Low-Level Radioactive Waste Management Office

ANNUAL REPORT 1999–2000

The Low-Level Radioactive Waste Management Office was established in 1982 to carry out the responsibilities of the federal government for low-level radioactive waste (LLRW) in Canada. The Office is operated by Atomic Energy of Canada Limited through a cost-recovery agreement with Natural Resources Canada, the federal department that provides the funding and establishes national policy for LLRW management.

The Office's mandates are:

resolving historic LLRW problems that are a federal responsibility;
establishing, as required, a user-pay service for the disposal of LLRW produced on an ongoing basis; and
addressing public information needs about LLRW.

For more information

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Dear Sirs,

I have the honour to present to you the Annual Report of the Low-Level Radioactive Waste Management Office for the fiscal year ending March 31, 2000.

This report has been prepared in accordance with section 5.2 of the memorandum of understanding between Energy, Mines and Resources Canada (now Natural Resources Canada) and Atomic Energy of Canada Limited, for the operation of the Low-Level Radioactive Waste Management Office.

Sincerely,

R. L. Zelmer, P.Eng., RPP
Director

Director's Message

Although much of the work of the Office to date has involved interim management of Canada's historic low-level radioactive waste, the goal of the Office and the Government of Canada is to find long-term solutions. I am pleased to report that in the interval 1999–2000 significant progress was made toward this goal on several fronts – notably in Surrey, British Columbia, and in the Port Hope, Ontario, area.

This year's report features three pages highlighting the completion of the Surrey Project! The Office removed about 5000 cubic metres of thorium-contaminated soil and slag from Anvil Way for disposal in the United States. As well, about 80 cubic metres of conditioned slag waste from the Thornton yard site was received at our licensed storage facilities for packaged waste in Chalk River, Ontario.

The Surrey Siting Task Force officially completed its work in Vancouver in 1999, having found a disposal solution that stood the test of environmental review. Chairman Dr. David Boyes and member Mr. Douglas MacKay then monitored the work from implementation to completion of the project. Executive Director Ms. Juliana Pasko and Administrative Assistant Ms. Carol Youds operated the Surrey Project Public Affairs Office until March 2000. The commitment and professional dedication of this team, established in 1989, has been a key to the success of this project.

Another siting process that began in 1988 came much closer to completion during the year, as the Ontario communities of Port Hope, Hope Township and Clarington submitted proposals to Natural Resources Canada (NRCan) for the construction of local long-term storage facilities in their municipalities. NRCan is currently negotiating a single legal agreement with the three communities to facilitate the implementation of the project. This is the first step in a 10-year process that will include environmental assessment, public consultation, cleanup and the development of long-term storage facilities. Agreement to establish these facilities will remove a primary impediment and enable the Office to move forward with the remediation of contaminated sites in the Port Hope area.

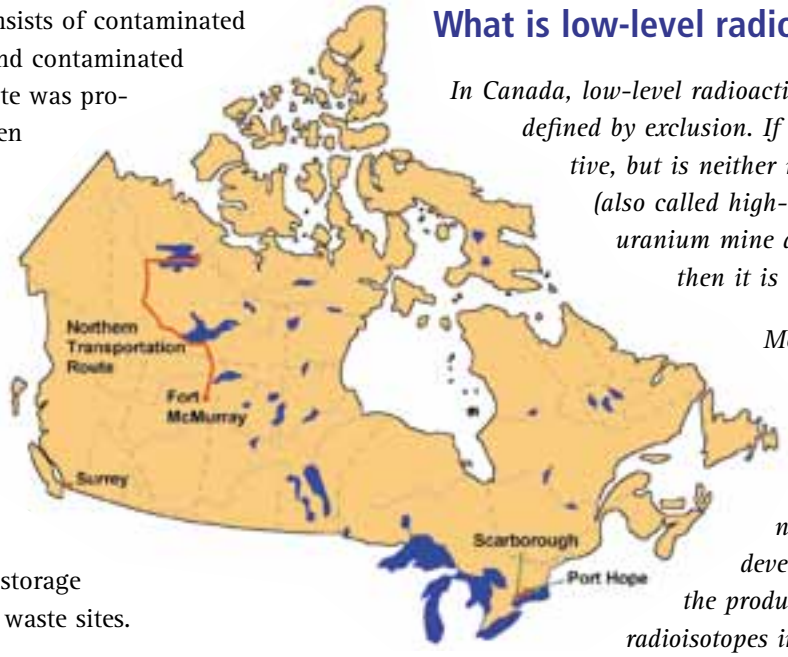
In closing these remarks on one of the most successful years in the experience of the LLRWMO, I wish to commend and thank those colleagues and friends who have left our team, all of whom have played an important role in the success this year and in many previous years: David Boyes, Doug MacKay, Juliana Pasko, Carole Youds and our Manager of Field Services, Barry McCallum. Thank you all.

R. L. Zelmer
Director

Historic Waste Program

Historic waste is low-level radioactive waste (LLRW) that was managed in the past in a manner that is no longer considered acceptable but for which the original producers cannot reasonably be held responsible. The federal government has assumed responsibility for historic waste in Canada through the Low-Level Radioactive Waste Management Office.

Most historic waste consists of contaminated soil, process residues and contaminated materials. The first waste was produced in the 1930s when radium was refined for medical applications at a refinery in Port Hope, Ontario. Canada has about 1.2 million cubic metres of historic waste, which is about 70 percent of the nation's total LLRW inventory. Most of the waste is in interim storage facilities at or near the waste sites.



The Office performs clean-up and remedial work and constructs and operates interim storage facilities, as required, until long-term management and disposal facilities are available for historic waste. All activities are carried out in accordance with the requirements of the Atomic Energy Control Board (AECB), the federal nuclear regulatory agency.[1]

The main historic LLRW sites in Canada are located in:

- Surrey, British Columbia
- Port Hope Area, Ontario
- Scarborough, Ontario
- Northern Transportation Route (Northwest Territories to Alberta)

What is low-level radioactive waste?

In Canada, low-level radioactive waste (LLRW) is defined by exclusion. If a waste is radioactive, but is neither nuclear fuel waste (also called high-level waste) nor uranium mine and mill tailings, then it is classed as LLRW.

Most LLRW today arises from activities associated with nuclear electricity generation, from nuclear research and development, and from the production and use of radioisotopes in medicine, education, research, agriculture and industry.

Examples of new arisings of LLRW range from slightly contaminated materials from operational activities to highly contaminated materials and components (such as ion exchange resins and reactor core internals) from operations, maintenance and decommissioning of facilities.

[1] *The AECB became the Canadian Nuclear Safety Commission (CNSC) on May 31, 2000.*

Final Waste Removal in Surrey

As March 2000 drew to a close, so did the final waste removal process, resolving LLRW issues at two industrial sites in Surrey, British Columbia. The project required the cooperation and approval of the community, governments at all levels, and regulatory authorities in Canada and the United States.

The history began with niobium ore imported during the 1970s. The ore contained naturally radioactive thorium, which remained after smelting in the slag. Some of the slag was inadvertently mixed with sand and gravel and used as fill on the Anvil Way site, and a small volume of the contaminated material was moved to what is now part of Canadian National Railway's Thornton Yard site, also in Surrey.

The federal government took responsibility for the removal and disposal of the waste in 1984 in a memorandum of understanding with British Columbia. At the same time, the Office signed an agreement with the owner of the site covering the removal and interim storage of the contaminated material. A year later, the Office moved most of the waste to a storage bunker at the Anvil Way site. In 1986, CN built a similar storage bunker for the Thornton Yard wastes.

Waste being removed from the Anvil Way site in Surrey, British Columbia.

Surrey Project Public Affairs Office

During the clean-up, the Surrey Project Public Affairs Office (SPPAO) in Vancouver maintained communications with the property owner, neighbouring industries, US border officials, the federal and provincial governments, local citizens and local members of Parliament. The SPPAO also led public consultations on behalf of NRCan and participated in the environmental assessment.

In consultation are SSTF Chairman Dr. David Boyes and Juliana Pasko, Executive Director (subsequently SPPAO Manager, Public Affairs and Intergovernmental Relations).

The search for a disposal solution took a new direction in 1989, when the federal Minister of Energy, Mines and Resources (now NRCan) appointed the Surrey Siting Task Force (SSTF), an independent group. The SSTF was chaired by Dr. David Boyes with Mr. Douglas MacKay as the second member. The SSTF, guided by the principle of voluntary community participation in the decision-making process, first contacted B.C. communities, but no appropriate B.C. site was offered. Later a proposal from a commercial disposal site in Alberta was selected, but the facility eventually declined. The SSTF then widened its search to include the United States and successfully negotiated to dispose of the

Excavation around a building column at the Anvil Way site.

Anvil Way waste at a commercial facility in Oregon, United States.

The waste in Thornton Yard was not compatible with the Oregon Site. The best interim option for this waste was to condition, package and move it to the Office's licensed storage facility at Atomic Energy of Canada Limited's Chalk River Laboratories.

After public consultation and an environmental assessment, NRCan concluded that the potential environmental impacts of excavation, consolidation, transportation and disposal were not significant or were mitigable with known technology. The Minister of Natural Resources decided that the waste should be removed from the Anvil Way site.

Truck carrying waste from Surrey arrives at the commercial facility in Oregon, United States.

Surrey Timeline

1972 Niobium ore from South America is brought to the Anvil Way site.

1972–74 Thorium-contaminated slag is inadvertently mixed with sand and gravel and used as fill on the Anvil Way site and some slag in drums is moved to the Thornton Yard site.

1984

- The federal government accepts responsibility for the removal and disposal of the contaminated material in a memorandum of understanding with British Columbia.
- The Office signs an agreement with the owner of the Anvil Way site for the removal and interim storage of the waste.

1985 The Office undertakes initial remedial work and constructs an on-site bunker to store waste excavated at the Anvil Way site.

1986 CN builds a storage bunker for the slag waste from Anvil Way that had been moved to Canadian National Railway's Thornton Yard site.

1989 The federal Minister of Energy, Mines and Resources (now NRCan) appoints the Surrey Siting Task Force (SSTF) to recommend a disposal solution for the wastes.

1990–95 The SSTF establishes the Surrey Community Liaison Group and seeks a volunteer community and site in British Columbia.

1995 The SSTF's scope expands to include potential sites outside of British Columbia.

1996 The SSTF recommends that the Anvil Way waste be sent to a commercial facility in Alberta.

1997 The Alberta facility withdraws its offer to accept the Anvil Way waste.

1998 The SSTF recommends that the Anvil Way waste be disposed of in a commercial facility in Oregon, United States, and that the Thornton Yard waste be transferred to the Office's licensed storage facility at AECL's Chalk River Laboratories.

1999

- NRCan assesses the potential environmental impact of the SSTF recommendations.
- The Minister of Natural Resources agrees that the waste should be removed from both sites.
- The Surrey Project Public Affairs Office is established in Vancouver.
- The Low-Level Radioactive Waste Management Office begins to remove the waste from Anvil Way in November.
- CN Railway removes all of the waste from Thornton Yard in December and transfers it to the Office's Chalk River storage facility.

2000 The Office completes the removal of the Anvil Way waste and restoration of the site in March.

Visiting staff members from NRCan, LLRWMO, the SPPAO and the owner of the Anvil Way site as the storage bunker cap is being removed at the Anvil Way site.

NRCan and LLRWMO staff with the owner (centre) of the Anvil Way site.

Once the decision was made, the Office undertook the work promptly. November 1999 saw the beginning of the removal of about 5000 cubic metres of thorium-contaminated soil and slag from Anvil Way for disposal at the Oregon facility. The Office shipped the waste, which was not considered radioactive under federal Transportation of Dangerous Goods Regulations, in 350 truckloads to the Oregon facility in securely covered trucks suitable for highway transport.

By early December, CN had removed the low-level radioactive slag that had been stored in barrels in the bunker at Thornton Yard. CN conditioned and packaged the waste, which was considered radioactive

under federal Transportation of Dangerous Goods Regulations, in 83 one-cubic-metre metal boxes. These boxes were placed in six containers for rail shipment to Toronto. The containers were then taken by truck to the Office's licensed storage facilities at AECL's Chalk River Laboratories.

By March 31, 2000, the Low-Level Radioactive Waste Management Office had removed all of the Anvil Way waste, taken gamma radiation readings and soil samples to ensure that all project criteria were met, and backfilled and restored the excavated areas. Gamma radiation readings were also taken at the Thornton Yard site. Radiation levels at both sites are typical of those found in the region and pose no health risk. The project received the cooperation of the B.C. Ministry of Health and the B.C. Ministry of Environment, Lands and Parks.

"This initiative resolves a long-standing environmental concern in Surrey. Its success is owed in large part to the active involvement of the public in finding promising solutions."

Ralph Goodale, Minister of Natural Resources Canada

The Town of Port Hope

Background

The historic waste in the town of Port Hope, Ontario, originated from radium and uranium refining operations of the former federal Crown corporation Eldorado Nuclear Limited from the 1930s to the 1950s. From 1975 to 1982, the AECB carried out investigations and remedial work on behalf of the Federal–Provincial Task Force on Radioactivity. Since then, the Office has conducted further investigations, clean-ups and consolidations.

About 265 000 cubic metres of waste is now located at four AECB-licensed facilities and nine unlicensed sites in Port Hope all under regular inspection and monitoring by the LLRWMO.

1999–2000 Activities

- Under the Construction Monitoring Program (CMP), jointly run by the Office and the Town of Port Hope, the Office continued to operate an AECB-licensed temporary storage site (TSS) that receives waste from construction monitoring activities within the town. The Office received 132 applications to the CMP and moved 102 cubic metres of contaminated soil to the TSS. As well, the Office issued about 500 letters in response to property owners and real estate agents who requested information concerning the radiological status of properties.
- The Office applied for a licence to expand the TSS, and began an environmental assessment (under the *Canadian Environmental Assessment Act*) for the proposed work.
- The Office continued to participate in meetings of the Port Hope Community Health Concerns Committee. The Office also assisted the AECB with a health study being conducted in response to committee requests.

CMP excavations in Port Hope.

Port Hope Area Waste: Long-term Storage

Background

The federal government's responsibilities for the long-term management of LLRW in Canada include materials found in the Town of Port Hope and also stored at two nearby licensed waste management facilities – the Welcome Waste Management Facility (closed in 1955) in Hope Township and the Port Granby Waste Management Facility (closed in 1988) in the Municipality of Clarington – currently operated by Cameco Corporation (formerly Eldorado Nuclear Limited).

In 1988, the federal government initiated an Ontario-wide siting process to seek a volunteer host community for the location of a disposal facility for the Port Hope area wastes. No agreement with a volunteer host community had been reached. Subsequently, in 1997 and 1998, the three area municipalites – Hope Township, the Town of Port Hope and the Municipality of Clarington – considered supporting local solutions to the long-term management of the wastes within their communities. Each municipal council established a local advisory committee to develop concept-level designs for potential long-term management options. By the fall of 1998, the Hope Township council recommended a preferred option to the federal government.

1999–2000 Activities

In 1999, both the Town of Port Hope and the Municipality of Clarington also proposed their preferred storage facility options to the federal government. All three communities are now involved in negotiations with the federal government to set out the terms and conditions applicable to the development of those facilities. The Office continues to provide NRCan with technical and other logistical support during the negotiations.

Scarborough

Background

Radium contamination – the result of radium recovery operations on a farm in the mid-1940s – was discovered in Scarborough, Ontario, on McClure Crescent in 1980 and at nearby McLevin Avenue in 1990. In 1995, the Office removed 16 000 cubic metres of soil from

Figure 1: Passmore Avenue Storage Mound 1999 Averaged Ambient Gamma Radiation (μSv/h)

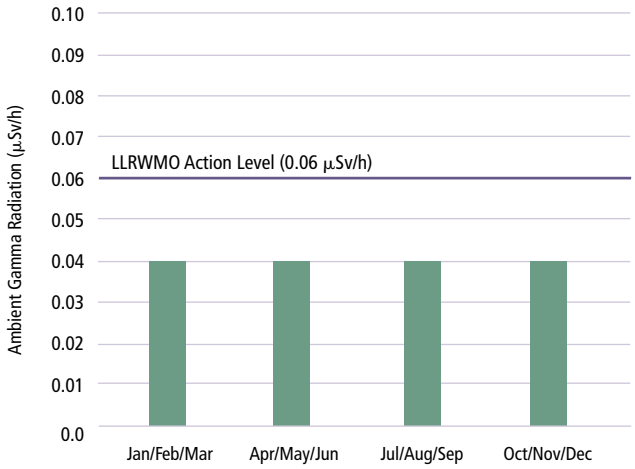
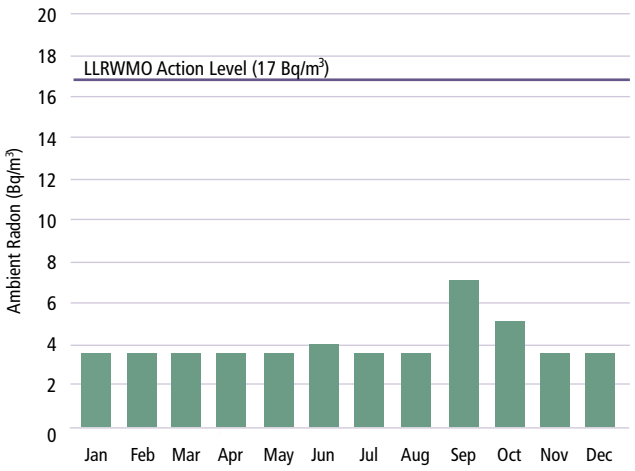


Figure 2: Passmore Avenue Storage Mound 1999 Ambient Radon in Air (Bq/m³)



more than 60 residential and commercial properties, transferring 50 cubic metres of licensable soil to the Office's storage facility at AECL's Chalk River Laboratories. The mildly contaminated soil was transferred to a storage site in an industrial area at Passmore Avenue.

1999–2000 Activities

The Office continued to maintain and monitor the Passmore Avenue storage site. The results of the environmental monitoring program are posted at the site and the annual monitoring reports are available at the Toronto Public Library, Malvern Branch. The results show that the storage site is not adversely affecting the local environment.

Northern Transportation Route

Background

From 1991 to 1993, the Office investigated the 2200-km route used from the 1930s to the 1960s to ship uranium and radium ores and concentrates from the Northwest Territories to Alberta, and identified an estimated 47 000 cubic metres of uranium-contaminated soil at several sites.

During the investigation, the Office took action in areas where there was a potential for unacceptable radiation exposure in the short term. This included removing small amounts of uranium ore and concentrates at some sites and, in one case, removing about 200 cubic metres of contaminated soil to a local temporary storage site.

From 1993 to 1996, the Office moved approximately 31 000 cubic metres of mildly contaminated soil from several sites in Fort McMurray, Alberta, to a specially built storage facility at the local landfill that the Office monitors annually. The Office continues to perform radiological surveys or remedial work necessary to accommodate local land use changes proposed at these sites. To date, the Office has removed a total of about 120 cubic metres of materials from various sites along the northern transportation route to its storage facility at AECL's Chalk River Laboratories.

Participants at a community workshop in Deline, Northwest Territories.

1999–2000 Activities

- Indian and Northern Affairs Canada (INAC) continued to lead committee meetings with NRCan (supported by the Office) and Health Canada to discuss the historic uranium operations in the area of Great Bear Lake, Northwest Territories. INAC has entered into a partnership with the Deline Dene Band by establishing the Canada–Deline Uranium Table, a forum to determine how to address the community's concerns about the impacts of historic mining at Port Radium. The Office's continued support to the Table included participating in community workshops and meetings in Deline, Northwest Territories.

- Discussions continued with representatives of Tulita to dispose of 200 cubic metres of uranium-contaminated soil in the temporary storage pile and to resolve the remaining historic uranium issues in the area. As part of this work, the material in the temporary storage pile was analyzed and a few kilograms were removed to the Office's storage facility at AECL's Chalk River Laboratories.

Taking gamma radiation measurements on materials at the temporary storage pile in Tulita, Northwest Territories.

Waste from Thornton Yard in Surrey is stored in standard containers in the Office's storage facility at AECL's Chalk River Laboratories.

Other Historic Waste Sites

The Office, on a case-by-case basis, cleans up small quantities of historic waste from companies that used radium for applications such as manufacturing, maintaining and repairing radium dials for watches and aircraft instruments. Waste, which includes radium dials and small amounts of contaminated soil and building materials, has been recovered in several provinces. The Office receives radium materials for storage, where resources permit, in response to requests from the AECB or from those who possess such waste.

1999–2000 Activities

The Office provided technical support for:

- renovation work at a building in Toronto that was contaminated by a former radium dial painting operation;
- the placement of a cover on a waste containment area and consolidation work funded by the Metro Toronto Regional Conservation Authority at a property in Toronto where radium-contaminated soil was previously identified;
- site assessments at two downtown Toronto locations; and
- the Ontario Ministry of the Environment's Deloro mine site rehabilitation project, as a member of the Technical Liaison Committee.

LLRWMO Storage Facility at AECL's Chalk River Laboratories

Small quantities of packaged waste from clean-ups and samples from site investigations are transferred to the Office's storage facility at AECL's Chalk River Laboratories. The storage facility consists of two buildings constructed in 1984 and 1990. During 1999–2000, about 70 cubic metres of historic waste was shipped to the storage facility, bringing the total amount of waste in the facility to about 460 cubic metres in 2500 packages. This includes the contaminated slag from the Thornton Yard site in Surrey, British Columbia.

Ongoing Waste Program

Ongoing waste is LLRW continually produced from licensed nuclear activities for which the producers are held responsible. Producers include electrical utilities, nuclear research organizations, nuclear fuel manufacturers, and the producers and users of medical and other radioisotopes. There are about 600 000 cubic metres of this waste in Canada and the waste is produced at about 4 000 cubic metres per year.

Under the Ongoing Waste Program, the Office provides input to NRCan on the development and implementation of national policies and strategies for the storage and disposal of this waste. The Office also assists NRCan in meeting its commitments to international organizations such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD).

1999–2000 Activities

- The Office published an *Inventory of Radioactive Waste in Canada*, which provides an update on the quantity of waste accumulated to December 1998, with projections to 2035. The inventory report is a comprehensive review of the production, accumulation and future projections of nuclear fuel waste, LLRW, and uranium mine and mill tailings from the peaceful application of nuclear energy in Canada. In particular, the map entitled "Radioactive waste sites in Canada" is a helpful reference for anyone seeking information about the location of radioactive waste in Canada.
- On behalf of NRCan, the Office provided general technical support for meetings of the OECD/NEA working group on environmental restoration of world uranium production facilities. The Office drafted a report on the remediation of uranium mine and mill sites in Canada and contributed information on national and international policies and regulations for the working group's final report, to be published by the end of 2000.
- The Office provided information in response to the IAEA's request for the 1998 update to its database on radioactive waste in Canada.
- The Office assisted NRCan with the compilation of information on decommissioning status in Canada as input to a country report for the Radioactive Waste Management Committee of the OECD/NEA.

Information Program

The Office provides information on LLRW in Canada. The National Office in Gloucester (near Ottawa) and the Field Services Office in Port Hope, Ontario, answer inquiries received by phone, by mail and in person. Both offices distributed information on LLRW management in Canada.

The Office also responds to requests for radiological information from owners of properties at the main historic waste sites in Canada. Approximately 500 responses were made in 1999–2000, mainly to requests from the Port Hope area.

Office Staff

(as of March 31, 2000)

National Office (Gloucester, Ontario)

Director	Bob Zelmer
Administrative Assistant	Vacant
Administrative Assistant	Teena Valentonis
Office Assistant	Monique Rhéaume
Financial Analyst	Sylvie Beauchamp
Manager, Field Services	Chris Clement (acting)
Scientific Specialist	Chris Clement
Technical Program Manager, Special Projects	Pab De
Technical Program Manager, Engineering and Operations	Vacant
Technical Specialist	Bob Barker
Project Management Specialist	Gary Vandergaast

Field Services Office (Port Hope, Ontario)

Technical Supervisor	Mark Gardiner
Administrative Assistant	Sharon Pickering
Technical Analyst	Ted Rowden
Technical Analyst	Susanne Ledgard
Technical Assistant	Mike Owen

Financial Review

NRCan transfers funds to AECL through a cost-recovery agreement (memorandum of understanding) for the operation of the Office. The major planning document is the Office's annual Business Plan, submitted to NRCan for approval before the start of each fiscal year. The Business Plan identifies how NRCan priorities can be accommodated with the available funding. Adjustments to priorities during the year are accomplished through joint quarterly progress reviews by the Office and staff of NRCan's Uranium and Radioactive Waste Division.

The Office's accounts and financial control system conform with AECL's financial policies and control. These provide assurance that reliable and accurate financial information is available on a timely basis. The financial statements in this annual report present the costs of operation of the Low-Level Radioactive Waste Management Office as of March 31, 2000.

Table 1 shows how NRCan funding was utilized on the Office's basic mandated areas.

Table 1. Expenditures Funded by NRCan for 1998–1999 and 1999–2000 ($ thousands)

Program Areas	1998–1999	**1999–2000**
Historic Waste Program		
Surrey	643	**2,398**
Port Hope	308	**276**
Port Hope Area Long-term Management	—	**98**
Scarborough	3 *	**5** *
Northern Transportation Route	161	**128**
Other Sites, General	129	**102**
Subtotal: Historic Waste Program	*1,244*	***3,007***
Ongoing Waste Program	208	**123**
Information Program	77	**105**
Management, Administration and Support Services	455	**568**
Total NRCan Funding	1,984	**3,803**

* Additional funds were provided by the Government of Ontario for this project (see Table 2).

Table 2 shows additional funding the Office received for work done for other organizations on a cost-recovery basis.

Table 2. Non-NRCan Funding for Fiscal Year 1999–2000 ($ thousands)

Scarborough — Government of Ontario Funding	36
Other Funding	20
Total Non-NRCan Funding	**56**

Figure 3 profiles Surrey Project costs related to its activities over the duration of the project (1984–2000).

Total project cost to completion was $6.887 million. Waste removal and disposal expenditures were $2.398 million in 1999–2000.

Figure 3: Surrey Project Expenditures 1984–2000 ($ thousands)