. This is expected to be most evident in people living close to the long-term waste management facility in regards to their thoughts about living near a facility that manages radioactive materials. Under normal operations, no widespread or extreme negative changes in feelings are considered likely. This cumulative effect was advanced for the assessment of significance.

Significance of Residual Environmental Effects

Section 12 of the EA Study Report describes the context, the criteria and the parameters for determining the significance of residual adverse effects of the Port Granby Project, which were determined to require further assessment. This included 13 residual adverse effects of the Project within the Socio-economic Environment and one residual adverse effect for Human Health and Safety Considerations. Also, a potential residual cumulative effect was identified in Human Health and Safety Considerations. No residual adverse effects were identified for the Port Granby Project in the Atmospheric, Geology and Groundwater, Aquatic or Terrestrial Environments.

An evaluation of the 14 residual adverse effects of the Port Granby Project and the single potential residual cumulative effect established that all such effects represent minor adverse effects (not significant). The assessment found that the proposed Project is not likely to result in any significant adverse effects on the environment, taking into consideration the identified mitigation measures.

Follow-up Program

Implementation of the Port Granby Project will include a program of comprehensive and long-term environmental monitoring to ensure that the performance and operational requirements of the long-term waste management facility are met. The monitoring program will be an ongoing operational element of the maintenance and monitoring phases of the Project. A proposed follow-up program is presented in Section 13 of the EA Study Report and summarized here.

The scope of the environmental assessment requires that the environmental assessment include a follow-up program to:

- Assist in determining that the environmental effects of the Project are as predicted in the environmental assessment;
- Confirm whether the mitigation measures implemented are effective; and
- Determine if new mitigation strategies are required.

New mitigation measures will be warranted if either the implemented mitigation measures are found to be ineffective, if the actual environmental effects are greater than predicted in the environmental assessment or if standards and regulations change in the future. Conceptual follow-up monitoring programs were identified for each of the six environmental components. The final scope and details of the program will be determined by the Responsible Authorities through consultation with the Federal Authorities and key stakeholders.

The proposed approach to developing the details of the follow-up program is as follows:

- Review the preliminary scope suggestions outlined in the environmental assessment;
- Determine the scope and timing of each of the identified program elements (including details of the monitoring parameters, locations, frequency, duration);
- Identify how the proposed program elements might be incorporated into or coordinated with existing or ongoing monitoring programs;
- Determine the frequency and the method of reporting results to the Responsible Authorities, public and other stakeholders;
- Review the details of all proposed programs with the Responsible Authorities and other regulatory agencies, as appropriate; and
- Review and discuss the program with the Municipality of Clarington.

Conceptual Decommissioning and Abandonment Plan

Section 14 of the EA Study Report provides a consideration of the decommissioning options (including abandonment), and potential environmental effects which are discussed at a conceptual level of detail. Decommissioning, when it does occur, would be subject to separate approvals, including a separate environmental assessment. A specific proposal to decommission the proposed facility is not advanced for this environmental assessment; however, conceptual level decommissioning options, which are considered applicable to the long-term waste management facility, include the following:

- Excavate and process the wastes for contaminant removal (i.e., major volume reduction);
- Excavate and transfer the wastes to a permanent disposal facility for low-level radioactive waste; and
- *In situ* decommissioning of the long-term waste management facility.

Abandonment of the decommissioned facility is also considered. All of the options involve construction activities, which are similar to those that will occur during the construction and development phase. It is assumed that all of the options would involve environmental monitoring for an appropriate period of time to ensure that environmental standards are achieved.

Conclusions of the Assessment

The conclusions of the Low-level Radioactive Waste Management Office on the environmental assessment of the Port Granby Project are presented in Section 15 of the EA Study Report. Taking into account the findings of the environmental assessment studies, including the identified mitigation measures, it is the Low-level Radioactive Waste Management Office's conclusion that the Project is not likely to result in any significant adverse effects on the biophysical and human environments. Indeed, the Project will result in a number of obviously beneficial effects on the environment, including the resolution of a long-standing environmental issue in the Municipality.