# 2000-2001
annual report

# Low-Level Radioactive Waste Management Office




**The Low-Level Radioactive Waste Management Office was established in 1982 to carry out the responsibilities of the federal government for historic 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 mandate of the Office includes:

- 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 concerning 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, 2001.

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

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# Director's Message

Across the country an era of great progress in the management of Canada's historic waste has begun. Fiscal year 2000 – 2001 was one of achievement, of intense negotiation and of outstanding cooperative problem-solving.

In the area of Port Hope, Ontario, local communities offered long-term storage solutions for the majority of Canada's historic uranium- and radium-contaminated waste. *Principles of Understanding*, built on community-recommended proposals from the Town of Port Hope, the Township of Hope and the Municipality of Clarington to host long-term storage facilities, laid the foundation for a *Legal Agreement* on the clean-up and safe management of the wastes. The Low-Level Radioactive Waste Management Office assisted the signatories to the agreement, the three municipalities and the Government of Canada, during the negotiations culminating in the finalization of both documents.

The history of the Port Hope area wastes and the search for a solution are highlighted in this year's report. The long-awaited remedial work is expected to begin in five years, after the proposals for the clean-up, storage and long-term management of the waste have successfully undergone the legislated environmental and licensing processes.

It is clear from the progress achieved in the Port Hope area that community initiative and support is vital to successfully resolving Canada's low-level radioactive waste management problems. Indeed, similar community-supported solutions appear to be emerging in Alberta and the Northwest Territories.

***Working together on community solutions for low-level radioactive waste management.***

*From the left: Connie Martinell, former secretary of the Township of Hope LLRW Ad Hoc Committee and now Executive Manager of the Municipality of Port Hope, Bob Zelmer and Mark Gardiner of the Low-Level Radioactive Waste Management Office, and Mike Rostetter, Chief Administrative Officer of the Municipality of Port Hope.*

For those of us in the environmental restoration and waste management field, this is an invigorating and exciting time. In the months and years ahead, the Office will continue to seek opportunities to contribute to solutions for the long-term safe management of all of Canada's historic low-level waste.

R. L. Zelmer
Director

# Historic Waste Program

### 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 of Canada's accumulated LLRW to date is historic waste consisting of contaminated soil generated over the past 70 years. 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. Other examples of LLRW produced on an ongoing basis range from slightly contaminated materials from operational activities to highly contaminated materials and components (such as ion exchange resins and reactor core internals) from operating, maintaining and decommissioning facilities.*

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 LLRW, mostly stored in interim management facilities in the Port Hope area.

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 Canadian Nuclear Safety Commission (CNSC), the federal nuclear regulatory agency.[1]

[1] *The Atomic Energy Control Board became the Canadian Nuclear Safety Commission on May 31, 2000.*

The main historic LLRW sites in Canada are located in:

- Town of Port Hope, Ontario
- Hope Township, Ontario
- Municipality of Clarington, Ontario
- Scarborough, Ontario
- the Northwest Territories and northern Alberta along the Northern Transportation Route

**Figure 1: Total Radioactive Waste in Canada to the end of 2000: 87 million $m^3$**

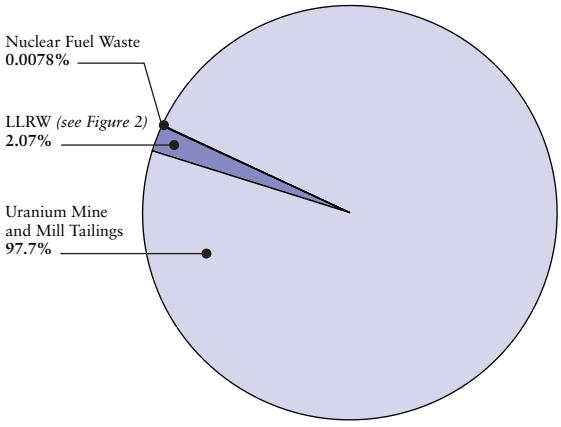


**Figure 2:** **Total LLRW in Canada: about 1.8 million $m^3$**

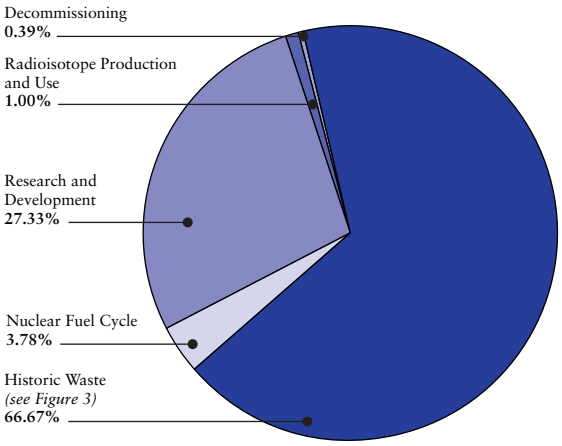
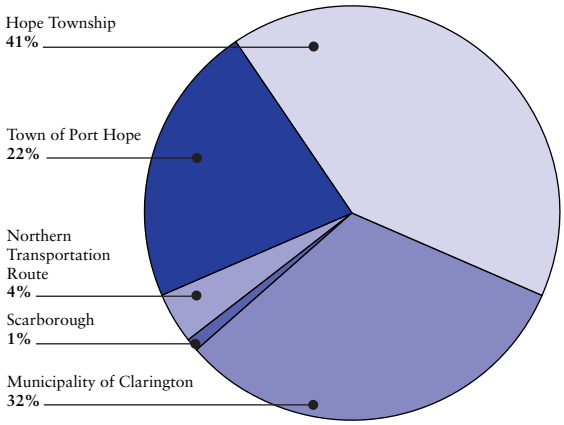



**Figure 3:** **Total historic waste in Canada: about 1.2 million $m^3$**




## A New Regulatory Environment

*On May 31, 2000, the* Nuclear Safety and Control Act *came into effect, replacing the* Atomic Energy Control Act, *which had been in force since 1946. Under the new Act, the Atomic Energy Control Board became the Canadian Nuclear Safety Commission (CNSC). All licensees and owners of radioactive materials are now required to comply with the terms of the new Act and regulations.*

*The Office has been examining how the new Act and its regulations may affect the operations of the Office:*

- *The Office is working closely with the CNSC to determine the effects of the new licensing regime on the Office's operations. Certain sites for which the Office has responsibility that are not currently licensed may now be subject to licensing. Office staff have accompanied CNSC staff on visits to such sites and have provided technical and other information so that the CNSC can carry out an objective assessment of each site.*
- *The Office's operations are unlikely to be significantly affected by the Act's reduction of the effective public dose limit from 5 millisieverts (mSv) to 1 mSv. During the past several years, the Office has been carrying out remediation and clean-up on the basis of both limits and has found that the choice of limit makes only a minor difference in triggering remedial work.*
- *The Office is still studying the effect of the legal authority the Act gives to the CNSC to order remediation of contaminated sites. The Office has always been diligent in providing interim remediation of known contaminated sites that have the potential to affect health and safety in the short term.*

## Port Hope Area Initiative: A Long-Term Solution

Last year a major milestone was reached on the road to cleaning up the historic wastes in the area of Port Hope, Ontario. A *Legal Agreement* for the clean-up, storage and long-term management of the waste in storage facilities in the municipalities of Port Hope, Hope Township and Clarington was signed by the communities in December 2000, and was signed by the federal government on March 29, 2001.

The *Legal Agreement* was developed based on *Principles of Understanding* initialled by the communities and the Government of Canada in October 2000, after eight months of negotiations. The Office provided support to Natural Resources Canada during the negotiations of both the *Principles* and the *Legal Agreement*.

The roughly 1 million cubic metres of LLRW located in the three communities dates back to radium and uranium refining that began in the 1930s. The federal government is responsible for the long-term management of this historic waste, which is currently stored in several licensed and unlicensed facilities in the Town of Port Hope and also 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 owned 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 waste. No agreement with a volunteer host community

### A Chronology of LLRW in the Port Hope Area

**1932** Eldorado Gold Mines Ltd. opens radium refining facilities in Port Hope.

**1930s to 70s** Properties in the Town of Port Hope become contaminated in a variety of ways, including spillage during transportation; unrecorded, unmonitored or unauthorized diversion of contaminated fill and materials; wind and water erosion; and contamination spread from residue storage areas.

**1942–1954** Production emphasis shifts from radium to uranium refining.

**1948–1954** Residues are stored at the Welcome Waste Management Facility in Hope Township, about 3 kilometres northwest of the plant site.

**1955–1988** Waste management operations are moved approximately 13 kilometres west to the Port Granby Waste Management Facility in Clarke Township, now the Municipality of Clarington.

**1976–1981** The Atomic Energy Control Board directs a large-scale radioactive waste removal program in the Town of Port Hope.

**1982** The Low-Level Radioactive Waste Management Office is established to manage historic waste in the Town of Port Hope and across Canada.

**1982–2001** The Office investigates, characterizes and consolidates waste within the Town of Port Hope. The Construction Monitoring Program is established to minimize the spread of waste.

**1988** The federal government establishes the Siting Task Force on Low-Level Radioactive Waste Management to find a permanent management facility for the Port Hope area waste.

**1988–1996** The Siting Task Force invites all Ontario municipalities to consider hosting a long-term management facility for the Port Hope area waste. Deep River negotiates with the federal government to be a host community, but negotiations end without agreement.

**1997–1999** Hope Township, the Town of Port Hope and the Municipality of Clarington develop community proposals to construct local long-term waste management facilities and present their proposals to the federal government.

**2000** The Government of Canada and the communities sign *Principles of Understanding* outlining terms for a project to clean up LLRW in the three communities.

The municipalities sign a *Legal Agreement* based on the *Principles of Understanding*.

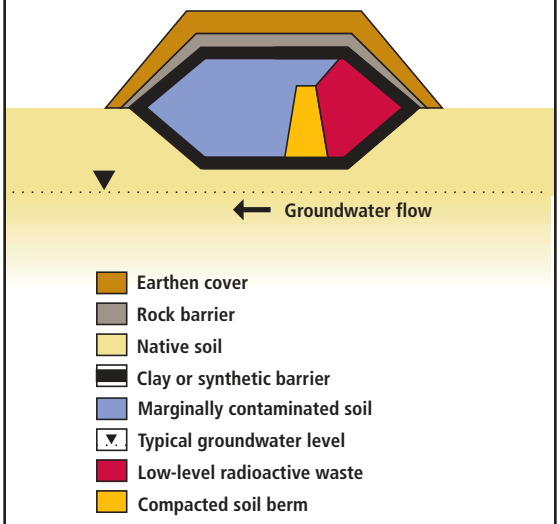
**2001** The Government of Canada signs the *Legal Agreement* outlining its commitment to clean up affected sites and construct long-term management facilities for LLRW.

was reached. Subsequently, in 1997 and 1998, the three area municipalities, led by Hope Township, considered supporting local solutions to the long-term management of the waste 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. In 1999, both the Town of Port Hope and the Municipality of Clarington also proposed preferred storage facility options to the federal government, and the three communities began negotiations with the federal government to set out the terms and conditions applicable to the development of those facilities.

The conceptual designs of the facilities — each designed to last for at least 500 years — vary somewhat by community. In Port Hope and Hope Township, the proposals involve complete encapsulation of the waste in new above-ground mound facilities (see figure below). Engineered barriers above and below the buried material isolate the waste. After closure the facilities may be landscaped for future recreational uses.

**The Above Ground Mound Concept**




The Hope Township design, illustrated here, has the features typical of the conceptual designs proposed by each community: each is multi-layered and will isolate wastes from the environment.

Clarington has opted for management of the waste in place (*in situ*). This includes constructing a groundwater interceptor trench around the existing Port Granby waste facility and then capping the waste with a multi-layer low-permeability cover. Some relocated waste material originating on site (approximately 20 per cent of the total on-site waste) would be entombed in a purpose-built mound on site. The Clarington proposal also involves stabilizing the facility to counteract the erosion of the bluffs and shoreline at the site, which borders Lake Ontario.

Over the next four to five years, these proposals will undergo detailed planning, engineering, community consultation and environmental studies under a complete environmental assessment and regulatory review. Construction and remediation activities will take 5 to 7 years after regulatory approval. After closure, the sites will be landscaped and available for recreational uses. Environmental monitoring will continue until regulators decide it is no longer necessary.

Waste Management Facility (WMF) Locations

## The Town of Port Hope: Interim Waste Management Activities

### 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 Atomic Energy Control Board 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 CNSC-licensed facilities and nine unlicensed sites in Port Hope, all under regular inspection and monitoring by the Office.

*Routine environmental monitoring in the Municipality of Port Hope includes sampling Ganaraska River water in the vicinity of historic LLRW sites.*

### 2000–2001 Activities

- Monitoring of the major licensed and unlicensed sites in the Town of Port Hope demonstrated that they made no significant impact on the environment.

- Under the Construction Monitoring Program (CMP), jointly run by the Office and the Town of Port Hope, the Office continued to operate the CNSC-licensed Pine Street extension temporary storage site (PSE TSS), which receives waste from construction monitoring activities within the Town. The Office received 131 applications to the CMP and moved 270 cubic metres of contaminated soil to the TSS.

*An Open House in April 2000 described the need to expand the Pine Street Extension temporary storage site to accomodate contaminated soil collected during normal construction and development activities in Port Hope.*

- As part of its application for a licence to expand the PSE TSS, the Office completed an environmental assessment screening (under the *Canadian Environmental Assessment Act*) and submitted it to the CNSC. The CNSC has circulated the document to stakeholders (including federal and provincial departments and agencies) for review.
- The Office issued about 540 letters in response to property owners and real estate agents who requested information concerning the radiological status of properties. One request prompted the Office to investigate a private residence; the investigation identified several areas in the home that exceed the criteria for interior contamination set by the 1977 Federal–Provincial Task Force on Radioactivity. Remedial work is scheduled for April 2001.

*Harbour lands on the centre pier in Port Hope are included in the clean-up and long-term waste management project outlined in the* Legal Agreement *between the federal government and the municipalities.*

- The Office continued to participate in meetings of the Port Hope Community Health Concerns Committee.
- The Office continued interim waste management at the Viaducts site by installing an intrusion barrier at a private property.
- For safety reasons, the Office demolished a collapsing addition to the building at its Cavan Street property.

## Northern Transportation Route

### Background

From 1991 to 1993, the Office investigated the 2200-kilometre 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.

*In Fort McMurray, the engineered containment cell at the Regional Municipality of Wood Buffalo landfill is monitored annually by the Office.*

From 1993 to 1996, the Office moved approximately 31 000 cubic metres of mildly contaminated soil from several sites in Fort McMurray, Alberta, to an engineered containment cell 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 the end of the year, the Office had removed a total of about 250 cubic metres of materials from various sites along the Northern Transportation Route to its storage facility at AECL's Chalk River Laboratories.

*Northern Transportation Route sites are regularly overseen by Office staff.*

## 2000–2001 Activities

- The Office has been cooperating with the CNSC as it develops a regulatory strategy for the Northern Transportation Route. In December 2000, the Office submitted a consolidated planning framework to Natural Resources Canada that presents a four-year plan for resolving all known historic LLRW concerns along the Northern Transportation Route (including Fort McMurray and the Northwest Territories).

- The Office continued its routine monitoring and maintenance of the engineered containment cell at the Regional Municipality of Wood Buffalo landfill site and the CN Waterways property in Fort McMurray, Alberta. This included modifying the fencing at the CN Waterways property to minimize the chances of exposure to elevated gamma radiation levels at the site. The annual report on the monitoring and maintenance of the engineered containment cell is completed and slated for delivery to stakeholders early in the 2001–2002 fiscal year.

  Office staff joined the CNSC in a visit to the CN Waterways site to assess the urgency of completing remedial work.

- The Office continued to provide technical support to the Tulita Uranium Working Group. The Office is a member of the group, which was formed to cooperatively develop a solution for the remaining historic uranium issues in the Tulita district.

- The Office continued to provide technical support for an interdepartmental committee (comprising Indian and Northern Affairs Canada, Natural Resources Canada, and Health Canada) that is discussing the historic uranium operations in the area of Great Bear Lake, Northwest Territories.
- The Office also provided technical support for the Canada–Deline Uranium Table (CDUT), a forum for Indian and Northern Affairs Canada and the Deline Dene Band to determine how to address the community's concerns about the impact of historic mining at Port Radium.

## 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 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.

### 2000–2001 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 levels of radon, gamma radiation and radium-226 are within natural background levels.

## 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 a variety of applications. 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 CNSC or from those who possess such waste.

*Sampling by Office staff is part of the monthly environmental monitoring at the Passmore Avenue site in Scarborough.*

### 2000–2001 Activities

- At the request of the CNSC, the Office conducted a tour of Toronto area LLRW-contaminated sites, which resulted in a detailed reassessment of the condition of an elevator on one property. This reassessment concluded that the elevator did not meet the criteria set by the 1977 Federal–Provincial Task Force on Radioactivity and needed remedial work. The Office decontaminated the elevator within the deadline set by the CNSC.

*Other historic waste sites requiring remediation by the Office in 2000–2001 included this Toronto area building. Work was completed within CNSC deadlines.*

- The Office picked up radium dials from a Toronto area college and radium dials and other artifacts from the CNSC offices in Mississauga. These materials were shipped to the Office's storage facility at AECL's Chalk River Laboratories. In Alberta, approximately 300 radium dials were consolidated in one location for subsequent shipment to the Chalk River storage facility.

## 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 Natural Resources Canada on the development and implementation of national policies and strategies for the storage and disposal of this waste. The Office also assists Natural Resources Canada 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).

### 2000–2001 Activities

- The Office, on behalf of Natural Resources Canada, continued to provide general technical support for meetings of the OECD/NEA working group on environmental restoration of uranium mining and milling facilities. The group has now completed its work and produced a draft report and the NEA plans to publish the final report in 2001.

- The Office was nominated by Natural Resources Canada to act as the official focal point (country coordinator for Canada) to support the IAEA's new initiative to set up a Net-Enabled Waste Management Database (NEWMDB). The database is designed to provide information required by the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (to be in force soon) and for the United Nations indicator of sustainable development on radioactive waste management, which is a follow-up to Agenda 21. The expected role of the Office will be to assemble data from nuclear utilities, AECL, uranium production companies and other waste generators. The Office has begun consulting with major stakeholders on how to update its database to be compatible with the NEWMDB.

- The Office has initiated an assessment of decommissioning and waste management by major waste producers in Canada. The Office undertook the last such study in 1992. Natural Resources Canada uses information from these assessments in its reports to international organizations such as the OECD/NEA and IAEA. Similar information has also been sought by the technical community and the public in Canada.

## Information Program

The Office provides information on LLRW in Canada. The National Office in Ottawa and the Field Services Office in Port Hope, Ontario, answer enquiries received by phone, by electronic and regular mail, and in person. Both offices distribute 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 2000–2001, mainly to requests from the Port Hope area.

In December 2000, the Office launched its Web site www.llrwmo.org.

## Office Staff

*(as of March 31, 2001)*

**Director:**
Robert Zelmer (Ottawa)

**Technical Program Manager, Special Projects:**
Pab De (Ottawa)

**Technical Program Manager, Engineering and Operations:**
Glenn Case (Port Hope)

**Project Management Specialist:**
Gary Vandergaast (Ottawa)

**Communications Officer:**
Sue Stickley (Port Hope)

**Scientific Specialist:**
Vacant

**Technical Specialist:**
Vacant

**Technical Supervisor:**
Mark Gardiner (Port Hope)

**Technical Analyst:**
Ted Rowden (Port Hope)

**Technical Analyst:**
Susanne Ledgard (Port Hope)

**Technical Assistant:**
Michael Owen (Port Hope)

**Administrative Assistant:**
Teena Valentonis (Ottawa)

**Administrative Assistant:**
Sharon Pickering (Port Hope)

**Administrative Assistant:**
Vacant

**Office Assistant:**
Monique Rhéaume (Ottawa)

**Financial Analyst:**
Sylvie Beauchamp (Ottawa)

# Financial Review

Natural Resources Canada (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, 2001.

Table 1 shows how NRCan funding was used for the Office's basic mandated areas.

**Table 1 | Expenditures Funded by NRCan for 1999–2000 and 2000–2001 ($ thousands)**

| Program Areas | 1999–2000 | 2000–2001 |
|---|---|---|
| Historic Waste Program | | |
| Surrey | 2398 | 101 |
| Port Hope Interim Waste Management | 276 | 267 |
| Port Hope Area Initiative | 98 | 499 |
| Scarborough | 5 * | — |
| Northern Transportation Route | 128 | 199 |
| Other Sites, General | 102 | 239 |
| *Subtotal: Historic Waste Program* | *3007* | *1305* |
| Ongoing Waste Program | 123 | 76 |
| Information Program | 105 | 135 |
| Management, Administration and Support Services | 568 | 383 |
| **Total NRCan Funding** | **3803** | **1899** |

* *Additional funds were provided by the Government of Ontario for this project.*

**Table 2 | Non-NRCan Funding for 1999–2000 and 2000–2001 ($ thousands)**

| Program Areas | 1999–2000 | 2000–2001 |
|---|---|---|
| Scarborough — Government of Ontario Funding | 36 | 30 |
| Other Funding | 20 | 40 |
| **Total Non-NRCan Funding** | **56** | **70** |

## 1999–2000

**Figure 1a:** Expenditures Funded by NRCan for 1999–2000 ($ thousands)

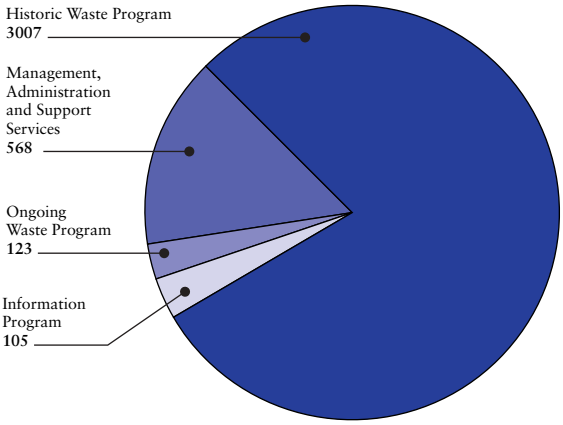
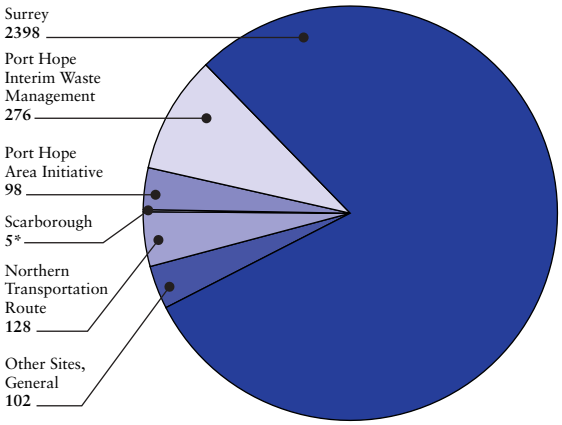



**Figure 1b:** Expenditures Funded by NRCan for 1999–2000 ($ thousands): **Historic Waste Program**




* *Additional funds were provided by the Government of Ontario for this project.*

## 2000–2001

**Figure 2a:** Expenditures Funded by NRCan for 2000–2001 ($ thousands)

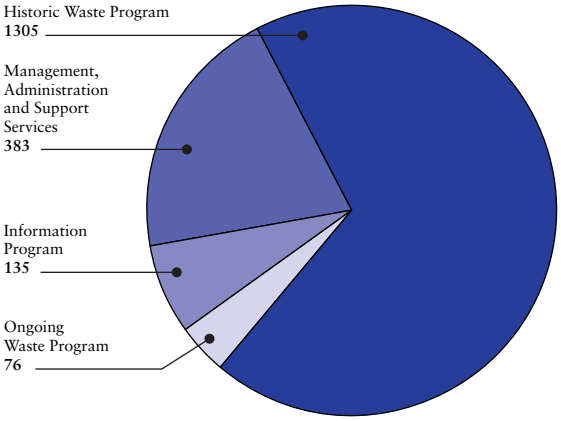



**Figure 2b:** Expenditures Funded by NRCan for 2000–2001 ($ thousands): **Historic Waste Program**