Recent Developments in the Management of Cameco Corporation's Fuel Services Division Waste - 13144

Thomas P. Smith
Cameco Corporation, Port Hope, Ontario, Canada

Introduction

Cameco Corporation is a world leader in uranium production. Headquartered in Saskatoon, Saskatchewan our operations provide 16% of the world uranium mine production and we have approximately 435 million pounds of proven and probable uranium reserves. Cameco mining operations are located in Saskatchewan, Wyoming, Nebraska and Kazakhstan.

Cameco is also a major supplier of uranium processing services required to produce fuel for the generation of clean energy. These operations are based in Blind River, Cobourg and Port Hope, Ontario and are collectively referred to as the Fuel Services Division.

The Fuel Services Division produces uranium trioxide from uranium ore concentrate at the Blind River Refinery. Cameco produces uranium hexafluoride and uranium dioxide at the Port Hope Conversion Facility. Cameco operates a fuel manufacturing facility in Port Hope, Ontario and a metal fabrication facility located in Cobourg, Ontario. The company manufactures fuel bundles utilized in the Candu reactors.

Cameco's Fuel Services Division produces several types of low-level radioactively contaminated wastes. Internal processing capabilities at both the Blind River Refinery and Port Hope Conversion Facility are extensive and allow for the recycling of several types of waste. Notwithstanding these capabilities there are certain wastes that are not amenable to the internal processing capabilities and must be disposed of appropriately.

Disposal options for low-level radioactively contaminated wastes in Canada are limited primarily due to cost considerations. In recent years, Cameco has started to ship marginally contaminated wastes (<500 ppm uranium) to the United States for disposal in an appropriate landfill.

The landfill is owned by US Ecology Incorporated and is located near Grand View, Idaho 70 miles southeast of Boise in the Owyhee Desert. The facility treats and disposes hazardous waste, non-hazardous industrial waste and low-activity radioactive material. The site's arid climate, deep groundwater and favourable geology help ensure permanent waste isolation. Combined with a state of the art multi-layer landfill liner system, the Grand View facility represents an ideal choice to minimize environmental liability.

Marginally contaminated wastes from operations within the Fuel Services Division are typically loaded into PacTec IP-2 rated Intermediary Bulk Containers and then transported by road to a nearby rail siding. The Intermediary Bulk Containers are then loaded in US Ecology owned gondola railcars. The gondolas are then transported via Canadian Pacific and Union Pacific railroads to the US Ecology Rail Transfer facility located in Mayfield, Idaho. The Intermediary

Bulk Containers are unloaded into trucks for transport to the disposal facility located approximately 32 miles away.

HISTORICAL CONTEXT

In 1932, Eldorado Gold Mines Limited (Eldorado) constructed a radium refinery in Port Hope, Ontario. In 1933, the facility began processing crushed radium ore from Port Radium on Great Bear Lake. The firm later expanded into uranium processing, and the Port Hope refinery formed the nucleus for the current Port Hope Conversion Facility (PHCF). By 1942, the strategic importance of uranium extraction and processing was apparent and the federal cabinet authorized the purchase of Eldorado shares. In 1944, Eldorado was fully nationalized. From 1933 to 1948, Low Level Radioactive Waste (LLRW) from the Eldorado Port Hope refinery was deposited at several waste management sites within the Port Hope area. These distributed sites were replaced in 1948 by the Welcome Waste Management Facility (WWMF), aerial view shown in Figure 1. Placement of LLRW at the WWMF continued until 1955, at which time the WWMF was closed and the Port Granby Waste Management Facility (PGWMF) was opened, aerial view shown in Figure 2. The PGWMF received LLRW between 1955 and 1988.

Figure 1 Welcome waste management facility

Figure 2 Port Granby waste management facility

In 1988, the merger of the federal Crown Corporation, Eldorado, and a provincial Crown Corporation, Saskatchewan Mining Development Corporation formed Cameco Corporation (Cameco). Under the terms of the agreement that created Cameco, the federal government took responsibility for the LLRW located at the PGWMF and the WWMF. Cameco agreed to manage the facilities on behalf of the federal government, until the implementation of a long-term management plan.

After the closure of the PGWMF in 1988, Cameco developed various waste management systems to deal with ongoing waste.

THE PROJECT

Roofing projects and maintenance activities at the Port Hope Conversion Facility have resulted in the generation of approximately 560 Quatrex totes, of marginally contaminated roofing material and insulation. Cameco's Fuel Services uses Quatrex totes as an intermediate bulk container for storing materials, shown in Figure 3. These totes were transferred to the Blind River Refinery several years ago for incineration. The materials did not burn effectively in the incinerator and were stored in the facility yard pending alternative processing or disposal.

These materials were investigated in July 2011 during a joint field trip between Cameco and US Ecology Idaho (USEI) staff. The survey of these was conducted by the USEI board certified Health Physicist. It was concluded that the totes containing roofing material and insulation met the USEI Waste Acceptance Criteria. Once confirmation was received from USEI, Cameco initiated the project planning process to dispose of this material.

During the same field trip, discussions were held with a local trucking firm who could move the materials to a rail siding located eight kilometers (km) away in the Town of Blind River. The same trucking firm has the appropriate equipment to load the USEI owned gondola cars. Using rail out of Blind River resulted in a significant cost savings for the project.

It was determined that the existing Quatrex totes containing the wastes were not acceptable for shipping due to degradation of the containers from being stored outside. A decision was made to repackage the Quatrex totes in PacTec IP2 rated lift bags, shown in Figure 4. Three hundred bags were ordered for the project. Upon receipt each Pactec bag was filled with two Quatrex totes.

Figure 3 Quatrex totes

Figure 4 Quatrex tote loading into Pactec Bag

A total of 273 PacTec lift bags were filled with the roofing material and insulation. Eight rail cars arrived at the Blind River rail siding the week of December 3, 2011 and were filled over a two day period. Cameco staff loaded the bags on flatbed trailers at the Blind River Refinery and the trucking firm off-loaded at the rail siding with the assistance of US Ecology staff, shown in Figure 5.

The rail cars were then picked up by the Huron Central railway and transported to Sudbury. From there Canadian Pacific railway moved this freight into the USA where the Union Pacific railway picked up the cars and delivered them to the USEI rail transfer facility located in Mayfield, Idaho, shown in Figure 6. The wastes were then transferred to the Grand View facility for burial.

Figure 5 Off-loading at Rail Siding

Figure 6 Unloading bags Mayfield, Idaho

CANADIAN REGULATORY PROCESS

In Canada, both the provincial and federal governments regulate waste. The Provincial Government regulates waste through the Ontario Ministry of the Environment who administer Ontario Regulation 347 – Waste Management. The Federal Government regulates wastes through a number of federal agencies including The Canadian Nuclear Safety Commission, Environment Canada and Transport Canada.

After the characterization for uranium was completed the waste materials were assessed for other potential hazardous constituents. Lab data indicated no hazardous constituents, so there was no requirement to obtain an export permit from Environment Canada under the *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (EIHWHRMR) nor was there a requirement to manifest the waste transfer under Ontario Regulation 347.

Cameco applied for an export permit from the Canadian Nuclear Safety Commission; however, this was not required as the uranium concentration was well below 0.05% by weight.

UNITED STATES REGULATORY PROCESS

Cameco chose to contract with US Ecology to serve as Importer Of Record and provide all waste import services. This streamlined the project since US Ecology was also providing all project logistics.

Numerous US regulatory agencies have jurisdiction over the importation of waste into the United States. The US Department of Homeland Security (DHS) and its division of Customs & Border Protection (CBP) have primary jurisdiction over import of all goods into the United States, and delegated authority to enforce the import regulations of other US agencies. Other agencies with applicable jurisdiction include the US Nuclear Regulatory Commission (USNRC), the US Environmental Protection Agency (USEPA), the US Department of Agriculture (USDA), the US Department of Transportation (USDOT) and others. A successful import project requires professional training in compliance with the regulations of each agency, technical compliance with these regulations, and good coordination and communication with these regulatory agencies prior to initiation of the shipment.

US Ecology served as Importer Of Record and also accepted title and liability at the initiation of shipments at Cameco's Blind River Refinery. As a result, US Ecology was entirely responsible for each shipment and had there been any compliance violation (there were none), any US regulatory agency enforcement would have been against US Ecology.

Cameco and US Ecology began the process by working cooperatively together for the proper radiological and chemical characterization of the material using analytical methods recognized by both Canada and the United States. Once thorough analytical information was compiled, US Ecology made determinations on the proper classification of the material and the applicable import licensing requirements of the USNRC and USEPA. US Ecology also advised Cameco on the proper packaging, marking and labeling requirements in conformance with USDA, CPB and USDOT regulations.

Following characterization, US Ecology compiled a regulatory compliance package which included draft US Customs entry paperwork with the applicable Harmonized Tariff Schedule and duty, and CBP marking and labeling requirements. This package also included draft notifications and documentation of compliance with USEPA import requirements and compliance with or exemptions from USNRC import licensing requirements. Transport classifications were prepared in accordance with 49 CFR USDOT and Canadian Transport of Dangerous Goods (TDG) regulations. The complete package was reviewed cooperatively between US Ecology, Cameco and US Ecology's certified US Customs brokerage firm.

Following agreement on the import package, US Ecology provided advance briefings to agencies with regulatory jurisdiction. Initial briefings were completed several months in advance of the target shipment date.

US Ecology and Cameco logistics and project management personnel worked together to finalize the paperwork package for each shipment (final weights, container counts, shipment dates, etc.). US Ecology then filed Entry of this shipment through its US Customs brokerage firm.

CONCLUSION

Cameco makes every effort to minimize the generation of waste and to recycle to the extent possible. Certain wastes are not recyclable and Cameco does not have access in Canada to a large appropriately permitted landfill for the disposal of uranium contaminated wastes. Certain

non-recyclable uranium contaminated wastes that meet the US Ecology Waste Acceptance Criteria are being shipped to the US Ecology landfill located in Grandview, Idaho for disposal.

The project undertaken at the Blind River Refinery in 2011 was unique as the waste was shipped by rail from Canada. Previous projects undertaken at the Port Hope Conversion Facility in recent years were completed by the shipping of the wastes (soil and concrete) by truck to a rail transfer facility located in the United States. Disposal at the US Ecology landfill is shown in Figures 7 and 8.

Figure 7 Off-loading - Grandview Idaho landfill

Figure 8 Aerial view Grandview, Idaho landfill

ACKNOWLEDGEMENTS

The author of this paper would like to acknowledge Lori Weygang who assisted in the preparation of the paper and the staff at US Ecology Idaho who actively participated in this project – Chad Hyslop, Marie McMonigle and Joseph Weismann.