THE REMEDIATION AND REJEUVENATION OF CAMECO'S PORT HOPE CONVERSION FACILITY

Aldo D'Agostino

Cameco Corporation

Port Hope, Ontario, Canada

ABSTRACT

Cameco's Vision 2010/Vision in Motion project is a comprehensive redevelopment plan for the Port Hope conversion facility (PHCF), Canada's oldest continually operating nuclear facility. It entails the cleanup and redevelopment of the site, which is currently home to a number of old or under-utilized buildings, contaminated soils and stored historic wastes. Following removal of the targeted structures, the contaminated soils and stored wastes, new replacement buildings will be constructed. The project is being carried out in conjunction with the Port Hope Area Initiative (PHAI), a federal government undertaking for the cleanup and long-term management of low-level radioactive and industrial waste in Port Hope.

The demolition program will form a significant portion of the Vision 2010 project activities. There are a number of buildings on the site that are to be removed, ranging in size from small pump-houses to large former production plants. The buildings slated for demolition will first have any remaining equipment and materials removed and then be cleaned to remove surface contaminants. Once the buildings have been cleaned, they will be dismantled.

The excavation of fill and native soil underlying Cameco's PHCF is another important element of Vision 2010. The soil has been contaminated by historical operations, largely related to predecessor uranium processing and radium production activities. Soil which exceeds the remedial objectives will be loaded onto trucks and transported to PHAI's long-term waste management facility (LTWMF) for management.

Throughout these activities, hazardous materials will be encountered, primarily during the demolition of buildings and the cleaning of materials to meet release criteria. Some hazardous materials may also be encountered during the preparation or repackaging of drummed waste prior to disposal at the LTWMF and during soil excavation.

1. INTRODUCTION

A major cleanup and renewal initiative is about to commence at Cameco Corporation's uranium conversion facility in Port Hope, Ontario. Conceived under the banner of "Vision 2010" in 2002, this initiative at the Port Hope conversion facility (PHCF) involves the removal of contaminated soils, a number of old or under-utilized buildings and stored historic wastes, along with the construction of new replacement buildings with necessary landscaping. Cameco selected "Vision in Motion" as the name for the project once it advances to the remediation and construction phase. The Vision 2010 brand will continue to be used throughout the regulatory approval process, which is currently underway.

The project is being carried out in conjunction with the Port Hope Area Initiative (PHAI) project, a federal government undertaking for the cleanup and long-term management of low-level radioactive and industrial waste in Port Hope. Vision 2010 presents a unique and timely opportunity to improve the operational efficiency and environmental condition of the PHCF, while also helping the facility integrate better with the community's vision for the future.

Cameco is a Canadian company involved in the exploration, mining, milling, refining and conversion of uranium as well as the fabrication of CANDU reactor fuel and components. While headquartered in Saskatoon, Cameco's uranium refining and conversion operations are located in Blind River and Port Hope, Ontario, respectively. Cameco also operates a nuclear fuel manufacturing facility in Port Hope.

The PHCF receives nuclear-grade UO_3 from the Blind River Refinery for conversion to uranium hexafluoride (UF_6), or uranium dioxide (UO_2). These products are further processed at other commercial facilities to produce fuels for light and heavy-water reactor programs. Cameco also generates electricity through its share of the Bruce Power Limited Partnership, which operates four nuclear reactors on the shore of Lake Huron in Ontario.

2. SITE LOCATION AND HISTORY

The Municipality of Port Hope, with a population of 16,500, is located on the north shore of Lake Ontario about 100 km east of Toronto. Port Hope is celebrated as having the best preserved 19^{th} century streetscape in Ontario and its downtown is well-known as a shopping destination for antiques and other specialty items.

The PHCF occupies an area of approximately 10 hectares on the lake's shoreline. Immediately to the east are the Port Hope harbour, the Centre Pier and the Ganaraska River. To the north of the PHCF are CN and CP rail corridors. Commercial and residential areas are located north of the tracks and east of the river.

The origin of the PHCF dates to 1932 when Eldorado Gold Mines Ltd. established an operation to process ore from Port Radium in the Northwest Territories into refined radium. In 1943 the company was renamed Eldorado Mining and Refining Ltd. and in 1944 the company became a federal Crown corporation. Uranium processing then became the focus of the operation.

The company was renamed Eldorado Nuclear Ltd. in 1968. In 1988, Eldorado Nuclear and the Saskatchewan Mining Development Corporation were merged to form a new entity, Cameco, A Canadian Mining and Energy Corporation. This organization was subsequently privatized in the early 1990s and the name shortened to Cameco Corporation.

The federal government, through the Low-Level Radioactive Waste Management Office and the Port Hope Area Initiative (PHAI), is currently conducting initiatives to consolidate historic low-level materials that are located in a number of areas throughout Port Hope. These materials are from past, pre-Cameco industrial practices. When completed, historic low-level radioactive materials will be transferred to a single long-term waste management facility (LTWMF), located in the municipality adjacent to Highway 401. During the time that the LTWMF is open, Cameco has an opportunity to transport its decommissioning waste for placement at the facility.

3. GOALS AND OBJECTIVES OF VISION 2010

Vision 2010 is being realized through the development of a preferred master plan using the following key objectives:

- Maintain plant operations at all times while soil remediation, demolition, and new construction is in progress (requires sequential relocation of personnel, materials and tasks);
- Consolidate site operations so that the analytical laboratory and other operations related to the production of UF_6 and UO_2 are ultimately situated as close as practical to their respective centres of activity;
- Enhance site safety and security;
- Improve the working environment for Cameco employees, to positively contribute to their health and welfare;
- Implement, to the extent possible, the stakeholder planning objectives for Vision 2010 articulated by Port Hope residents during a comprehensive community consultation process; and
- Optimize the site's overall operations through the remediation/construction process. An optimized program that delivers maximum results when considering all technical, operational, commercial, environmental and social objectives is sought.

4. OVERVIEW OF PROJECT WORKS AND ACTIVITIES

The Vision 2010 project has two major components: remediation and new construction. Several activities within each component will occur simultaneously as both will be undertaken in an incremental manner.

Remediation is comprised of three primary activities: removal of stored historic waste, building demolition and soil excavation. All of these activities will generate contaminated material that will be shipped to the LTWMF.

In terms of the overseeing regulatory authority, Cameco's PHCF falls under federal jurisdiction. The Canadian Nuclear Safety Commission (CNSC) is the federal authority responsible for the regulation of nuclear facilities in Canada. Approval from the CNSC is required before Cameco may proceed with Vision 2010. One aspect of this approval will be the completion of a comprehensive study environmental assessment (EA), which is currently underway.

In addition, emissions to the environment from the project's operations must conform to existing provincial certificates of approval and all building demolition and new building construction will require permits from the Municipality of Port Hope.

5. SCOPE OF REMEDIATION WORKS

Currently, the scope of the remediation works is captured in a series of plans intended to guide clean-up activities at the PHCF. These plans are outlined below, following which additional activity descriptions related to building demolition, soil excavation and hazardous material abatement work have been provided.

Excavation and Sampling Plan: This document is intended to guide the excavation and sampling activities that will take place through Vision 2010 to ensure the proper removal of radiological and non-radiological contaminated soils (including verification requirements). The plan covers: sampling and analysis campaigns; identifying the extent of contamination; defining excavation areas and alternatives; water treatment; and, verification sampling.

Erosion Control Plan: This plan provides guidance to ensure that appropriate erosion and sediment control measures are carried out during site remediation. The plan establishes procedures to plan, prevent, control and mitigate potential soil erosion and the generation of sediments that may result. The plan covers the development of site specific strategies, inspection and monitoring, and temporary erosion and sediment control measures.

Construction Groundwater Control Plan: Contaminated soil zones below the groundwater table will require excavation during Vision in Motion. Soil will be transported to the LTWMF for disposal and, as such, must meet the requirements of a slump test to be acceptable as solid waste. The plan discusses the use of sheet-piling to contain the soil, with extraction wells to de-water the area.

Wastewater Treatment Plan: This document describes how water generated during site remediation activities will be managed. The pretreatment and treatment of water are discussed based on existing capabilities at the PHCF and planned upgrades.

Hazardous Materials Abatement Plan: This plan provides guidance on identifying, removing, packaging and disposing of designated substances and other hazardous materials in buildings that are to be demolished. Its primary objective is to ensure that such materials are handled in accordance with applicable regulations and safe environmental practices. The materials discussed include asbestos, mercury, silica, PCBs and ozone depleting substances.

Accumulated Waste Disposal Plan: This plan addresses drummed waste accumulated prior to the creation of Cameco and as a result of subsequent decommissioning work. As this waste will be delivered to the LTWMF, it must be prepared in accordance with PHAI's waste acceptance criteria. Descriptions of the various types of accumulated waste are provided.

Building Demolition Plan: This document provides guidance to ensure that the demolition of buildings takes place in a manner that protects the health and safety of employees and the public, minimizes environmental impacts and allows Cameco to meet the requirements of the LTWMF. The general demolition approach is established with issues and constraints listed.

Environmental Monitoring Plan: The Environmental Monitoring Plan provides a framework to monitor the impact of project activities in the vicinity of the plant and along transportation routes. Its objective is to characterize the condition of environmental media before the project and then measure conditions throughout implementation to identify if any changes take place.

Waste Management Plan: This plan provides guidance on the management of generated waste. It identifies the waste materials by type and provides a description of how each would be dealt with depending on whether it was sent to the LTWMF or handled through traditional waste management outlets.

Transportation and Receiving Plan: This document provides direction on the transport of waste materials from the site remediation work and their deposition at the LTWMF. It covers transport regulations, packaging, transport vehicles, trip tickets and record keeping.

Emergency Response Plan: This plan defines roles and responsibilities as well as actions to be taken in an emergency (in a complementary manner to Cameco's existing emergency response planning procedures).

Personnel Management Plan: This plan's primary objective is to ensure that the relationships and lines of authority for decision-making among Cameco employees, the supervising engineers and contractors are clearly defined. Organizational charts are provided and training is discussed.

Health and Safety Plan: This plan seeks to ensure that site remediation activities during Vision in Motion protect site and non-site personnel and the general public from harm due to accidents and exposure from project-related risks. The plan complements PHCF's occupational health and safety program and highlights the existing safety plans and procedures. Project hazards are grouped into chemical, biological, physical and radiological categories.

Radiation Protection Plan: This plan provides guidance to ensure that remediation activities take place in a safe manner. The key objective is to keep worker and community radiation exposures below regulatory limits and to levels that are as low as reasonably achievable. The plan discusses protection measures, exposure control, dosimetry and contamination control. It complements PHCF's Radiation Protection Program Manual.

Quality Assurance Plan: This plan addresses Cameco's corporate and site quality assurance requirements during project implementation to ensure that site remediation activities consistently meet or exceed regulatory requirements and stakeholder expectations.

Site Restoration Plan: The purpose of this plan is to ensure that the PHCF site is restored to an acceptable condition both for plant activities (in terms of continued production, safety and security) as well as in a complementary manner to Port Hope's waterfront planning.

6. BUILDING DEMOLITION PLAN

There are a number of buildings that are to be removed, ranging in size from small pump-houses to large former production plants. Of the more than 34 buildings currently on the PHCF site and Centre Pier, two-thirds will be demolished under the Vision 2010 project. The reasons for demolition are varied – some buildings are unused or under-utilized, some are situated on contaminated soils, and some contain operations that would be better located elsewhere.

The primary objective of the Building Demolition Plan is to carry out these removal activities in a manner that does not adversely impact on the health and safety of employees, contractors or the public. The following objectives are being targeted:

- Cleaning of building structures, as part of the demolition activities;
- Ensuring that buildings are dismantled in a manner that preserves their stability during the process;
- Use of controls to minimize the release of dust and contaminants; and
- Coordinating demolition activities with on-going plant production.

Due to past and/or current operations, the subject buildings exhibit varying degrees of contamination. For the old process buildings, dust containing uranium compounds has accumulated on surfaces, equipment that was used in the production process may contain residues of uranium, and spills may have contaminated surfaces. Because of the wide range of in-place materials, contamination is both surficial and volumetric.

During demolition, buildings will be stripped of remaining friable asbestos, equipment, materials and services. Removed equipment and materials will be either cleaned for free release to traditional waste management outlets or packaged into a format acceptable for the LTWMF.

As equipment and support structures are removed, they will be cleaned. A number of technologies will be used, depending on the extent and type of contamination. Preferred approaches include those that suppress dust emissions with mitigation measures in place to prevent impacts to the facility and its surroundings.

When the buildings have been cleaned, they will be dismantled. Dismantlement will allow the orderly removal of material which promotes segregation into types to aid in processing and disposal. Dust suppression will again be implemented during the process.

6.1 Preparation for demolition (cleaning)

Equipment that contains residual materials will be sealed to prevent the release of materials during transfer to a processing area. Piping will be opened and drained (where required) prior to removal. Equipment, piping and materials that meet the unrestricted-release criteria will be shipped from the site in accordance with the facility’s operating license. Material that does not meet unrestricted release criteria will be either decontaminated for transfer to traditional waste management outlets or sent to the LTWMF for disposal.

Contaminants present in buildings can be categorized as either surface contamination or volumetric contamination. The method of cleaning chosen will depend on the type of contamination present, and the type of building materials. A variety of methods are available:

Vacuuming: In situations where contaminants are present in the form of damp or dry dust with minimal tackiness, vacuums equipped with High-Efficiency Particulate Air (HEPA) filters will be used. Vacuuming is the preferred method of cleaning because contaminants are captured as they are removed.

Pressure Washing: High-pressure water may be used to remove accumulated dust and debris from building surfaces, but only in circumstances where wastewater can be readily collected and treated.

Wet Brushing: For smaller areas, simple brushing or mopping can be effective.

Short-Term Fixatives: Short-term fixatives can provide temporary mitigation of dust generation during demolition. One technique uses an aerosol capture coating which is generated as a 'fog' that covers surfaces, creating a coating to which dust and particulates adhere. Strippable coatings have also been used successfully in other remediation projects, being applied like paints by spraying, rolling or brushing. Finally, polymeric barrier systems, similarly applied, can be used to form a strong impermeable barrier locking the dust in place.

Scarification/Scabbling: Some porous building materials may have become contaminated beyond the surface by ground-in particles or absorption. Removal of the surface layers can achieve the desired cleaning results. Such removal is conducted by mechanical methods known as scabbling or scarification. This technology requires extensive dust control/collection.

For building surfaces, it is expected that a combination of the methods described above will be used. Vacuuming is expected to work effectively in areas where the dust is loose and will likely be the primary method for its removal. On surfaces where the dust is sticky, vacuum brushing will be required. Surfaces with oily coatings will likely require cleaning with water and detergents, either by hand in small isolated areas or by pressure washers when the surface contamination is widespread. To avoid the uncontrolled spread of contaminated water, the use of pressure washing will be constrained to areas where collection sumps are present or in areas where some other form of containment can be implemented. Further, cleaning methods that abrade the surface will not be used on asbestos-cement building materials.

For all of these technologies, workers will use appropriate respiratory protection and protective clothing. Depending on the circumstances, powered air purifying respirators may be employed. Once surfaces have been confirmed as sufficiently clean, building dismantlement will proceed.

6.2 Dismantlement program

Dismantlement will be conducted in a systematic manner which involves taking down a structure in the reverse order to which it was constructed. Engineering surveys will be completed prior to dismantlement to plan the sequence in which components will be removed, and to identify tensioned structures. Dismantlement methods that are known to generate large quantities of dust, such as the use of explosives and the demolition ball, will not be utilized.

Prevention of the release and/or spread of contamination during dismantlement will be accomplished in a variety of ways. Foremost is the prior cleaning of the structure. Secondly, dust control methods may be utilized including the use of water misting or fogging and spraying of fixatives.

Mitigation measures will also be implemented to minimize the tracking of contaminants to other areas within the facility (by pedestrian and vehicular traffic). Methods to minimize tracking will include the use of dedicated footwear in the demolition zone, monitoring of vehicle tires prior to leaving the work area and the construction of reinforced hoardings around demolition zones to minimize access.

Demolition debris that can be recycled or re-used may be decontaminated to unrestricted-release criteria. Demolition debris that does not meet such criteria will be prepared, placed into appropriate containers and shipped to the LTWMF.

7. EXCAVATION AND SAMPLING PLAN

The excavation of fill and native soil underlying Cameco's PHCF is another important element of Vision in Motion. Soil has been contaminated by historical operations, some possibly preceding the early uranium processing and radium production activities. Contamination from uranium and radium originated from the original Eldorado operations, most likely caused by spills, process upsets and excess material storage, none of which would be considered acceptable in today's environment. Soil which exceeds the remedial objectives will be loaded onto trucks and transported to PHAI's LTWMF for disposal.

The purpose of the Excavation and Sampling Plan is to provide guidance for the excavation and sampling activities. Its objective is to ensure the proper removal of radiological and non-radiological contaminated soils present on site.

7.1 Geology and hydrogeology

Several subsurface investigations have been conducted at, or in the vicinity of, the PHCF. To date, a combined total of 277 investigative boreholes have been drilled. The investigations revealed consistent soil units across the site, though the thickness of the individual layers was variable. The subsurface soil comprised a variable thickness of fill, underlain by native soils. In some places, the upper fill contains fragments of brick, concrete, wood, coal, tar, slag and clinker. Principal native soil units consist of peat, sands, silt, gravel, and glacial tills.

Groundwater flow patterns are through the overburden soils toward the south and southeast across the site, in the direction of Port Hope harbour and Lake Ontario.

7.2 Extent of soil contamination

As previously noted, Cameco's PHCF has been subject to several subsurface investigations. In addition to the number of established boreholes, sample quantities from all subsurface work total over 1,900 for either inorganic or organic compounds. Data from these investigations was used to define the distribution of contaminants and estimate the quantity of material requiring remediation.

After reviewing the analytical results, it was noted that uranium, radium and arsenic were the principal parameters that determined whether an area was "contaminated". Although some samples had concentrations of other parameters exceeding guidelines, this was, in almost every case, combined with elevated levels of one of the three key parameters.

Historically, criteria applied by Cameco for the identification of contaminated soil has been based on the document: *The Siting Task Force - Port Hope: Technical Working Group (RAP) Proposed Clean-up Criteria* (1994). Subsequently, the PHAI have further refined the clean-up criteria. The present criteria for the principal contaminants of concern to define soil contamination on site are as follows:

- Total Uranium: 35 μg/g;
- Radium-226: 0.29 Bq/g; and
- Arsenic: 20 μg/g.

Based on the above criteria, the total area of contamination identified at the plant is estimated at 40,950 m^2 (over 47% of the property). By volume, there is about 76,900 m^3 of in-situ contaminated soil, about one-third of which is found above the water table.

7.3 Excavation types

Two approaches are proposed for excavation. One involves utilizing coffer dams constructed from sheet piling to facilitate the de-watering of the contained soil. The other approach conducts such work in partially submerged conditions (i.e., wet excavation approach).

Regardless of the excavation approach adopted, mitigation measures to control dust emissions and the off-area tracking of contaminants will be put in place. Such measures will be similar to those described for the building demolition work (Section 6.2). Excavations will also be conducted in such a manner as to minimize interference with the normal day-to-day activities at the PHCF.

Wet Excavation Approach

Under this approach, excavations would be undertaken using a hydraulic excavator digging in the water. Standard sheet piling systems would be required to stabilize excavation walls in some areas.

After allowing for some free-draining at the excavation area, the saturated soil would be moved to a solidification and mixing area. The solidification agent used would most likely be cement by-pass dust, an economical and proven material that adds little overall volume to the saturated soil. When the material has firmed up sufficiently to meet transport requirements, it will be loaded onto dedicated trucks and sent to the LTWMF.

While the soil is excavated, bucket samples would be continuously examined and monitored for contamination. When verification samples have shown that the remaining material is acceptable, stone or low-strength concrete would be placed into the bottom of the excavation, displacing the accumulated groundwater. Once the water table has been reached, the placement would cease and the excavation left undisturbed until the groundwater has resumed its static level. The remainder of the excavation would then be backfilled.

Dry Excavation Approach

Under this approach, sealed sheet piles driven around the excavation perimeter would minimize groundwater entering the area. Extraction wells and pumps would remove the water in the soil, which would be sent for treatment. When the water extraction rate begins to fall off and the groundwater is at least 1 m below the bottom of the excavation, the work would begin. Depending on excavation depth and the proximity of bedrock to the excavation bottom, additional support in the form of bracing, walers, tie-backs and toe pins to keep the walls in position and sealed may be needed.

With sheet piling in place, groundwater infiltration can be controlled and the excavation would proceed in a conventional manner. Soil sampling would determine the extent of the excavation. The sheet piles would be removed once the backfilling is complete.

In addition to issues associated with groundwater management, many of the excavation areas are located adjacent to, or close to the harbour walls. This leads to complications, most notably with tie-back systems and in ensuring the walls maintain their integrity when soil pressure is affected by material removal. The harbour walls were constructed in stages with different designs and have been partially retrofitted. The walls along the turning basin are the oldest structures comprising timber cribs originally built in the mid 1800s. The Queen's Wharf on the west side of the approach channel was constructed with sheet piles of varying design, including some with timber cribs, during the first half of the 1900s.

Any excavated soil that remains saturated despite the installation of the coffer dams and groundwater pumping would be drained and solidified before transport.

7.4 Verification sampling

As previously noted, prior investigations have found that soil is contaminated primarily by uranium, radium and arsenic. Heavy metals (copper, zinc, lead, beryllium, nickel, cobalt) and TPH (gas/diesel and heavy oils) are also present. Excavation will proceed to a pre-determined depth based on the borehole sampling information and then the bottom of the excavated area will be tested to verify its condition before backfilling activities commence.

Verification samples will be taken at the intersections of a planned grid. Samples of odorous or stained soil will be also collected. The verification samples will be sent to an off-site laboratory for analysis.

Alpha, beta and gamma radiation will be monitored using direct reading instruments. The handheld instruments and direct reading dosimeters will provide an immediate and continuous indication of radiation dose and activity in an area. Selected soil samples will also be analyzed for gross alpha/beta radiation under laboratory conditions.

A field quality control (QC) program will be put in place. The analytical laboratories used will also be required to have established QA/QC procedures to deliver defensible data. A Chain of Custody Record will be maintained.

8. HAZARDOUS MATERIALS ABATEMENT PLAN

Hazardous materials will primarily be encountered during the stripping, cleaning and dismantlement of buildings, and the decontamination of materials to meet release criteria. Some hazardous materials may also be encountered during the preparation or repackaging of drummed waste prior to disposal at the LTWMF and during soil excavation.

Due to the age of the facility, its industrial nature and the processes undertaken in its operation, hazardous materials have been found to include coatings on building surfaces, parts of process equipment, etc. Materials identified are asbestos, lead in paint, mercury, silica, PCBs, and refrigerants containing ozone-depleting substances.

To this end, a Hazardous Materials Abatement Plan has been developed to ensure that designated substances and other hazardous materials encountered during site remediation are handled in accordance with applicable regulations and in such a way as to protect personnel.

8.1 Asbestos

Asbestos-containing materials (ACM) have been confirmed by various surveys. Cameco has developed and implemented removal procedures and trained key employees to handle this material safely. In addition, specialty contractors have been engaged for ACM removal projects in specific buildings. Prior to the commencement of demolition activities in a defined area, all remaining ACM that is potentially friable will be removed. Currently, ACM is present in various building materials, namely:

- pipe and mechanical insulation;
- textured coatings;
- drywall joint compounds;
- vinyl floor tiles;
- asbestos cement board (such as Transite^{TM}); and
- asbestos cement pipe.

Asbestos is hazardous when it is friable (i.e., easily crumbled), or made respirable, as the short fibres released can enter the body. All ACM will be removed by a qualified contractor in accordance with Cameco's established procedures, which are based on provincial requirements for handling, containment and personal protection.

All asbestos waste contaminated with radionuclides removed during demolition will be placed in the LTWMF for disposal (after transport in dust-tight containers). No attempts will be made to clean contaminated asbestos to unrestricted-release criteria.

8.2 Lead

Survey work has indicated that lead in paint is present in a small number of locations in the buildings scheduled for dismantling. During site remediation activities, instantaneous determinations using an X-Ray fluorescence analyzer can be carried out as needed. Lead pipes and fittings are expected to be uncommon and will be identified by visual inspection.

Respiratory protection is required for workers where lead in paint could be removed as the result of grinding or cutting. However, in most cases, adequate protection will already be provided for uranium and no additional protection would be required. There will be no partial occupation of buildings that are being demolished and, hence, no concern about impact of airborne lead on unprotected people. Lead-containing paint will not be removed from waste surfaces prior to disposal. With respect to recoverable metal, the lead-based paint will be removed by grit blasting equipment that is equipped with dust collection. Contaminated non-recyclable material/equipment coated with lead paint will be sent to the LTWMF for disposal.

8.3 Mercury

Mercury may be present at the PHCF in electrical switches, fluorescent light tubes, high intensity discharge lights, batteries, thermostats and gauges. During interior stripping of the buildings, items that are found to contain mercury will be removed with care. All fluorescent bulbs and batteries will be assumed to be mercury-containing.

Mercury-containing items will be handled through the existing PHCF waste management program. Items will be collected in appropriate containers and spill kits will be available in the event of an accidental release.

Mercury-containing items will be sent to an off-site waste management company. Mercury-containing equipment contaminated with radioactive material will be cleaned to un-restricted release criteria (by careful vacuuming) before leaving the facility.

8.4 Silica

Silica may be released during site remediation activities, particularly when concrete and brick are scarified/scabbled during cleaning and decontamination work. As a result, a control program will be implemented to minimize unnecessary exposure to silica, involving a combination of controls and the use of personal protective equipment. Controls include the use of wet methods when cutting, grinding or drilling, use of hoods with portable dust collectors and fitting dust-generating tools with dust collection systems.

Silica-containing materials generated during cleaning and decontamination are likely to contain radioactive material, and will be packaged and sent to the LTWMF.

8.5 PCBs

Cameco has had a program in place for many years to identify and dispose of PCB-containing electrical equipment including transformers, capacitors and fluorescent lighting ballasts. All known PCB-containing transformers and capacitors have been removed from site. It is expected that only fluorescent lighting ballasts will be encountered during building demolition.

The fluorescent light ballasts will be handled through the existing PHCF waste management program. The ballasts will be removed from the fixtures and kept in an approved on-site storage unit until final disposal is arranged. As required, the ballasts will be decontaminated to permit release from the site.

8.6 Ozone depleting substances

Ozone depleting substances (ODS) are present in refrigeration systems, air conditioning units and fire extinguishers located in buildings that are subject to demolition. As part of facility operations and in accordance with regulatory requirements, an ODS inventory has been prepared. Where ODS cannot be recovered while equipment is still in place, the equipment will be removed intact to prevent the release of ODS to the environment.

Equipment containing ozone-depleting substances will be disposed of once it has been confirmed that the ODS has been removed. Contaminated equipment that cannot be cleaned to unrestricted-release criteria (for recycling) will be sent to the LTWMF for disposal.

9. CONCLUSION

The redevelopment of Cameco Corporation's Port Hope conversion facility (PHCF) is being undertaken under the Vision 2010/Vision in Motion project. This project is being carried out in conjunction with the Port Hope Area Initiative (PHAI), a federal government undertaking for the cleanup and long-term management of low-level radioactive and industrial waste in Port Hope.

The clean-up activities planned for the PHCF comprise building dismantlement/demolition, contaminated soil excavation and the removal of accumulated waste. Various remediation plans have been prepared to guide the associated activities, of which three have been briefly profiled in this paper. They include:

Building Demolition Plan: intended to provide guidance to ensure that the demolition of buildings takes place in a manner that preserves health and safety, minimizes impact to the environment, and allows Cameco to meet the requirements of the LTWMF;

Excavation and Sampling Plan: meant to provide guidance for the excavation and sampling activities that will take place at the PHCF with the objective of ensuring the proper removal of radiological and non-radiological contaminated soils present on the site; and

Hazardous Materials Abatement Plan: whose purpose is to provide guidance on identifying, removing, packaging and disposing of designated substances and other hazardous materials present in the buildings that are to be demolished.

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