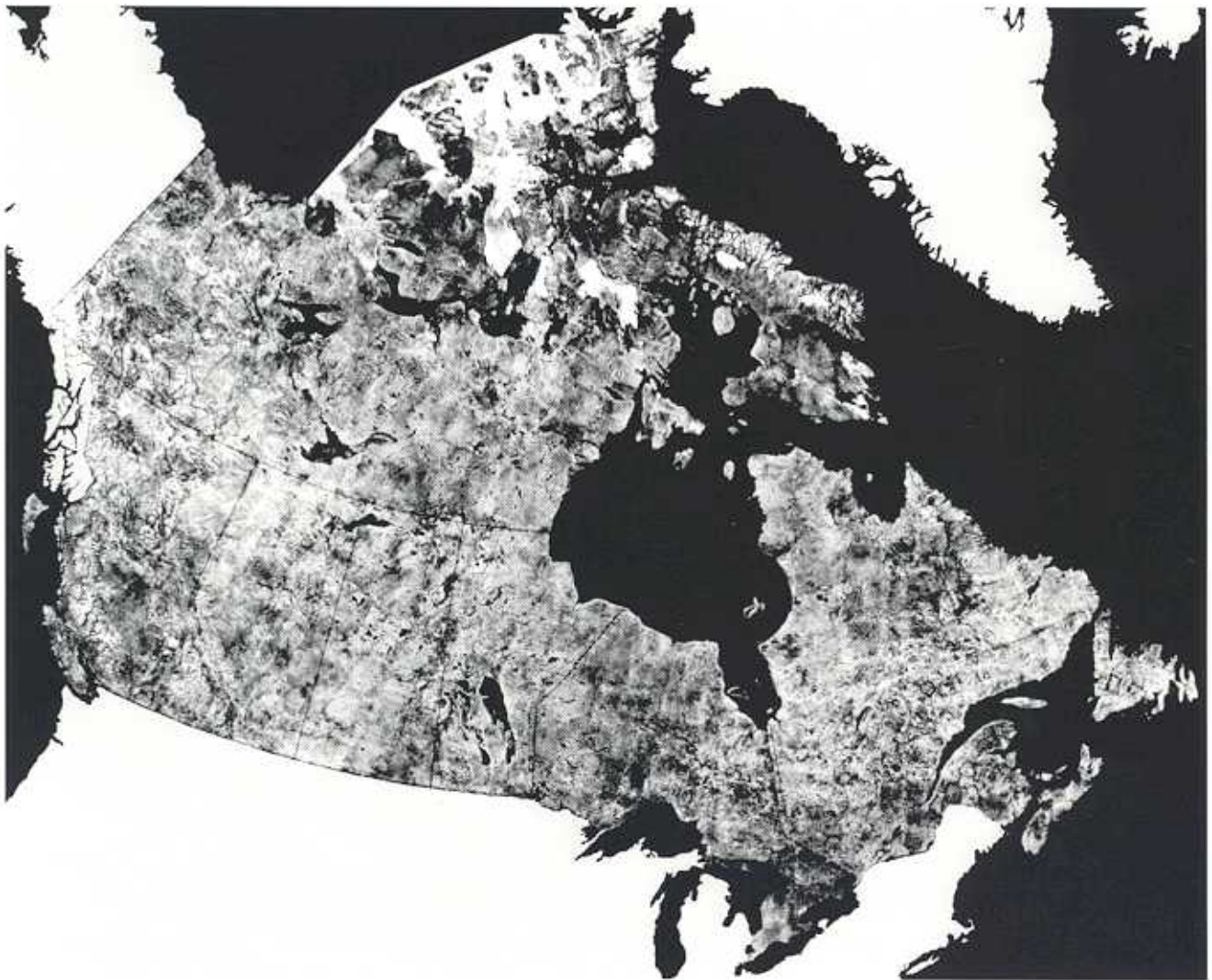


1995 / 96 ANNUAL REPORT



Low-Level Radioactive Waste
Management Office

MISSION

The Low-Level Radioactive Waste Management Office (LLRWMO) was established in 1982 to carry out the responsibilities of the federal government for low-level radioactive waste (LLRW) management in Canada.

MANDATE

- *resolve historic waste problems that are a federal responsibility,*
- *establish, as required, a user-pay service for the disposal of LLRW produced on an ongoing basis, and*
- *address general public information needs about low-level radioactive wastes.*

The Low-Level Radioactive Waste Management Office is operated by Atomic Energy of Canada Limited (AECL) through a cost recovery agreement with Energy, Mines and Resources Canada (now called Natural Resources Canada - NRCan), the federal department which provides the funding and establishes national policy for LLRW management.

LOCATIONS

National Office

1595 Telesat Court, Suite 700
Gloucester, Ontario
K1B 5R3
Tel: (613) 998-9442
Fax: (613) 952-0760
E-Mail: llrwmo@compmore.net

Field Services Office

67 John Street, Suite 104
Port Hope, Ontario
L1A 2Z4
Tel: (905) 885-9488
Fax: (905) 885-7458
E-Mail: llrwmph@eagle.ca

*Cover Page Photo: Produced by Topographical Survey, Surveys and Mapping Branch, Natural Resources Canada, Ottawa.
Prepared from Landsat - 1 Multispectral Imagery Band 6 obtained during 1972 - 1974.*

Dr. R.W. Morrison
Director General
Uranium & Nuclear Energy Br.
Natural Resources Canada
580 Booth Street
Ottawa, Ontario
K1A 0E4

Dr. P.A. Brown
Director
Radioactive Waste & Radiation
Uranium & Nuclear Energy Br.
Natural Resources Canada
580 Booth Street
Ottawa, Ontario
K1A 0E4

Dr. C.J. Allan
General Manager
Physical & Environmental
Sciences
AECL
Whiteshell Laboratories
Pinawa, Manitoba
ROE 1LO

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 1996 March 31.

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

Sincerely,

Robert W. Pollock

R.W. Pollock
Director

HIGHLIGHTS

Scarborough, Ontario: Expenditure \$2,686 k



The Malvern Remedial Project resulted in the removal of radium-contaminated soils from more than 60 residential and commercial properties in the Malvern community of Scarborough. Restoration of the properties completed the solution to this long-standing problem.

Excavated soil, amounting to over 16,000 m³, was sorted using equipment developed specially for the project. Materials with licensable concentrations of radium, representing only about 0.3% (50 m³) of the total amount, were transferred to an LLRWMO interim storage facility at AECL Chalk River Laboratories. The remaining mildly contaminated soil, reduced to about half the original volume after separation of clean soil, is now securely stored in an engineered mound at the same site in an undeveloped part of an industrial area. It will be removed when a permanent disposal facility is available.



Port Hope, Ontario: Expenditure \$603 k



Implementation of the recommendations developed by the Siting Task Force, for further interim waste management steps in Port Hope, progressed. This work includes relocation of small volumes of contaminated soil from some sites to the Temporary Storage Site and improvements to waste isolation at other locations. Ongoing environmental monitoring and site inspections will identify whether any further actions are needed before a permanent disposal facility becomes available.

Northern Transportation Route/Fort McMurray, Alberta: Expenditure \$260 k

Soil contaminated with uranium ore was discovered on industrial properties in Fort McMurray in 1992 and subsequently at other transfer points along the historical transport route from the mine at Great Bear Lake in the Northwest Territories. With the work performed at two sites this year, cleanup is now complete at eight of the nine properties in Fort McMurray. In situ measurements, performed with portable gamma spectrometer, are used to confirm that these properties are now suitable for redevelopment without restrictions on their future use.



Ongoing Waste: Expenditure \$212 k

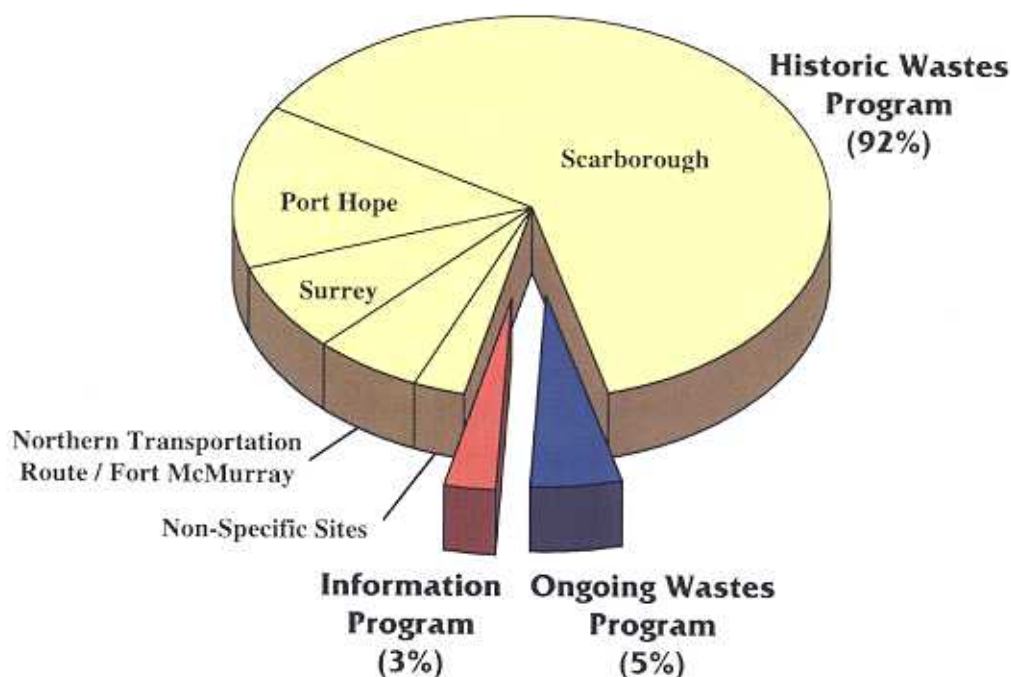
The stakeholder consultation process initiated by NRCan should lead to a policy framework for the disposal of radioactive waste in Canada. To support this policy development, the LLRWMO provided technical analyses of factors related to low-level radioactive waste disposal.

Information Program: Expenditure \$129 k

Communications activities for the Malvern Remedial Project focussed on project implementation. A field office within the residential cleanup area provided an effective means of responding quickly to questions and concerns of local residents.

1995/96 LLRWMO Funding from NRCan

Total \$4.319 M



This figure shows the allocation of LLRWMO funding from NRCan in 1995/96. Total project costs, including funding from other sources, are detailed in the Financial Review section. All costs shown are fully overheaded, that is, all staff and support service costs have been allocated to their respective projects.

DIRECTOR'S MESSAGE

The resolution of historic waste problems has been, and continues to be, a major focus for the LLRWMO. The Director's Message in last year's annual report highlighted the importance of a cooperative approach to solving historic waste problems, amongst the LLRWMO, communities, and all other parties with interests in contributing to solutions. This year, I would like to highlight the role that the development of innovative technology has played in reaching effective, acceptable solutions.

Historic waste sites generally date back to the radium industry and to the early years of the uranium industry. At many sites, the original waste volume has been substantially increased due to contamination of native soils. In some cases, this has been due to natural contaminant transport processes, such as groundwater transport of contaminants leached from the wastes. In other cases, physical mixing of the wastes with native soils has occurred due to activities such as property development. In either case, the results are a heterogeneous distribution, with the original wastes still containing much of the contaminant inventory, but now associated with an additional large volume of mildly contaminated or suspect soil. This creates the possibility that segregation of wastes into different inventories may lead to more effective solutions, since each fraction of the wastes can then be treated in a manner appropriate to its potential hazard.

The technical requirement is to perform these segregations such that different inventories are correctly and cost-effectively classified with a high degree of confidence. The approach developed by the LLRWMO is based on computer-aided detection of gamma radiation. Gamma radiation is an effective "marker" for radium present in most historic wastes. Two different systems are now in use. The Large Area Gamma Survey (LAGS) system is portable, and is used for characterization of sites and in-situ inventory segregation. The Soil Sorting Conveyor System (SSCS) is a fixed location system developed for the Malvern Remedial Project, where soil was moved past the detection system with a conveyor. Both systems collect a large number of measurements, so that statistical techniques can be used in the computer analyses of data to achieve high confidence levels.

As described in the Operations Review section of this report, these systems have been used effectively in Fort McMurray and in Scarborough. In both cases, less than 1% of the originally excavated waste volume required a licence from the AECB for its possession. These materials were transferred to the LLRWMO storage building at the Chalk River Laboratories of Atomic Energy of Canada Limited. Depending on their further classification, mildly contaminated soils are placed in interim storage within the local municipality or disposed as industrial waste. These mildly contaminated soils pose little direct hazard, but represent an environmental risk if misused. For example, they could cause elevated indoor radon, due to their radium content, if used as backfill around basements. In Scarborough, it was also possible to segregate about half the original volume as clean soil, which was interspersed with contaminated soil throughout the excavation area.

The ability to segregate excavated soils into different inventories has been demonstrated to be a cost-effective approach at these sites. This approach has also been effective in obtaining community support, since each inventory can be seen to be managed in a safe and environmentally sound manner tailored to that material. These methods thus offer future potential at other historic waste sites, since they create opportunities where public acceptance and cost-effectiveness are not mutually exclusive.

OPERATIONS REVIEW

The activities of the LLRWMO are generally carried out within three broad program areas, namely:

- *Historic Wastes Program*
- *Ongoing Wastes Program*
- *Information Program*

HISTORIC WASTES PROGRAM

Historic wastes are low-level radioactive wastes for which the original owner can no longer be held responsible and which are managed in a manner no longer considered acceptable. If they are wastes for which the federal government accepts responsibility, their management comes within the mandate of the LLRWMO. Historic wastes are located at several sites across Canada.

The goal of the Historic Wastes Program is to perform cleanup and interim remedial work at historic waste sites, in order to protect human health and the environment, prior to the availability of permanent disposal facilities for these wastes. In this connection, close liaison was maintained with, and necessary technical advice was provided to, the independent Siting Task Forces appointed by the Minister of NRCan to locate sites for the long-term management of historic wastes.

Activities and achievements during 1995/96 in the specific historic waste projects are detailed below.

Scarborough, Ontario (Malvern Remedial Project)

A major milestone was achieved this year with the completion of the cleanup of radium-contaminated soil in Scarborough. The contaminated soil, discovered at McClure Crescent in the Malvern community in 1980, originated from the radium dial painting industry at the time of the Second World War. Several initiatives to remove it failed when residents who lived close to proposed interim storage sites objected vigorously. The Malvern Remedial Project (MRP), a joint Canada/Ontario project to complete the cleanup in the Malvern area, was announced in 1992 March. The main elements of the project were to complete the cleanup of soils at McClure Crescent and at a second location subsequently discovered at McLevin Avenue, to sort the soil to remove all licensable material and to store the remaining mildly contaminated soil at the sorting site until a permanent disposal site is available in Ontario.

A proposed site for the soil sorting and interim storage activities was identified by the Government of Ontario in mid-1993. The planning and approval phase of the project, including environmental assessment in accordance with the federal Environmental Assessment Review Process (EARP) Guidelines Order, was completed in 1994.

Excavation of contaminated soil at the McClure Crescent and McLevin Avenue sites began 1995 June 01. At McLevin Avenue, the work included removal of contaminated soil stockpiled at the site during a partial cleanup in 1990, and extension of the excavated area to the city street and a small portion of the adjacent shopping center property. Restoration of the properties was generally concluded by September.



The first truckload of excavated soil leaves McClure Crescent for the soil sorting / temporary storage site, 1995 June 01.

A requirement to remove additional amounts of contaminated soil from the McClure Crescent area resulted in an extension to the planned schedule. The original project scope included about 40 properties identified during the initial surveys of the area in the early 1980s. Improvements in surveying technology resulted in the identification of 25 additional properties in 1994, during the extended gamma radiation surveys being performed in parallel with this project. Only limited surficial excavations were anticipated at these additional properties. However, more extensive subsurface zones of contaminated soil were discovered during excavation and the decision was taken to extend the excavation and restoration schedule into November to complete the cleanup. Deferral of this work to 1996/97 would have resulted in further increases in costs and a second year of disruption to local residents.

Excavated soil, amounting to over 16,000 m³, was sorted using equipment developed specially for this purpose. This technology was pivotal to the success of the project, given the commitment to segregate licensable material. These materials, which represented only about 0.3% (50 m³) of the total amount, were transferred to an LLRWMO interim storage facility at AECL Chalk River Laboratories. Separation of clean soil, interspersed throughout the excavated material, then reduced the original volume by about half. The remaining mildly contaminated soil was placed in an engineered storage mound at the sorting site, on Passmore Avenue in an undeveloped part of an industrial area. It will be removed when a permanent disposal facility is available. The sorting operation experienced some initial difficulties in handling soils with high moisture content and extended hours were required to maintain the throughput rate made necessary by the increased volume of excavated soil. In spite of these problems, the original objectives were met while still maintaining cost effectiveness. The total cost for soil sorting operations, including equipment purchase and rental, and future site decommissioning, will be about \$2.9 M. This will produce an estimated savings of \$3 M to \$9 M in future disposal costs, due to the volume reduction resulting from the separation of clean soil.

The project was also successful in terms of worker safety and protection of public health and the environment. There were no lost time injuries at any project work site. Environmental monitoring data, and inspection by an independent environmental inspector, showed consistent compliance with criteria. Mitigative measures to control dust concentrations in the immediate vicinities of work areas were the only actions consistently required, and these were successfully employed when needed.

The extended survey of the Malvern community was also completed. From 1992 to 1995, gamma radiation surveys were conducted at more than 1,000 residential properties and all 14 schools in the Malvern community. No additional findings of contaminated soil were made outside of the previously known areas at McLevin Avenue, and at McClure Crescent and the area immediately to the west. Surveys in this latter area, referred to as southwest Malvern, included all properties other than a small number where the owners declined, and also included indoor radon measurements.

Port Hope, Ontario

The presence of widespread contamination of soils and building materials in Port Hope was discovered in the mid-1970s. A large-scale cleanup program was carried out by the AECB as the lead agency for the Federal/Provincial Task Force on Radioactivity (F/P Task Force). However, the radioactive waste storage site at the Chalk River Laboratories of AECL, to which the Port Hope wastes were transferred, had limited capacity. Cleanup work thus concentrated on developed residential, public and commercial properties. Large volumes of contaminated soil in vacant areas, and the contaminated sediments at the harbour, were left for cleanup at a later date. As well, small quantities of slightly contaminated soils, that is, soils with above background radioactivity content but meeting the

cleanup criteria established by the F/P Task Force, exist along some public roads and on some private and public properties. LLRWMO activities in Port Hope are directed at both large and small scale sites.



Interim storage sites such as the Strachan Street Ravine Consolidation Site, is one of several that are maintained and monitored by the LLRWMO.

In 1995, the Siting Task Force on Low-Level Radioactive Waste Management, which had been established by the Minister of NRCan to locate a new, permanent site for all of the historic wastes in the Port Hope area, completed its mandate. This included the completion of conceptual remedial action plans for all historic waste sites in Port Hope, together with recommendations for further interim waste management steps. Good progress was made towards implementation of this interim waste management program. The work consisted of relocation of small volumes of contaminated soil to the Temporary Storage Site (TSS) and the improvement of waste isolation at some locations. An outstanding item is the placement of a cover on some soils exhibiting elevated radiation readings at the Viaduct area. Completion of this work will bring all major sites to a condition where the only planned ongoing activity will be the comprehensive environmental monitoring and site inspection program. This will confirm the adequacy of the interim work, and identify whether any further actions are needed before a permanent disposal facility becomes available.

The Construction Monitoring Program (CMP), a joint initiative of the Town and the LLRWMO, continued at small-scale sites. The program enables normal development to continue while preventing the inadvertent misuse of contaminated soil as backfill around buildings or at other locations. During the year approximately 163 properties were inspected and 37 m³ of contaminated soil from 6 properties was taken to the TSS. In addition, approximately 1,400 m³ of contaminated soil, excavated during the realignment of a Town street by CN Rail, was relocated to a storage cell on the adjacent CN property.

Northern Transportation Route, Northwest Territories and Alberta

In August of 1992, uranium-contaminated soil and building materials were found at an unused warehouse in Fort McMurray, Alberta. The discovery resulted from an investigation of the 2,200 km water transportation network used, from the 1930s until the 1950s, to transport uranium ore from the Port Radium mine, at Great Bear Lake in the Northwest Territories, to Waterways (now Fort McMurray), Alberta for rail shipment to Port Hope. The investigations identified an estimated 20,000 m³ of uranium-contaminated soil at eighteen sites along the northern transportation route north of Fort McMurray. Sites where people were living in close proximity to contaminated materials were cleaned up during the investigations.

In the short-term there is no need for action at the remaining sites along the northern transportation network unless the use of the properties changes. During 1995, radiological surveys were conducted at Fort Smith and Fort Resolution where developments near the contaminated sites were planned, and at Fort Fitzgerald, at the request of a property owner. The result is a better characterization of the contaminated sites at Fort Smith and Fort Fitzgerald. Sufficient information was gained in Fort Resolution, where a few pieces of uranium ore from unexplained origins were found and removed during the initial investigations, to determine that no additional work was required.

The focus will now shift to developing, in consultation with residents of the communities and government officials, an overall plan for cleanup and long-term management of the resulting wastes, while continuing to perform any surveys or other work necessary to accommodate local land use requirements. To facilitate this, the Fort McMurray Working Group will be expanded to include representation from areas of interest south of Great Slave Lake. In addition, a second Working Group will be established, jointly with Indian and Northern Affairs Canada, for representatives from the areas of Great Bear Lake, the Great Bear River and the Sahtu region. It will coordinate the work to be undertaken by the LLRWMO with other projects already being undertaken by Indian and Northern Affairs Canada.

Fort McMurray, Alberta

Cleanup of contaminated sites in Fort McMurray continued in 1995, using the cleanup criteria and waste management plan developed in 1993 by the Fort McMurray Working Group in consultation with the community. The Working Group continues to oversee implementation of the project and consists of representatives from the LLRWMO and their engineering consultant, the Regional Municipality of Wood Buffalo (which includes Fort McMurray), and the Northern Lights Regional Health Centre. In 1995, work focussed on completing verification work at the former Northern Transportation Company Limited (NTCL) landing site in Lowertown and conducting a cleanup at the site of the former Gunnar Mines Landing. Approximately 4,500 m³ of material was cleaned up in 1995, bringing the project total for eight sites to 31,000 m³. Cleanup work is still required at one property owned by CN at Waterways, the first landing site established in Fort McMurray.



Tugs, like the Radium King, towed barges loaded with uranium ore from the mine at Great Bear Lake to Fort McMurray for shipment, by rail, to Port Hope. The ore was often loaded and unloaded prior to being placed on the train, resulting in soil contamination from spills at these transfer locations.

The cleanups in Fort McMurray continue to be conducted such that the inventory of material exceeding the licensable uranium concentration of 500 parts per million (ppm) is separated at the source from mildly contaminated soils. Licensable material is placed in 210 litre drums for transfer to the LLRWMO interim storage facility at Chalk River Laboratories. The remaining mildly contaminated soil is placed in dump trucks for transfer to the disposal cell, which was constructed at the municipal landfill site separate from the municipal waste cell.

The concept of segregating the licensable inventory has resulted so far in about 84 m³ of licensable material, with an average uranium concentration in excess of 1000 ppm, being removed from approximately 31,000 m³ of contaminated soil with an average uranium concentration of about 12 ppm. Licensable inventories are much more difficult and costly to manage than mildly contaminated soil classed as, and treated as, industrial waste. The volume ratio of mildly contaminated soil to the licensable inventory (presently about 400 to 1), and the factor of approximately 100 between the concentrations of the two inventories demonstrates the effectiveness of the approach taken.

Surrey, British Columbia

Approximately 4,000 m³ of contaminated soils and slag exists on two industrial properties in Surrey, BC. The principal radioactive contaminant is thorium, which was contained in niobium ore imported during the 1970s and which remained in the slag following smelting. Cleanup work during the 1980s resulted in the material being placed in interim storage on both sites pending disposal. The LLRWMO contracts annual inspections and maintenance of one of these facilities, the other being the responsibility of the owners.

The Surrey Siting Task Force (SSTF) was established by the Minister of NRCan to locate a disposal site for this material and began preparation of its final report this year. The LLRWMO continued to provide administrative and technical support to the SSTF by assisting with selection of consultants, and by technical review of reports such as that for the environmental assessment of disposal options. In preparation for disposal, the LLRWMO also began developing the cleanup plans for the waste storage facilities.

Non-specific Sites

• Small-Scale Cleanups

In addition to remedial work at the major historic waste sites, the LLRWMO undertakes cleanups of small-scale historic waste occurrences as required. These usually involve buildings used in the past in connection with the radium industry, and include cleanups of old radium dial inventories or small volumes of contaminated soil.

The majority of this remedial work is part of a cooperative program with the AECB to locate and collect inventories of radium-containing materials. These are generally luminous radium dials at premises used, or formerly used, for purposes such as instrument repair shops, aircraft museums and jewellers. In many cases radium contamination,



Concrete, containing uranium ore, was removed from a building in which it had been placed many years ago to provide a radon spa. Radon spas, some of which are still in service, normally used natural mineralization locations.

ranging from minor to widespread, has occurred at these premises. During the year, inspections were made of four sites and a cleanup was conducted at one site resulting in the removal of two cubic meters of waste. The cleanup involved the removal of a concrete floor containing uranium ore which had been installed, by a past owner of a small building, to generate radon for therapeutic purposes.

- *LLRWMO Central Storage Facility*

Wastes from small scale cleanups, and small amounts of AECB-licensable materials from some of the major sites, are transferred to an LLRWMO storage facility located at AECL Chalk River Laboratories. It consists of two metal clad buildings, one constructed in 1984 and the second in 1990, operated as storage warehouses. Concept assessment work was initiated for additional storage capacity. The present method is relatively expensive and alternative concepts, including bulk storage where appropriate, are to be identified and assessed from technical and financial perspectives.

Supporting Technology

The segregation approach developed by the LLRWMO requires the categorization of contaminated materials as clean soil, mildly contaminated soil, or licensable low-level radioactive waste (LLRW) materials. Clean soil has a radium-226 concentration that falls within the normal range of background. All materials that exceed the licensable concentration of the radioactive contaminant must be classified as LLRW. Mildly contaminated soil falls in the region between clean soil and LLRW.

Two technical solutions for performing these classifications have been developed by the LLRWMO. The Large Area Gamma Survey (LAGS) System was developed to produce detailed surface gamma radiation surveys which can distinguish these points in the field. The system was extensively used during the year in Fort McMurray and in Scarborough to determine cleanup boundaries prior to excavation and to verify whether criteria were met following cleanups. The LAGS system is continually being improved to meet present and future requirements.

The Soil Sorting Conveyor System (SSCS), which was initially developed in 1990, was redesigned and rebuilt on a larger scale and, with enhanced detection capabilities, for use during the Malvern Remedial Project. The task included a major quality assurance component to ensure the successful operation of the system. The system operates by passing a stream of soil on a conveyor past sensitive radiation detectors, the output of which is monitored by a computer. The computer triggers a gate to segregate the material based on its gamma radiation. Soil samples are automatically collected for analysis to confirm soil classification. The SSCS processed more than fourteen thousand cubic meters of soil at the Malvern Remedial Project. The LLRWMO now has a complete system available for other projects, as required.

ONGOING WASTES PROGRAM

Ongoing wastes are low-level radioactive wastes (LLRW) which are produced from operational activities of generators who are currently in business. The generators are thus responsible for the management and disposal of these wastes.

The goals of the Ongoing Wastes Program are to provide NRCAN with comprehensive analysis of requirements for disposal services and facilities, and technical assessments and advice related to the development of national policies and strategies for the disposal of these wastes.

During the year, NRCan initiated a consultation process with major stakeholders on a proposed federal policy framework for radioactive waste disposal in Canada. A Discussion Paper entitled "The Development of a Federal Policy Framework for the Disposal of Radioactive Wastes in Canada", was prepared to facilitate the consultation process. The LLRWMO provided technical analyses of factors related to LLRW disposal - as input to, and subsequent comment on, the Discussion Paper. These included both general considerations, and specific assessments of the potential cost savings resulting from an integrated approach to LLRW disposal. In an integrated approach, waste producers would share the costs to site, build, operate and decommission LLRW disposal facilities.

Annual inventory reports on LLRW production and inventories have been produced for the past three years. It was decided that the period between these reports could be extended to two or three years, while still maintaining the most recently published report as an adequate current reference. The analyses performed to support the Discussion Paper also showed that there is a need to extend the waste volume projections to the complete life cycle of existing nuclear facilities, including decommissioning. Previous inventory reports have been based on projections to a given date, typically 2025, which does not extend over the life cycles for all facilities.

INFORMATION PROGRAM



The MRP PLC Chairman discusses project status with local media.

The goals of the Information Program are to provide general information about LLRW management and to carry out communications activities in support of specific historic waste projects.

Communications requirements of the Malvern Remedial Project continued as a major activity for the Information Program. Information was provided through the continued operation of the Malvern Remedial Project Office (MRPO) in a major shopping centre and, during the approximately six month period of excavation and restoration, from a field office within the work area at McClure Crescent. The MRPO provided information directly to visitors and support to the Public Liaison Committee (PLC), a citizens' group which ensured that the public was informed

about progress through newsletters, open houses and other activities. The field office was able to respond quickly to questions and concerns arising from the progress of the excavation and restoration of more than 60 residential properties in the McClure area.

In Port Hope, the LLRWMO continued its sponsorship of an annual essay contest at the high school. The Office also responded to frequent requests for information from the public and the media. Communications activity associated with this year's work in Fort McMurray ensured that local political leaders, the media and the public continued to be informed about the steady progress of this project. The work in Fort Smith along the Northern Transportation Route resulted in stories in both print and broadcast media in the area.

An initiative of the Information Program this year was the production of two videos, one showing work on the Northern Transportation Route and in Fort McMurray and the other describing the Malvern Remedial Project. These videos, using footage taken by project staff, have been used for both public presentations and for familiarization of staff and others with a direct interest in the project.

The preparation of technical papers and their presentation at scientific conferences is another component of the information program. The papers are authored, or co-authored, by LLRWMO staff. Seven papers were published during the year.

Project Management and Administrative Support

The LLRWMO is operated by AECL through a cost-recovery agreement with Natural Resources Canada, the federal department which provides the funding and establishes national policy. Administratively, the LLRWMO operates as a division of the Physical and Environmental Sciences unit of AECL.

The current organizational structure for project management, and for administrative support and services, was established in 1992/93, with minor refinements since then to reflect changing needs. The LLRWMO functions as a small project management-oriented organization as reflected in the organization chart shown in Appendix A.

The National Office is located in Gloucester, Ontario. Technical Program Managers and Senior Project Managers report directly to the LLRWMO Director, and have substantial autonomy within project budgets approved through the Business Plan. Administrative support is provided efficiently through a combination of internal staff for specific functions required on a full-time, dedicated basis and external services provided by other units of AECL on a pro-rated or direct user-pay basis, or purchased directly from external suppliers. Those field support and laboratory services which are provided more economically, or more expeditiously, internally are consolidated through the Field Services Office located in Port Hope (PHFSO). It operates on a cost recovery basis and charges its services at a fully overheaded rate. The PHFSO also provides the same services to other organizations, such as government departments, where appropriate.

The LLRWMO participates in the AECL Environmental Plan and other programs to maintain and improve the quality of its work. The QA program is an important part of compliance with the requirements of the five AECB licenses the LLRWMO holds for sites in Port Hope, and for specific projects and activities.

Five years has elapsed since LLRWMO funding responsibilities were transferred, in 1990/91, from AECL to NRCAN. This was considered by NRCAN as an appropriate time for an audit of LLRWMO financial and management processes and controls as they pertain to NRCAN funded activities. The overall assessment of the audit, conducted by Consulting and Audit Canada, was that the Office is operating in a manner which provides an efficient and effective delivery of its services and that the staff is customer-focussed and committed to satisfying NRCAN's requirements. Several measures for improvements to the Office's operations were also identified by the Audit. These improvements, including those already underway at the time, are targeted for completion by FY 96/97.

FINANCIAL REVIEW

General

Until FY 94/95, funding for the LLRWMO was separately established within the reference level of NRCan, through Treasury Board approval. In FY 95/96, funding was provided directly from the NRCan operating budget.

NRCan transfers funds to AECL through a cost recovery agreement (a Memorandum of Understanding) for the operation of the LLRWMO. The major planning document is the annual Business Plan, submitted by the LLRWMO for approval by NRCan prior to the start of each fiscal year. The Business Plan takes account of changes in priorities which have to be accommodated within the available funding. Adjustments to priorities during the year are accommodated through quarterly progress reviews held between LLRWMO staff and staff of the Uranium and Nuclear Energy Branch of NRCan.

The books of account and the financial control and information system of the LLRWMO are consistent with AECL financial policies and control. They provide reasonable assurance that reliable and accurate financial information is available on a timely basis. The financial statements in this Annual Report present fairly the financial positions and the results of operation of the LLRWMO as of 1996 March 31.

The following paragraphs compare actual expenditures with the Business Plan, and provide a summary of expenditures by major program areas. Appendix B provides additional details on the allocation of costs to major program areas and a comparison to costs during the preceding four years.

Actual Expenditures Compared to Business Plan

In previous years, the LLRWMO funding was grouped under two main types: *core funding* and *project funding*. Core funding activities were those associated with routine operation of the LLRWMO and its committed programs. Project funding activities were those required for waste disposal or interim remedial work at specific major historic waste sites and which usually required substantial funding compared to routine operations. For financial planning and reporting in FY 95/96 (and subsequent FYs), this grouping is no longer used, although it remains possible to redistribute the totals to the old format for comparison. Instead, activities in FY 95/96 were grouped under the three major program areas of the LLRWMO, namely

- Historic Wastes Program
- Ongoing Wastes Program
- Information Program

This grouping reflects the three distinct areas within the mandate of the LLRWMO, and has been adopted in reporting progress in the Operations Review section of the report.

Expenditure planning and tracking within the AECL financial reporting system is based on assigning a work project (WP) number to each major item of expenditure. Table 1 provides a summary of the types of expense with associated work projects (WPs). The types of expense are grouped together following the format mentioned above.

Table 1: Work Project (WP) Numbers & Description of Expenses

LLRWMO Mandates	Program	Description of Expenses (Subprograms/Projects)	WP No.
Resolve historic waste problems that are a federal responsibility	Historic Wastes	<i>Site Specific Historic Waste Projects:</i>	
		- Scarborough	576
		- Port Hope	578
		- Surrey (Siting Task Force)	577
		- Fort McMurray/Northern Transportation Route	200
		<i>Non-Specific Sites Historic Waste Projects</i>	580
		- Generic Studies	
		- Small-Scale Sites Cleanups	
		- Central Waste Storage Facilities (at AECL-CRL)	
Establish, as required, user-pay service for ongoing LLRW disposal	Ongoing Wastes	- Annual Inventory Report	579
		- Technical Assistance to NRCan	
		- Studies and Assessments	
Address general public information needs	Information	- General Public Information	
		- Technical Information	588
		<i>Administrative Management and Support Services ⁽¹⁾</i>	310 ⁽¹⁾
		- Salary Costs for Overhead Activities	
		- Support Services and Facilities	
		- Miscellaneous Expenses, including	
		- Net Balance from Port Hope Field Services Office (WP 562)	
		- Net Balance from Cost Recovery from External Users of Services (WP 558)	

⁽¹⁾ WP 310 collects those charges which are of a general overhead nature. Program management and support services which can be directly attributed to a WP are charged against that WP.

Table 2 provides the financial summary for funding received from NRCan in 1995/96, with a graphical display in Figure 1.

The Business Plan was based on prioritization of projects within an overall funding amount of \$4.0 M from NRCan. This was based on \$2.0 M for the Malvern Remedial Project (MRP) and \$2.0 M for all other LLRWMO expenditures, including \$615 k allocated to the Surrey historic waste project. The MRP was the major project as reflected in its budget allocation; allocations for all other projects except Surrey reflected reductions in NRCan funding resulting from government program review.

The Business Plan also included \$2.9 M in funding estimated from non-NRCan sources, primarily from the Government of Ontario in connection with the cost sharing agreement for the MRP.

Figure 1: Financial Summary for NRCan Funding for 1995/96

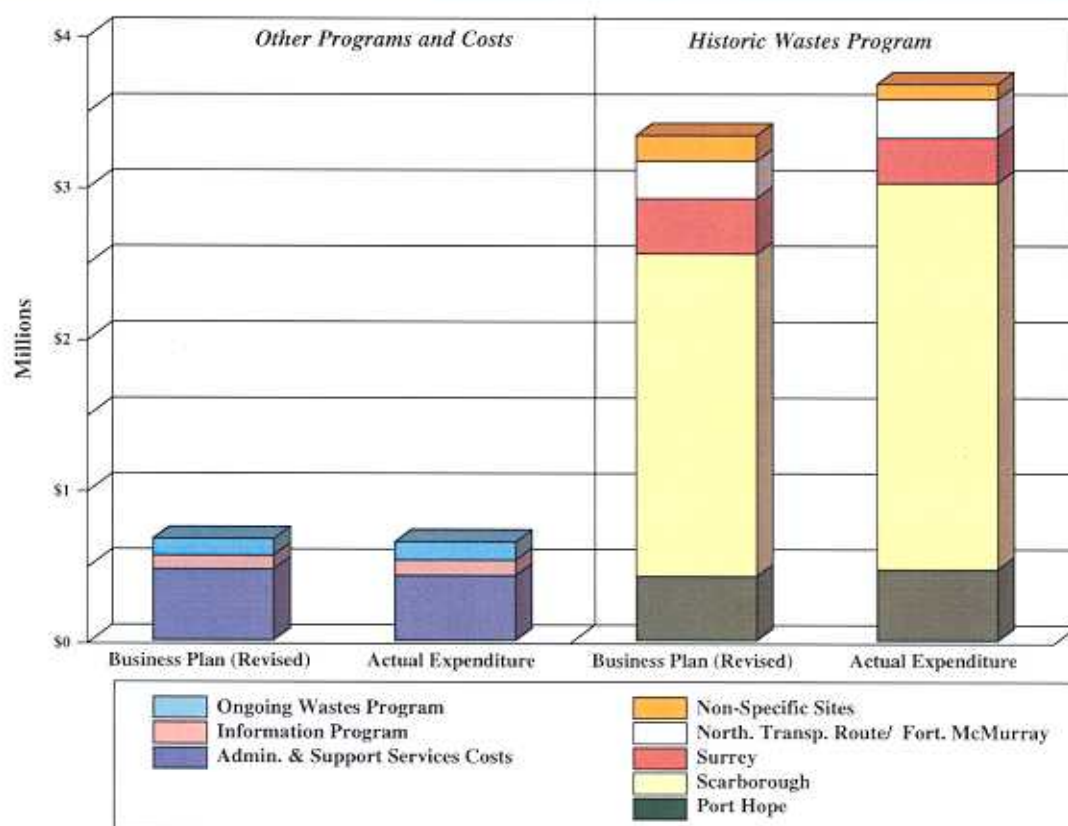


Table 2: 1995/96 Financial Summary for NRCan Funding (\$M)

	WP Code	Business Plan	Business Plan Revision	Actual Expenditure
Historic Wastes Program				
- Scarborough (Malvern Remedial Project)	576	2.000	2.125 0.300 ¹	2.544
- Port Hope	578	0.425	0.425	0.470
- Surrey	577	0.615	0.365	0.301
- Fort McMurray/Northern Transportation Route	200	0.120	0.245	0.252
- Non-Specific Sites	580	0.170	0.170	0.101
Subtotal Historic Wastes Program		3.330	3.630	3.668
Ongoing Wastes Program	579	0.110	0.110	0.122
Information Program	588	0.090	0.090	0.100
Administrative Management & Support Services	310	0.470	0.470	0.429
TOTAL NRCan FUNDING		4.000	4.300	4.319

¹ An additional \$0.3 M was approved for the expanded scope of the Malvern Remedial Project to be offset by a similar reduction in the LLRWMO 1996/97 budget.

The Surrey Siting Task Force (SSTF) advised early in the year that their requirements would be about \$250 k less than originally allocated for their use. This allowed transfer of \$125 k to the Fort McMurray budget so that cleanup of one of the two remaining sites could proceed. The balance of \$125 k was transferred to the MRP budget.

As noted in the Operations Review, the MRP scope included about 40 properties identified during the initial surveys of the McClure Crescent area, and an additional 25 properties, added in 1994. More extensive subsurface zones of contaminated soil were discovered during excavations of the additional properties. The decision was taken to extend the project scope and schedules, since deferral of this work to 1996/97 would have resulted in further increases in costs and a second year of disruption to local residents. Although other MRP costs were collectively less than estimated, the increased scope resulted in an increase of \$544 k to NRCan. About 40% of this amount was available through reduced costs for other LLRWMO projects. As shown in Table 2, these project costs were all generally as estimated and, in total, about \$225 k less than the \$2.0 M allocated in the Business Plan. NRCan funding for 1995/96 was thus increased to \$4.3 M, with the increase of \$0.3 M allocated to the MRP. This will be reflected by an equivalent reduction to the LLRWMO budget for 1996/97.

The actual expenditure was \$4.319 M, with the small difference from the approved budget of \$4.3 M handled as an accounts receivable by AECL for the following year.

Additional funding of \$3.0 M from non-NRCan sources was received in 1995/96. This was primarily from the Government of Ontario for its share of MRP costs. The actual expenditure was \$2.4 M, compared to an original estimate of \$2.6 M. This reflects the fact that, except for the increase noted above, all other MRP costs were maintained within budget, in spite of the increased volume of soil which had to be sorted. The remaining amount (\$0.6 M) resulted from cost sharing with owners of properties on which work took place in Scarborough and in Fort McMurray. Table B2 and Figures B2a and B2b in Appendix B provide additional details on non-NRCan funding.

Overall, the ongoing cooperation between the LLRWMO staff and the Uranium and Nuclear Energy Branch staff of NRCan has resulted in a flexible and cost-effective approach to changes in priorities. Funding from other sources, particularly for the Malvern Remedial Project and the cleanups at Fort McMurray sites, has also been crucial to maintaining progress.

These factors have enabled substantial progress to be made in Scarborough while still allowing the LLRWMO to discharge its responsibilities elsewhere.

Summary of Expenditures by Program Areas

The LLRWMO mandate has three major program areas - *historic wastes*, *ongoing wastes* and *information*. For comparison of expenditures in these program areas, the Administrative Management and Support Services costs of Table 2 (ie. \$429 k) have been allocated to the above program areas on a prorated basis. Table 3 shows a summary of the allocation by program area and is the basis for the graphical summary shown in the Highlights section of this report. Supporting details are contained in Table B3 of Appendix B, including the rationale for prorating.

**Table 3: Summary of 1995/96 LLRWMO Expenditures
of NRCan Funds by Program Areas (\$M)**

Program Areas	WP	Expenditures	Percent
<i>Historic Wastes Program</i>			
- Scarborough (Malvern Remedial Project)	576	2.686	62
- Port Hope	578	0.603	14
- Surrey	577	0.317	07
- Fort McMurray & Northern Transportation Route	200	0.260	06
- Non-Specific Sites	580	0.113	03
Subtotal Historic Waste Program		3.979	92
<i>Ongoing Wastes Program</i>	579	0.212	5
<i>Information Program</i>	588	0.129	3
TOTAL		4.319	100

It can be seen that over 90% of the funds from NRCan were utilized in direct support of historic waste projects, reflecting the consistently high priorities assigned to historic waste cleanups.

APPENDIX A

LLRWMO Organization Chart (as of April 1995)

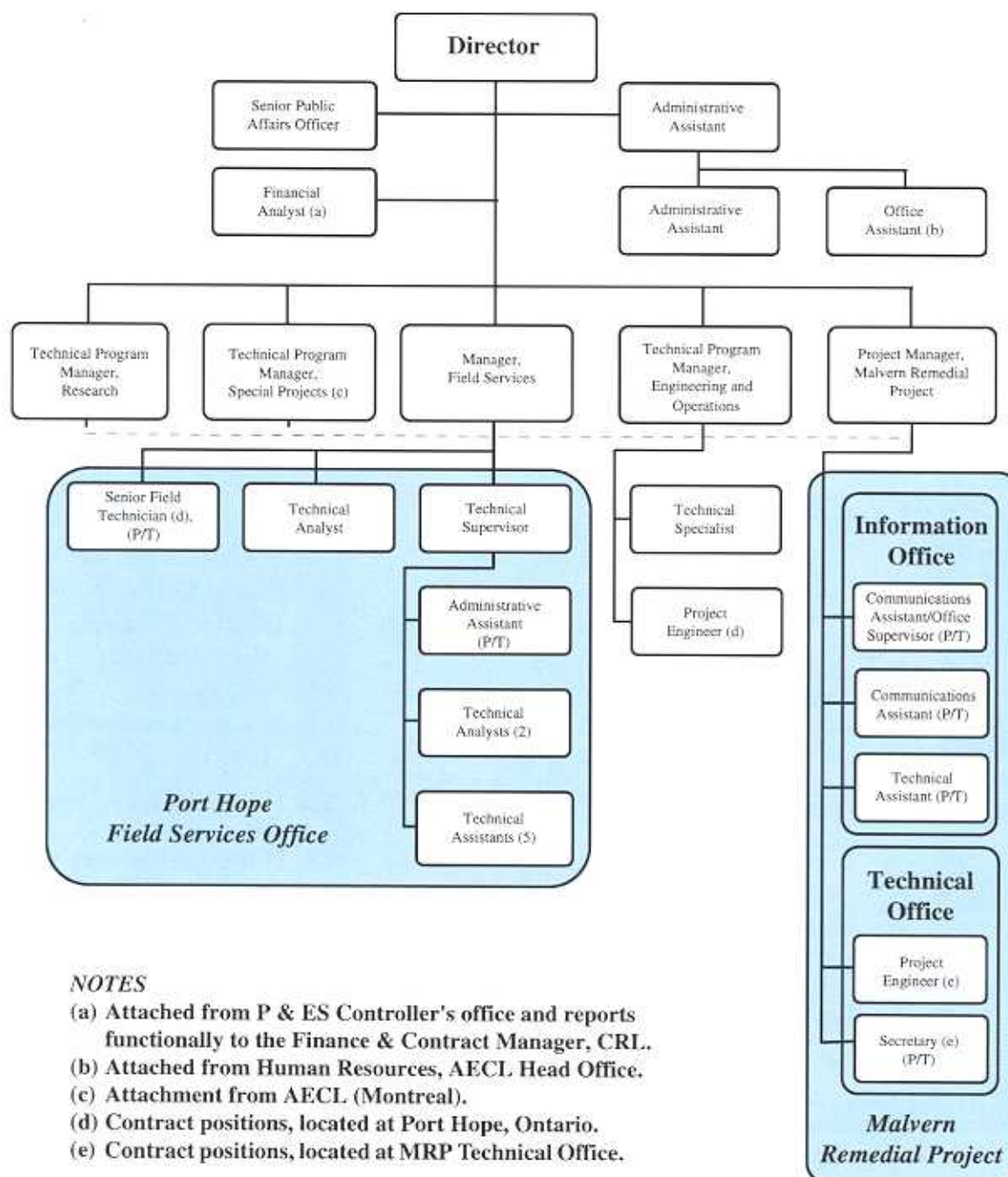


TABLE A1 - LLRWMO Staff List (1995 April)

Location	Position	Incumbent
<i>National Office (Ottawa)</i>		
	Director	R.W. (Bob) Pollock
	Administrative Assistant	L.D. (Lorraine) Delaney
	Administrative Assistant	T.A. (Teena) Valentonis
	Office Assistant ⁽¹⁾	M.I. (Monique) Rhéaume
	Financial Analyst ⁽²⁾	S.E. (Sylvie) Beauchamp
	Sr. Public Affairs Officer	B.J. (Brad) Franklin
	Manager, Field Services	B.A. (Barry) McCallum
	Technical Program Managers, Special Projects ⁽³⁾	P.L. (Pab) De
	Research	D.E. (Dennis) Main
	Engineering & Operations	R.L. (Bob) Zelmer
	Technical Specialist	R.C. (Bob) Barker
<i>Port Hope Field Services Office</i>		
	Technical Analyst	C.H. (Chris) Clement
	Technical Supervisor	M.J. (Mark) Gardiner
	Administrative Assistant (p/t)	S.A. (Sharon) Pickering
	Technical Analyst	D.M.(Dale) Huffman
	Technical Analyst	E.P. (Ted) Rowden
	Technical Assistant	S.L. (Susanne) Ledgard
	Technical Assistant	G.A. (Gina) Arscott
	Technical Assistant	M.J. (Mike) Owen
	Technical Assistant	B.J. (Bo) Malyczewsky
	Technical Assistant	C.L. (Christine) Sauvé
<i>Malvern Remedial Project</i>		
	Project Manager	B.S. (Bhajan) Dosanjh
	Communications Assistant/ Office Supervisor (p/t)	A.M. (Angela) Boorne
	Communications Assistant (p/t)	S. (Sati) Ragbeer

⁽¹⁾ Attached from Human Resources, AECL Head Office⁽²⁾ Attached from P&ES Controller's Office⁽³⁾ Attachment from AECL (Montreal)

APPENDIX B

B1. Comparison of Expenditures to Prior Year Expenditures

Table B1 shows a comparison of actual expenditures against approved funding for the last five years (1991/92 to 1995/96). This is graphically shown in Figure B1.

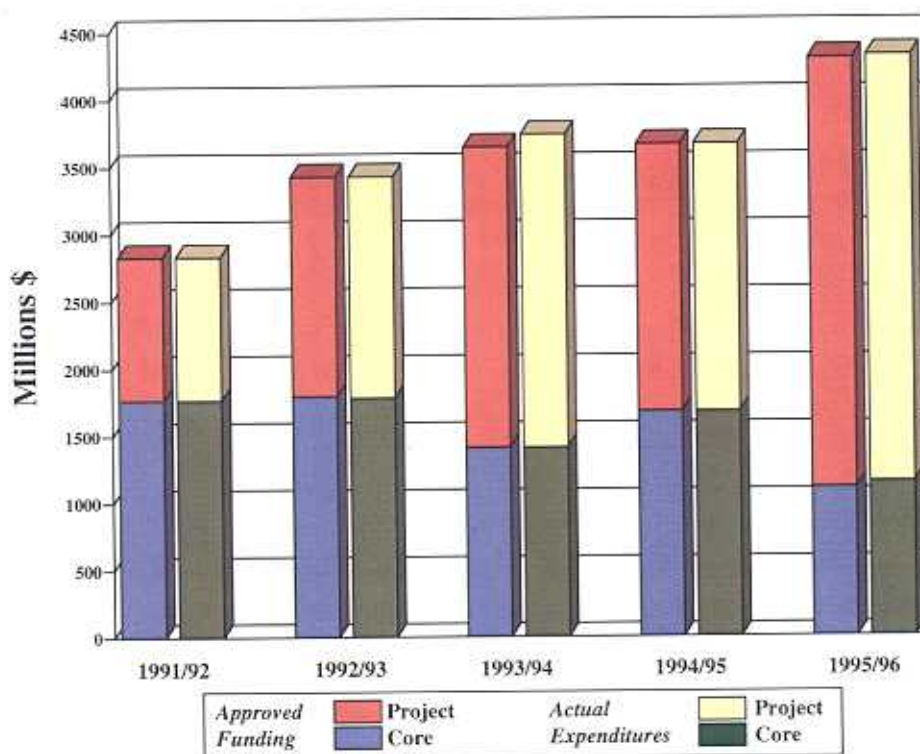
Table B1: Breakdown of LLRWMO Actual Expenditures Versus Approved Funding (1991/92 to 1995/96) (\$k)

	1991/92		1992/93		1993/94		1994/95		1995/96	
	TB*	Actual	TB	Actual	TB	Actual	TB	Actual	NRCan	Actual
Core Funding										
- Staffing & Support Services	866	954	882	945	899	888	916	838	560	529
- Studies & Assessments	400	378	400	287	400	172	400	143	140	154
- Management of Historic Wastes	250	437	250	550	250	352	250	695	405	463
Total Core Funding	1,516	1,769	1,532	1,782	1,549	1,412	1,566	1,677	1,105	1,146
Project Funding										
Historic Waste Disposal/ Interim Remedial Work										
- Port Hope	800	716	800	313	500	64	0	372	195	140
- Surrey	600	244	600	341	0	116	0	197	330	236
- Scarborough	0	103	0	170	1,300	417	1,300	986	2,125	2,544
- Northern Transportation Network/Fort McMurray	0	0	0	822	0	1,728	0	433	245	252
Total Project Funding	1,400	1,063	1,400	1,646	1,800	2,325	1,300	1,987	2,895	3,172
Total Original TB/ NRCan Approval	2,916		2,932		3,349		2,866		4,000	4,319
Subsequent Government- wide Cost Reduction Program	(100)	0	(200)	0	(200)	0	(200)	0	0	0
NRCan - Additional Funding During Year	0	0	700	0	495	0	995	0	300	0
TOTAL APPROVED FUNDING	2,816	2,832	3,432	3,428	3,644	3,737	3,661	3,664	4,300	4,319

* Treasury Board (TB) approval of the five-year funding ended in FY 1994/95

As mentioned in the Financial Review section, until 1994/95 all expenditures were reported under two main categories: *core funding* and *project funding*. Beginning in 1995/96, reporting was lined up to match the three elements of the mandate of the LLRWMO: *Historic Wastes Program*, *Ongoing Wastes Program*, and *Information Program*. However, for the sake of comparison with prior year expenditures in Table B1, the 1995/96 expenditures were redistributed, to the extent practical, to show entries under the previous categories of core funding and project funding.

**Figure B1: LLRWMO Actual Expenditures
Versus Approved Funding (1991/92 to 1995/96)**



It should be noted that core funding costs in FY 95/96 for staffing and support services reduced substantially. This was due to the fact that the LLRWMO National Office staff time which could be reasonably attributed to specific projects was actually charged against those projects, instead of being charged to the LLRWMO overhead account. This provided a fairer picture for both project and overhead costs. Also, core funding previously included two program costs: *Ongoing Wastes Program* and *Information Program*. In addition, it included activities required to meet commitments arising from AECB licenses, legal agreements, and other mandatory needs, which were, since FY 95/96, charged directly to the relevant historic waste projects. All these measures substantially reduced the allocation to core funding activities in FY 95/96.

Except for the MRP, which was a major project, all other project funding activities had modest budgets in 1995/96.

B2. Funding from Non-NRCan Sources for 1995/96

A substantial portion of the cost of some LLRWMO projects is provided by organizations other than NRCan. This additional funding is shown in Table B2 and graphically presented in Figures B2a and B2b.

Table B2: Summary of Expenditures Versus Funding from NRCan and Non-NRCan Sources for 1995/96 (\$M)

	Total Expenditure	F U N D I N G		
		NRCan	Non-NRCan	Total
Historic Wastes Program				
- Scarborough (Malvern Remedial Project)	5.352	2.544	2.424 ¹ 0.384 ²	5.352
- Port Hope	0.470	0.470	0.000	0.470
- Surrey	0.301	0.301	0.000	0.301
- Fort McMurray/Northern Transportation Route	0.455	0.252	0.203 ³	0.455
- Non-Specific Sites	0.101	0.101	0.000	0.101
Subtotal Historic Wastes Program	6.679	3.668	3.011	6.679
Ongoing Wastes Program	0.122	0.122	0.000	0.122
Information Program	0.100	0.100	0.000	0.100
Administrative Management & Support Services	0.438	0.429	0.009 ⁴	0.438
Subtotal	7.339	4.319	3.020	7.339
Accounts Payable to AECL	0.000	(0.019)	0.019	0.000
TOTAL	7.339	4.300	3.039	7.339

Non-NRCan Funding Sources

¹ Government of Ontario - Management Board Secretariat

² Private Property Owners at Scarborough

³ Private Property Owner at Fort McMurray

⁴ Other Cost Recovery Work

Figure B2a: Contribution of NRCan and Non-NRCan Funding to LLRWMO Expenditures for 1995/96

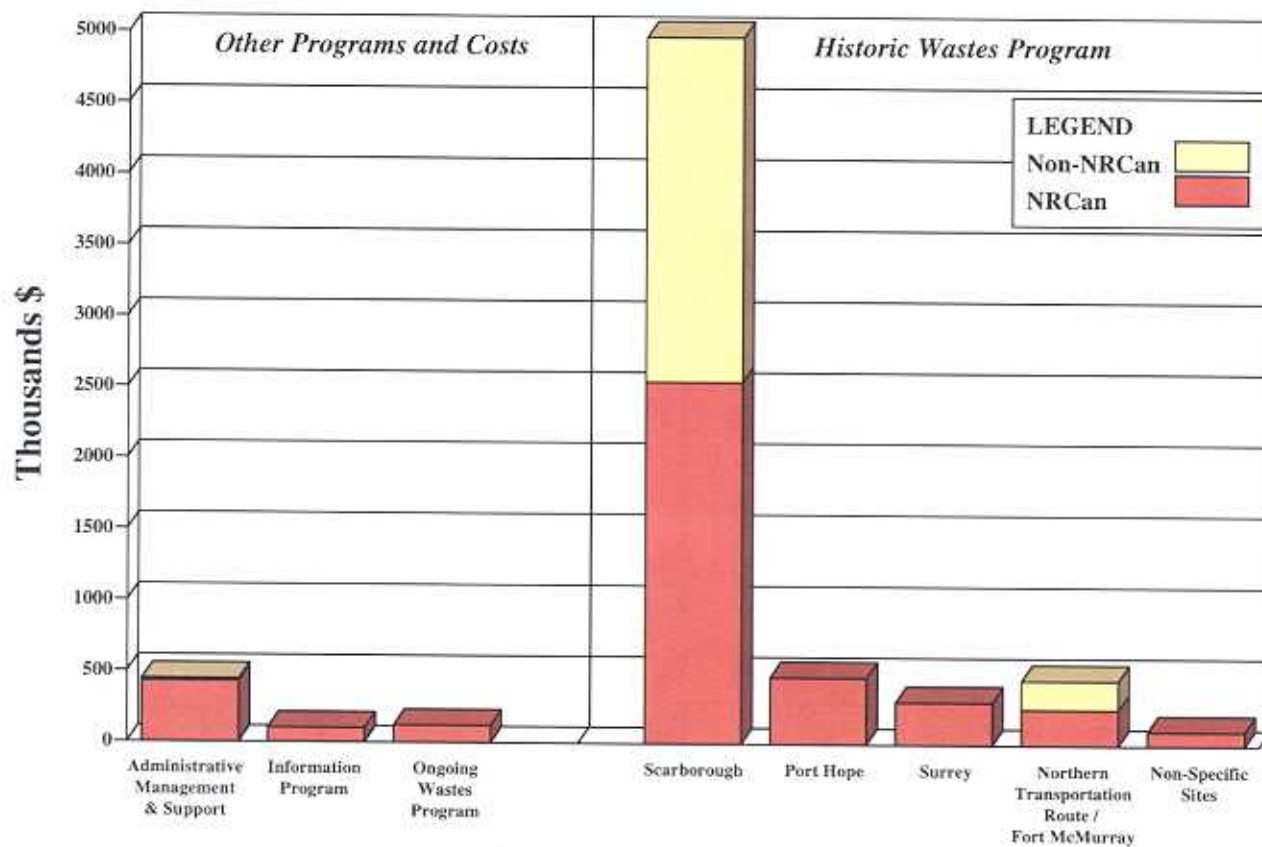
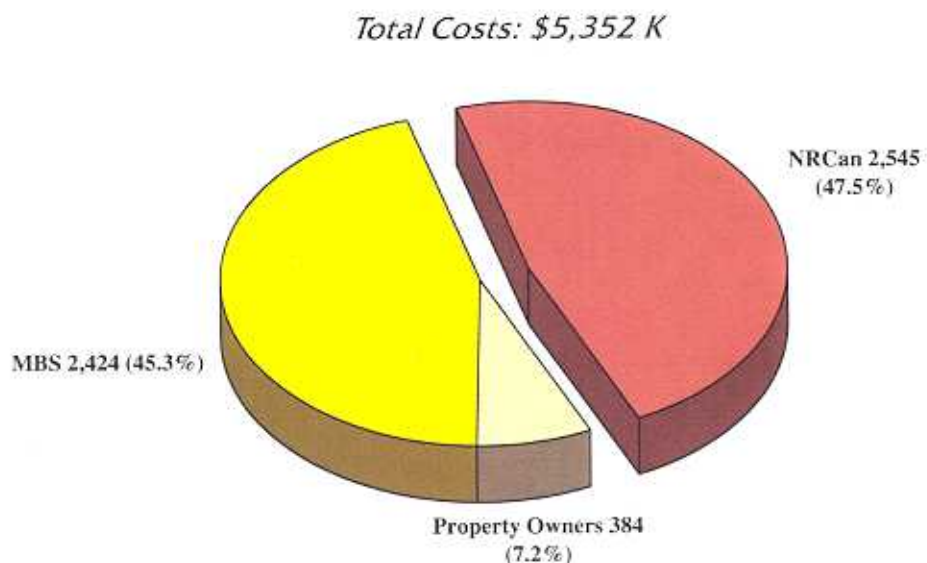


Figure B2b: Funding Contributions for Malvern Remedial Project for 1995/96 (\$k)

In 1995/96, the total expenditure by the LLRWMO was \$7.3 M of which approximately \$3.0 M was provided by non-NRCan sources. The major sources of non-NRCan funding were:

- \$2.4 M from the Management Board Secretariat of Ontario under a cost-sharing agreement between Ontario and Canada covering the Malvern Remedial Project.
- \$0.6 M from private property owners in Malvern and in Fort McMurray. A standard approach exists for the sharing of costs with private owners at historic waste sites.

The Malvern Remedial Project represented about 70% of the LLRWMO expenditures in 1995/96. Figure B2b shows the distribution of these costs. The Ontario and federal government shares were about equal, with a much smaller amount from a private property owner.

B3. Details of Breakdown of Expenditures by the Three Program Areas

Table B3 shows the detailed breakdown of expenditure for the three LLRWMO program areas under two broad categories: project directs and project indirects.

**Table B3: LLRWMO Expenditures of NRCAN Funds
by Major Program Area for 1995/96 (\$M)**

Program Areas	WP Code	Project Directs	Project Indirects Project Mgmt Costs ¹	Overhead ²	Total
Historic Wastes Program					
- Scarborough (Malvern Remedial Project)	576	2.442	0.103	0.141	2.686
- Port Hope	578	0.374	0.096	0.133	0.603
- Surrey	577	0.289	0.012	0.016	0.317
- Fort McMurray/Northern Transportation Route	200	0.246	0.006	0.008	0.260
- Non-Specific Sites	580	0.092	0.009	0.012	0.113
Subtotal Historic Wastes Program		3.444	0.225	0.310	3.979
Ongoing Wastes Program					
Information Program	579	0.057	0.065	0.090	0.212
	588	0.079	0.021	0.029	0.129
TOTAL		3.579³	0.311³	0.429	4.319

¹ Technical program and project management salary costs (WP 310)

² Administrative management and support services non-salary overhead costs (WP 310) distributed to WPs on a prorated basis.

³ Costs incurred by work projects funded by non-NRCAN are not included in this table.

Expenditures through Port Hope Field Services Office sources included in Project Directs.

Project Directs

These are expenditures charged directly to work projects, such as external contracts, Port Hope Field Services Office labour and materials, project management staff time, etc.

Project Indirects

These costs are initially collected within WP 310. These are Administrative Management and Support Services costs incurred through the National Office, as they cannot be attributed to WPs directly. For the purpose of comparison among program areas, these costs are then distributed among WPs on a prorated basis, the basis being the Project Directs Costs.

Project Management Costs

These are labour costs for technical program, project management and administrative personnel at the National Office.

Overhead

These are costs for routine operation of the LLRWMO National Office. They consist of space rental, contribution to AECL overhead, training, computers including software, QA coordination, office supplies, travel for administrative purposes and other miscellaneous costs.