AECL EACL

Annual Performance Report

AECL ANNUAL ENVIRONMENTAL PERFORMANCE REPORT FOR 2005

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(AECL-MISC-387-05)
Revision 0

2007 February

UNRESTRICTED

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Mississauga, Ontario
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EXECUTIVE SUMMARY

This report summarizes the environmental performance of AECL's operations and activities at its Canadian sites during 2005. Operations during 2005 were in compliance with applicable environmental regulations. Audits and assessments conducted during the year revealed that AECL's verification and compliance monitoring programs continue to be adequate, suitable and effective.

AECL continued to work towards continual improvement of its environmental performance and management system in 2005, and to further implement the Environmental Protection Program requirements at the facility and activity level. These activities lead to the successful maintenance of ISO-14001 registration of the Chalk River Laboratories (CRL) Site and a recommended upgrade in the CNSC rating of the site from a C to a B, indicating that the program and its implementation meet CNSC requirements and is improving based on a CNSC Type I EMS Inspection of CRL.

AECL completed the assessment of the environmental aspects, and their significance related to operations and activities at the CRL, Sheridan Park (SP), and Whiteshell Laboratories (WL) sites. Similar effort at AECL's shut down facilities continues. Based upon these assessments, updated environmental objectives and targets have been developed and incorporated into AECL's Environmental Plan for 2006-2007 and CRL and WL Environmental Protection Program Indexes (EnvPPI).

The Environmental and Effluent Verification (Compliance) Monitoring Programs at all AECL sites continued to be effective and demonstrated that all air and liquid emissions comply with legal limits.

Radioactive emissions from AECL sites and facilities were monitored and remained below applicable Derived Release Limits (DRLs) in 2005. The sum of the average airborne weekly releases of all radionuclides from all monitored sources at the CRL site was 11.2% of the DRL, a value slightly below the 5-year average of 12.3% of the DRL. Emissions of argon-41 to the atmosphere from the CRL site remained the dominant radioactive emission from AECL sites, averaging 8.89% of the DRL (argon-41 DRL for the CRL site is 2.93E+15 Bq/wk), but below the 5-year average of 10.4% of the DRL. Emissions of mixed fission product noble gases from the Mo-99 Production Facility decreased by a small amount, averaging 1.98% of the DRL. All of the other airborne and liquid emissions were much lower.

Emissions of non-radioactive substances from AECL sites and facilities were monitored or estimated. Airborne emissions of acid gases at CRL, mainly from combustion of oil for building heating, were in line with the previous 5-year average in the case of Nitrous Oxide (NOx), but significantly less in the case of Sulphur Oxide (SOx) as a result of a decrease in fuel oil sulphur content. The WL value was comparable to the previous 5-year average. Emissions of greenhouse gases were comparable to the previous 5-year average.

Non-radioactive liquid emissions, including the mean effluent temperature rise of process water,

remained comparable with previous years. The number of times parameter concentrations exceeded AECL monthly guidelines (48 exceedances at WL and 30 exceedances at CRL) are trending towards achieving the benchmark of zero exceedances by 2015. Waste Treatment Centre (WTC) effluents from CRL periodically exceeded AECL daily guidelines for mercury again in 2005, however, the concentrations and overall mercury loading from the site decreased in 2005 compared to the previous four years.

An Ecological Effects Review (EER), completed in 2004 (see Section 2.3.5.3), concluded that based on benchmark values, there were no observable effects on populations of the most sensitive species on site as a result of releases from the Chalk River site, and the recommendations from that study for further monitoring and performance improvement in selected areas are now being implemented. (See the 2005-06 Environmental Plan for details.)

Solid radioactive wastes generated at AECL sites, as well as wastes received from external sources, continued to be stored safely in waste management facilities at the sites in accordance with AECL site licences. The CRL site continued to generate and store the largest quantities of radioactive waste. The volume in 2005 was consistent with that generated in 1999 through 2004. Waste diversion programs associated with the operation of the Waste Management Areas at CRL, designed to minimize the quantities of low-level solid waste, operated efficiently in 2005.

The total volume of high-level liquid waste generated at AECL and added to current interim tank storage inventories remained small in 2005. Treatment provision for all low-level liquid wastes prior to discharge has been achieved for CRL, but not for WL. Efficient operation of the CRL Waste Treatment Centre, designed to treat Low Level Liquid Wastes (LLLW) prior to discharge to the Ottawa River, continued in 2005. At WL, monitoring programs are in place to ensure that these wastes are below radioactive release criteria prior to discharge. Inventories of medium, high-level, and organic liquid radioactive wastes continued to be safely stored.

Recycling programs for minimizing quantities of non-radioactive wastes requiring disposal, and programs for collection and disposal of hazardous non-radioactive wastes at approved off-site facilities, operated successfully during the year.

In 2004 November, CNSC staff indicated that CRL's longstanding practise of placing sewage sludge directly into Waste Management Area "C" was no longer acceptable and should be halted immediately. CRL complied with the request. The sewage sludge is currently being dewatered and surface stored in above ground containers in WMA-C. This temporary storage arrangement has been approved by the CNSC.

The CNSC staff has accepted that the sludge generated at CRL meets the Ontario Ministry of Environment (MOE) Regulation 347's definition of non-hazardous, except with respect to radioactivity. The CNSC concluded the sewage sludge could not be declared non-radioactive, notwithstanding the CH2M Hill assessment indicating it meets the IAEA guidelines. However, CNSC also concluded that the proposal to construct a landfill site, based on the MOE design, should go forward as the appropriate means to dispose of the sludge.

A proposed permanent landfill structure designed to meet the most rigorous landfill design standards developed in Ontario MOE, *General Waste Management*, Environmental Protection Act Regulation 347 and *Guideline on the Regulatory and Approval Requirements for New or Expanding Landfill Sites*, Provincial Act Regulation 232/98 will include the design of an engineered double-lined landfill with a leachate collection system.

A proposed site and an alternate for this landfill were selected for technical assessment in 2005 using a formalized Site Selection Process conducted by a multi-disciplinary team. The preferred location is a wooded greenfield area of over 80 000 m^2 at the CRL site, South of WMA C. Construction and commissioning of the landfill is proposed for FY 2007/2008. It is anticipated that the landfill will be ready to accept dewatered sewage sludge prior to the end of FY 2007/08, however this is dependent on resolving the licensing conditions.

Inventories of ozone-depleting substances (ODSs) and PCBs in waste storage and in use continued to be well managed, and reduced where possible through phase-out programs. While inventories have remained relatively constant over the past several years, work continued at all sites towards achieving the target of eliminating all ODSs at AECL by 2020.

Quantities of chlorine used for water treatment at CRL in 2005 were consistent with previous years, as a result of earlier improvements made to the chlorination process used at the sanitary wastewater treatment facility. At WL, chlorine use to disinfect the domestic potable water supply was also consistent with previous years.

Energy consumption at AECL sites remained relatively constant compared with previous years, partly as a result of continued efficient operation of the new heating boilers in the CRL Power House, and other energy improvements implemented in recent years. The intensity value (i.e. per unit floor area) has remained relatively constant over the past several years, with the value for 2005 slightly above the 5-year average.

In 2005, there were 64 environmental-related incidents logged for CRL and three for WL. There were no environmental incidents for SP, Gentilly-1 Waste Management Facility, the Nuclear Power Demonstration Waste Management Facility, the Douglas Point Waste Management Facility, or the areas under surveillance of and monitored by the Low Level Radioactive Waste Management Office (LLRWMO).

All environmental incidents at both WL and CRL, which were reported as being environmental-related, were investigated as required, mitigated when possible, and corrective actions implemented when needed in order to prevent the recurrence of similar incidents. Of the 64 reported at CRL, Event Notification Forms (ENFs) were generated for 49, and the remaining 15 were reported using other reporting mechanisms. A total of 11 incidents were reportable to external regulators (eight being Halocarbon releases reported semi-annually under the FHR; the other three being reported to the CNSC). The actual impacts to the environment had ratings of none or negligible with the exception of one incident which had an actual rating of minor. The potential impacts to the environment ranged from a potential of none to a single incident with a potential impact rating of major.

In addition to these events, there was one warning of an alleged violation of the Federal Halocarbon Regulations (FHR) at SP. Environment Canada's Emergencies & Enforcement Division inspected the SP site in 2005 May. Proper records were not readily at hand to show that a leak test had been conducted at least once every 12 months for the air conditioning system. Although a contractor maintained the equipment in question, AECL is obliged under the Federal Halocarbon Regulations to retain such records on-site with the equipment.

Planning for facility and site decommissioning and for remediation of contaminated areas on AECL sites progressed. Three existing radioactive groundwater plume-interception systems at CRL continued to operate effectively. Decommissioning Plans are in place for all facilities, including the CRL site, as required by the CNSC. A decommissioning licence for the WL site was granted by the CNSC effective 2003 January 1; it received successful interim (2-year) review by the Regulator in 2005 May.

AECL communicated regularly with the public regarding environmental issues related to operations and activities at its sites through a variety of methods, including meetings with local community officials, public meetings and displays, internet websites, and various media stories. The AECL Speaker's Bureau was re-established to facilitate and organize presentations on the nuclear industry upon request from interested groups within the community.

1. INTRODUCTION

1.1 AECL Sites in Canada

AECL was established in 1952 as a Canadian Crown corporation, reporting to the Parliament of Canada through the Minister of Natural Resources. AECL develops, markets, and manages the construction of CANDU® power reactors, produces medical isotopes, performs associated research and development, carries out underlying reactor research, supplies CANDU and light water reactor (LWR) support services, and offers radioactive waste management products and services.

AECL owned or operated numerous sites throughout Canada in 2005, including office and engineering sites, research sites, sites of decommissioned nuclear facilities, and sites for interim storage of historic low level radioactive wastes.

AECL's head office site is located in the Sheridan Park Research Community in Mississauga, Ontario. The Sheridan Park (SP) site also includes engineering offices and facilities, and an engineering laboratory. The laboratory operates in accordance with prescribed substance, and radioisotope licences issued by the Canadian Nuclear Safety Commission (CNSC).

The largest and most diverse AECL site is the Chalk River Laboratories (CRL) research site at Chalk River, Ontario, including associated engineering offices in Deep River, Ontario. A second large site is the Whiteshell Laboratories (WL) at Pinawa, Manitoba. The site is undergoing decommissioning. Both these sites contain numerous nuclear and non-nuclear research and support facilities, and are operated or decommissioned in accordance with licences issued by the CNSC.

The Underground Research Laboratory (URL), located near the Whiteshell Laboratories, has been used to conduct geotechnical research into the concept of waste disposal in deep geological formations, as part of the Nuclear Fuel Waste Management Program (NFWMP). No radioactive wastes have been stored in this facility; it is currently also undergoing shutdown and early phases of decommissioning. The site is leased from the Province of Manitoba and operates in accordance with the Manitoba Mines Act.

AECL maintains the sites of several shutdown nuclear facilities, including the former Nuclear Power Demonstration (NPD) site at Rolphton, Ontario, the Douglas Point (DP) site at Tiverton, Ontario, and the Gentilly-1 (G-1) site at Gentilly, Québec. These sites are maintained in a "shutdown with surveillance" state in accordance with waste management facility operating licences issued by the CNSC. Agreement was reached with the CNSC that action levels were not warranted for the off-site facilities. Interim end-state reports and storage with surveillance plans for NPD were approved by the CNSC and comments received for the G-1 documents. Preliminary decommissioning plans for G-1 and NPD were submitted to the CNSC.

AECL uses the site of the decommissioned heavy-water plant at LaPrade, near Bécancour, Québec, for storage of some heavy water under a CNSC prescribed-substance licence.

AECL's Low-Level Radioactive Waste Management Office (LLRWMO) carries out assessments and cleanups of various sites contaminated with historic waste on behalf of Natural Resources Canada. In conjunction with these activities, the LLRWMO operated and maintained several sites for the management of the resulting low-level radioactive wastes. Pending establishment of permanent disposal facilities, the LLRWMO has a license for the "Pine Street Extension" Temporary Storage Site (this site is still receiving materials when found). Licenses are also in place for the "Pine Street Extension" Consolidation Site, the "Strachan Street" Consolidation Site, and the "Sewage Treatment Plant" Temporary Storage Site (these three sites are closed to the receipt of any new materials; LLRWMO does monitoring at these sites only). In addition, the LLRWMO has a license for Historic Waste Remediation Operations, which allows the office to take possession of LLRW accumulations at other locations across Canada. Two additional licenses permit the LLRWMO to operate laboratory and analytical equipment.

It should be noted that the LLRWMO operates under an independent agreement between the AECL CEO and NRCan. This agreement (1982) established the LLRWMO as a distinct unit of AECL to manage low-level radioactive wastes on behalf of the federal government and allows LLRWMO to operate independently of AECL's other roles.

2. ENVIRONMENTAL MANAGEMENT SYSTEM

2.1 AECL's Environment Policy

The Environment Policy, issued under the authority of the AECL Board of Directors, states AECL's commitment to protecting the environment, and establishes the overall principles and goals for environmental responsibility and performance expected of the organization, its managers and employees.

The following statements are taken from AECL's Environment Policy:

- "We practice responsible environmental management.
- We are committed to the principle of pollution prevention.
- We set environmental objectives and targets to support continual improvement of our environmental performance.
- We comply with environmental laws, requirements, and recognized standards and guidelines applicable to our activities.
- We review the impacts of our activities, facilities, projects, services and products on the environment.
- We meet all applicable environmental requirements of our customers.
- We will seek to develop and improve technologies to advance environmental protection and clean air solutions.

- We promote public and employee awareness of this policy."

Additional requirements and expectations of the Board of Directors include the production of an annual environmental plan, incorporating environmental objectives, targets and performance indicators for achieving continual improvement in environmental performance at AECL sites in Canada, and regular reporting by AECL management to a Sub-Committee of the Board of Directors on the implementation of the environmental policy and progress against the annual environmental plan.

2.2 Environmental Management in AECL

Overall accountability for environmental protection within AECL lies with the AECL Board of Directors. During 2005, the Board continued to fulfil its responsibilities through a subcommittee receiving and reviewing AECL management's reports on implementation of the Policy, resolution of identified issues, and progress against environmental plans during 2005.

The AECL Safety Review Committee (SRC), an internal committee independent of line management, reviews and approves, on behalf of the AECL President and Chief Executive Officer, the acceptability of proposed and existing facilities and activities at AECL's Canadian sites with respect to protection of the environment, health and safety.

The Chief Environmental Officer and Senior Environmental Committee continue their mandate to ensure implementation of AECL's Environment Policy, ensure coordination of AECL's response to regulatory requirements on environmental performance, and to ensure fulfilment and continual review of AECL's environmental responsibilities. The Chief Environmental Officer chairs the Senior Environmental Committee.

2.3 Environmental Management at AECL's Sites

2.3.1 Program Responsibility

Functional responsibility for development and maintenance of the environmental management system, processes and procedures that implement the AECL Environment Policy within AECL's Canadian sites lies with the AECL Environmental Protection (EnvP) Program, one of several company wide programs as defined by the AECL Management Manual.

Executive Authority responsibility for the Environmental Protection Program lies with the Vice President, AECL Nuclear Laboratories Business Unit (NLBU). Functional responsibility for developing, maintaining and implementing the Environmental Protection Program, as Program Authority, is with the Director, Safety and Environment Division (SED), within the Facilities and Nuclear Operations (FNO) unit of NLBU. The Environmental Panel consists of the General Managers and Vice President of the NLBU, the Program Authority and Program Manager, and is chaired by the General Manager of FNO. The Environmental Panel has general responsibility for recommending environmental protection policies and priorities, and reviewing environmental

performance within AECL sites, and setting strategic objectives and targets. The Panel approves the Annual Environmental Plan that communicates the environmental objectives and targets and lists the actions planned to address these objectives and targets during the year.

The need for additional resources within the EnvP Program was identified by the CNSC in their audit of the program in 2002 November. To determine resources required for mature program operation, a formal Staffing Needs Analysis exercise was completed in 2003 November. Part 1 of the Staffing Needs Analysis, which outlines the resource needs of the EnvP Program Staff, was completed and submitted to the CNSC in 2004 October. Part 2 of the Staffing Needs Analysis, addressing the facility/field resources necessary to respond to the EnvP Program process requirements, was completed in 2005 June and submitted to CNSC staff late in the year.

In 2005 September, one additional EnvP Program staff was hired for a one-year term position at CRL for a total of five staff members, and further hiring is underway. Disposition of the recommendations identified in Part 2 of the Staffing Needs Analysis, including further hiring, is also underway.

2.3.2 AECL's Environmental Protection Program

The EnvP Program and Environmental Management System (EMS) requirements, responsibilities, processes and procedures are defined in the AECL EnvP Program Manual, RC-2000-021. During 2005, efforts continued towards implementation of the Program within AECL sites, and continued implementation and improvement of the EMS, with the intent of achieving greater conformance with the ISO-14001 standard at AECL sites in Canada, and achieving registration to the standard for the CRL site. Successful ISO-14001 registration for the CRL site was achieved in 2004 April. An ISO 14001:2004 Surveillance Audit was conducted there by Quality Management Institute (QMI), on 2005 June 23, 24 and 27-30, to evaluate the "suitability, adequacy and effectiveness of the organization's Management System in meeting the requirements of the ISO-14001:2004 standard and the company's Management System Documentation, for the declared scope of registration." All of the applicable requirements of the ISO-14001:2004 standard were audited and were considered to be adequately implemented.

The auditors identified a total of 12 opportunities for improvement (OFIs). Of the 12 OFIs, two were proposed closed in 2005. The remaining 10 OFIs have actions scheduled for completion in 2006.

Environmental objectives and targets for 2005, and key actions planned to achieve the objectives and targets, were documented in the Environmental Plan for AECL Sites in Canada 2005/06. The following table summarizes AECL's strategic environmental objectives and shows the status of key actions captured under the respective objectives. Actions considered include both routine and one-time actions. No changes to the definition of AECL's strategic environmental objectives were made in 2005.

Table 1: AECL's Strategic Environmental Objectives and Key Actions

Objectives	No. of Actions	Average % Complete of Actions as of 2005 December (3Q)[1]
Prevent environmental degradation	3	48%
Provide responsible environmental management	12	58%
Demonstrate environmental compliance	14	68%
Provide improvement on environmental protection systems and technology	39	47%

To 2005 December 31, of the 68 actions outlined in the Environmental Plan for 2005/06, 12% of the actions are 100% complete, 75% are progressing but remain open, and 13% were deferred due to unavailability of funding or lower priority ratings compared to other actions.

The EnvP Program Performance Model, developed in 2003, documented AECL's four strategic environmental goals in alignment with the Environment Policy:

- Prevent Environmental Protection degradation (including Prevent Pollution);
- Provide responsible Environmental Protection management;
- Demonstrate compliance to Environmental Protection legislation and regulations; and
- Provide improvement of Environmental Protection systems and technology.

The EnvP Program Performance Index (EnvPPI) was developed for the CRL site and included in the 2003/4, 2004/5, 2005/6 Environmental Plan. The EnvPPI consists of four sub-indices, one for each strategic environmental goal: the Environmental Performance Sub-Index (EnvPI), the Environmental Management Sub-Index (EnvPMI), the Environmental Compliance Sub-Index (EnvPCI), and the Environmental Systems and Technology Improvement Sub-Index (EnvPSTI). Each sub-index identifies detailed objectives to be achieved by 2015 and specific 2005 targets to achieve those long-term objectives. This report focuses primarily on the performance against specific targets and objectives in the EnvPI. During 2004, a similar index was developed for the WL site, consisting of an EnvPI and EnvPMI only. It was fully implemented and maintained in 2005. Future endeavours in the EnvP PI will include continued work on the development of WL EnvP-CI and EnvP-STI sub-indexes, a further refinement of the definitions of performance based on operational experience, and development of the indexes for other AECL sites.

[1] The Environmental Plan is for the fiscal year 2005/2006. Table 1 summarizes the status of 3Q 2005/2006.

2.3.3 2005 Environmental Protection Program Initiatives

Various environmental improvement initiatives were completed in 2005, which support AECL's commitment to continual improvement in environmental performance:

- B240 TK1. Since 2005 June, the Reactor Drains portion of the active drain system has been used to transfer waste liquid from NRU directly to the Holding Tank Facility. The Building 240 Tank 1 has been out of routine operation since June.
- Successful maintenance of registration of the CRL site to the "ISO-14001:2004" standard for Environmental Management Systems (EMS).
- A total of 34 EnvP Program training sessions were delivered in 2005 to a wide cross-section of AECL employees at CRL, SP, and WL.
- The preliminary decommissioning plan was completed for all listed facilities at CRL, and the CRL site.

2.3.4 Environmental Aspects

During 2005, as part of the continuing implementation and improvement of the EMS, and maintenance of ISO-14001 registration for the CRL site[2], AECL continued to actively monitor and evaluate the significance of environmental aspects associated with its facilities and activities, and identify and document the operational controls of identified Significant Environmental Aspects (SEAs).

AECL completed the initial identification and significance evaluation of environmental aspects associated with all operations and activities of facilities and activity groups at the CRL site in 2003. However, taking into consideration the requirement for annual review of the environmental aspect assessments, the over-all status of environmental aspect assessment by the end of 2005 was 93% up-to-date. At the end of 2005, 88% of operational control information for SEAs was also collected and documented. The quality of this data is also improving over time, and work continued in 2005 on developing a more user-friendly database.

The Environmental Aspect Assessment reports for WL were completed in 2005 December. There are a total of 18 SEAs identified for WL. The assessment of environmental aspects for SP was ongoing as of 2005 December. SP identified three activity groups with a total of six SEAs. The assessment of environmental aspects for the three off-site decommissioning facilities is ongoing.

[2] Registration of the CRL site to the ISO-14001:1996 Standard for Environmental Management Systems was first achieved in 2004 May.

2.3.5 Environmental Performance & Compliance Assessments and Reviews

2.3.5.1 Audits

In 2005 the following Audits and Assessments were conducted:

- AECL CRL Internal EMS Audit conducted by an external management consulting firm, 2005 March 28 to April 1
- ISO 14001:2004 Surveillance Audit conducted by Quality Management Institute (QMI) at CRL, 2005 June 23 to 30
- CNSC Type I Inspection of CRL's EnvP Program, 2005 October 31 to November 4
- CNSC Type II Augmented Environmental Compliance Inspection of NRU Reactor, 2005 September 27 to 30
- WL EnvP Program gap analysis, 2006 January, by an external management consulting firm
- LLRWMO – An AECL Internal Audit was conducted in 2005 September, and QMI conducted an annual surveillance audit in 2005 December

These audits and assessments conducted in 2005 revealed that AECL is maintaining its environmental performance in compliance with applicable legal and other requirements, and taking positive steps to ensure that all AECL sites are headed for the successful implementation of a revised EMS. As noted previously the external audit of the EnvP Program for CRL by the CNSC put forward the recommendation that the overall rating for the EnvP Program be upgraded from the C-rating, which was assigned in the 2002 audit, to a B-rating, indicating that the program meets CNSC's requirements, and is improving. The implementation of the program remained at the same B-rating it was assigned during the 2002 audit.

Progress made on actions resulting from audits and assessments conducted in previous years shows improvements in the process of identifying environmental objectives and targets, and in developing environmental plans, internal communications, environmental awareness training, and assessments of environmental impacts as a result of AECL activities.

2.3.5.2 Environmental Assessments

AECL carries out Environmental Assessments pursuant to the Canadian Environmental Assessment Act (CEAA) of proposed new or modified facilities and activities. Environmental Assessments and reviews are undertaken:

1. To meet requirements of the CEAA;
2. To secure regulatory approval for the projects; and,
3. For compliance with the AECL policy on protection of the environment.

Environmental Assessments (EA) are invoked through regulatory approvals required for projects to proceed. CNSC as the Responsible Authority is responsible for the conduct of the EA's. Staff determines regulatory approval EA requirements. In 2005, EA Screenings were in progress for ten projects at the CRL site. AECL provides technical studies in the form of EA Study Reports and public consultation in support of the EA's. A brief overview of the status of these EA's follows.

DECOMMISSIONING OF SHUTDOWN FACILITIES (Six Projects)

Environmental Assessment Screening for Decommissioning of the 204A/B/Fuel Storage Bays: CNSC has accepted AECL's EA Study Report. A CNSC EA decision is anticipated in 2006.

Environmental Assessment Screening for Decommissioning of the Heavy Water Upgrading Plant: CNSC has accepted AECL's EA Study Report. A CNSC EA decision will follow.

Environmental Assessment for Decommissioning of the Pool Test Reactor: AECL has issued the EA Study Report to the CNSC for review.

Environmental Assessment Screenings for Decommissioning of Plutonium Recovery Laboratory (Bldg 220), the Plutonium Tower (Bldg 223) and the Waste Water Evaporator (Bldg 228): The CNSC has approved EA Guidelines for these projects. AECL will be preparing EA Study Reports for the projects.

WASTE REMEDIATION INITIATIVES (Two Projects)

Environmental Assessment Screening for the Proposed Construction and Operation of a Liquid Waste Storage System by Atomic Energy of Canada at Chalk River Laboratories: The project will provide a new Storage System designed and constructed to modern standards for intermediate and high level radioactive liquid wastes stored at CRL. The CNSC has accepted AECL's EA Study Report. A CNSC EA decision is anticipated in 2006.

Environmental Assessment Screening for the Fuel Package and Storage Project: The project will stabilize older metal fuels currently stored in tile holes and provide a new storage system for these fuels. CNSC has approved EA Guidelines for these projects. AECL has begun preparation of the EA Study Report.

RESEARCH AND OPERATIONS FACILITIES (Two Projects)

Environmental Assessment Screening Report for the Continued Operation of the NRU Reactor: The CNSC Commission made an EA Decision in August 2005 that the continued operation of NRU taking into taking into account mitigation measures, is not likely to cause significant adverse environmental effects.

Environmental Assessment screening for the Shielded Modular Above Ground Storage Facility: The project will increase by approximately a factor of two the storage capacity for low level solid wastes at CRL's Waste Management Area 'H'. CNSC has accepted AECL's EA Study Report. A CNSC EA decision is anticipated in 2006.

2.3.5.3 Ecological Effects Review – Follow-Up

The final report detailing an Ecological Effects Review (EER) of the CRL site, which quantified the potential ecological effects of all present and past CRL activities and operations, was completed in 2004 and issued in 2005 January. The EER was conducted based upon available ecological risk assessment guidance from the Canadian Council of Ministers of the Environment (CCME 1996) and the U.S. Environmental Protection Agency (EPA 1998).

The EER report outlined a total of ten recommendations, all of which were included in the 2005-06 and 2006–07 Environmental Plans.

The implementation of the recommendations complements the current CRL monitoring programs and will serve to guide, as appropriate, a review of the programs.

3. ENVIRONMENTAL PERFORMANCE

As described in Section 2, performance of the EnvP Program is evaluated and measured against key targets. Specific targets for AECL sites for 2005 were specified in the Environmental (performance) Sub-Index (EnvPI). Wherever possible and where applicable, the performance against these targets for the 2005 calendar year has been included in this report, and further details are provided in Appendix B and C.

3.1 Emissions to the Environment

AECL's Environment Policy states that the Company will set objectives and targets to support continual improvement of our environmental performance. To this end, and as a condition of the site operating licenses, emissions to the environment are continuously monitored and controlled.

3.1.1 Emissions of Radioactive Substances

3.1.1.1 General

In 2005 as in previous years, radioactive emissions from AECL sites and facilities have been regulated by the CNSC, through site-specific Derived Release Limits (DRLs) that are the legal upper bounds for releases to the environment. The DRLs are calculated using environmental pathway modelling, and are set such that a continuous release of any radionuclide at a rate less than the DRL would result in exposures at the public dose limit, 1 mSv in a year[3].

[3] The public dose limit of 1 mSv in a year came into effect in 2000 with the new Nuclear Safety and Control Act.

To ensure compliance with regulatory and AECL EnvP Program requirements, both airborne and liquid effluents from AECL sites and facilities that potentially contain radioactive contaminants are monitored. During 2005, there were no radioactive emissions from AECL sites or facilities in excess of regulatory limits.

3.1.1.2 Airborne Emissions

Table 2 summarizes radioactive emissions in airborne effluents from the CRL, WL and NPD sites during 2005, along with values for the five previous years for comparison. The releases are given as the sum of emissions from all sources and all radionuclides for each site, and are expressed as a percentage of the DRLs in effect during 2005. Radioactive emissions from other AECL sites were negligible. The 2005 target for the CRL and WL sites described in the EnvP Program Index (EnvPPI), specifically the Environmental (Performance) Index (EnvPI) for radioactive emissions to air under normal operating conditions, was 12.6 %DRL for CRL and 0.005 %DRL for WL. These targets were met.

Table 2: Radioactive Airborne Emissions From AECL Sites 2000 to 2005

SITE	Total Airborne Emissions as % DRL						
	2000	2001	2002	2003	2004	5-yr average	2005
CRL*	13.8	9.5	14.9	10.3	12.8	12.3	11.2
WL**	0.00083	0.0021	0.0021	0.0016	0.00072	0.00147	0.00076
NPD***	0.00008	0.0020	0.0014	0.0029	0.00017	0.00131	0.00014

Notes: * The DRLs used for CRL are those in effect as of 2000 November 01.
** The DRLs used for WL are those in effect as of 2002 January 01.
*** The DRLs in use at NPD from 1999 to 2003 were based on the old public dose limit of 5 mSv/a. The DRLs accepted by the CNSC in 2003 were implemented in 2004.

In 2005, the CRL site continued to account for the majority of airborne radioactive effluents from AECL. All emissions of radioactive material in CRL airborne effluents during 2005 were below regulatory limits, as expressed by the DRLs, and below the regulatory Action Levels. The sum of the average airborne weekly releases of all radionuclides from all monitored sources was 11.2% of the DRL. This was a decrease compared with 2004, and the average for the past five years of 12.3 % of the DRL. Figure 1 illustrates the releases of radionuclides in airborne effluents from CRL for 2005 and the past five years.

Emissions of argon-41[4] from the NRU/DIF stack continued to be the most significant radioactive releases from the CRL site, averaging 8.89% of the DRL compared to an average for the

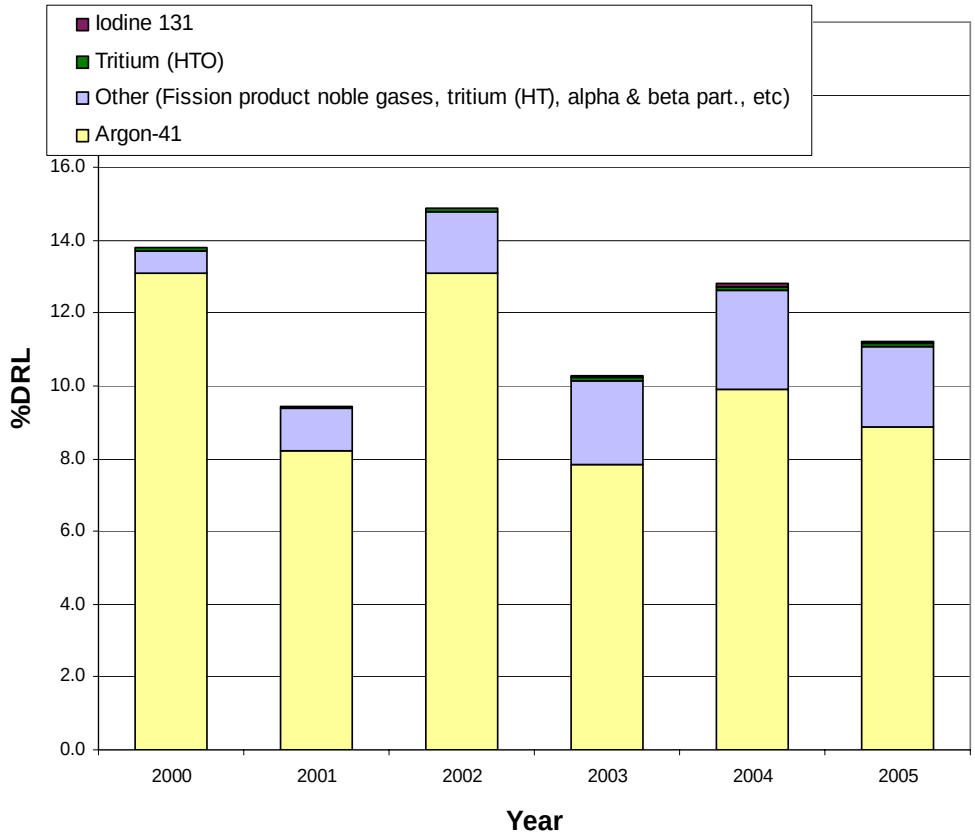
[4] Argon-41 is a relatively short-lived (half life 1.8 h) noble gas produced by irradiation of natural argon in air within the NRU reactor structure, for example, in the graphite thermal column, experimental beam holes and J-rod annulus.

previous five years of 10.4% of the DRL.

Argon-41 is produced by irradiation of air within the reactor structure. An ALARA study of Argon-41 emissions was completed in 2004 and introduced several options to reduce Argon-41 emissions; the options identified all involve significant design modifications and cost. The study also demonstrated that some of the current systems to maintain Argon-41 emissions to a minimum (e.g. the CO2 system that is used to exclude air from the J-rod annulus immediately surrounding the reactor core, which was upgraded in the 1990s) are operating effectively. Four of the options identified in the ALARA study were included as target actions in the 2005-2006 Environmental Plan.

Releases of mixed fission product noble gases from the molybdenum-99 medical isotope production process decreased by a small amount, averaging 1.98% of the DRL; in 2003 the value was 2.64% of the DRL. Decreased emissions from the Molybdenum-99 Production Facility were attributed to a variety of factors, including quantity and timing of isotope requirements for certain periods. The requirement to solidify (cement) high-level radioactive wastes from the process, since the Fissile Solution Storage Tank, which normally receives these wastes was near its approved maximum capacity, continued throughout 2005. Releases of Iodine-125 averaged 0.014% of the DRL in 2005, an increase compared with the 2004 value of 0.0017% of the DRL, but well below the regulatory limit of 100% of the DRL. The main contributor to these emissions continued to be the Iodine-125 medical isotope production facility in the NRU.

Releases of other monitored nuclides or parameters remained comparable with the past four to five years' levels.



NOTE: The DRL for cesium-137 has been used for calculation of gross beta particulate releases as of 2000.

Figure 1: Radionuclides in CRL Airborne Effluents (2000-2005)

The Whiteshell Laboratories routine Effluent and Environmental Monitoring programs were maintained in 2005. Total radioactive airborne emissions from the WL site during 2005 averaged 0.00076 % of the applicable Derived Release Limits (DRLs). This is below the previous 5-year average value of 0.0015%. There were no individual releases of significance.

3.1.1.3 Liquid Emissions

Table 3 summarizes radioactive emissions in liquid effluents from the CRL, WL, NPD and DP sites during 2005, along with values for the five previous years for comparison. The releases are given as the sum of emissions from all sources and all radionuclides for each site, and are expressed as a percentage of the DRLs in effect during 2005. Radioactive emissions from other AECL sites were negligible in 2005. These releases are also illustrated in Figure 2. The target

for the CRL and WL sites described in the EnvPI, for the 'emissions to water' under normal operating conditions, was 0.20% of the DRL and 0.020% of the DRL, respectively.

Table 3: Radioactive Liquid Emissions From AECL Sites 2000 to 2005

SITE	Total Liquid Site Emissions as % DRL						
	2000	**2001**	**2002**	**2003**	**2004**	**5-year average**	**2005**
CRL*	0.16	0.22	0.21	0.19	0.26	0.21	0.26
WL**	0.022	0.012	0.012	0.013	0.016	0.015	0.014
NPD***	0.01	0.06	0.024	0.020	0.002	0.033	0.0014
DP****	0	0.01	0.015	0.015	0.0012	0.008	0.0042

Notes: * The DRLs used for CRL are those in effect as of 2000 November 01. Data do not include releases of groundwater from CRL Controlled Area 2.
** The DRLs used for WL are those in effect as of 2002 January 01.
*** The DRLs currently in use for NPD are based on the old public dose limit of 5 mSv/a. New DRLs were approved by the CNSC in 2003 and implemented in 2004.
**** DRL values used for Douglas Pt are old DRLs in effect while the reactor was operating, and based on the old public dose limit of 5mSv/a. New DRLs were approved in 2004 September.

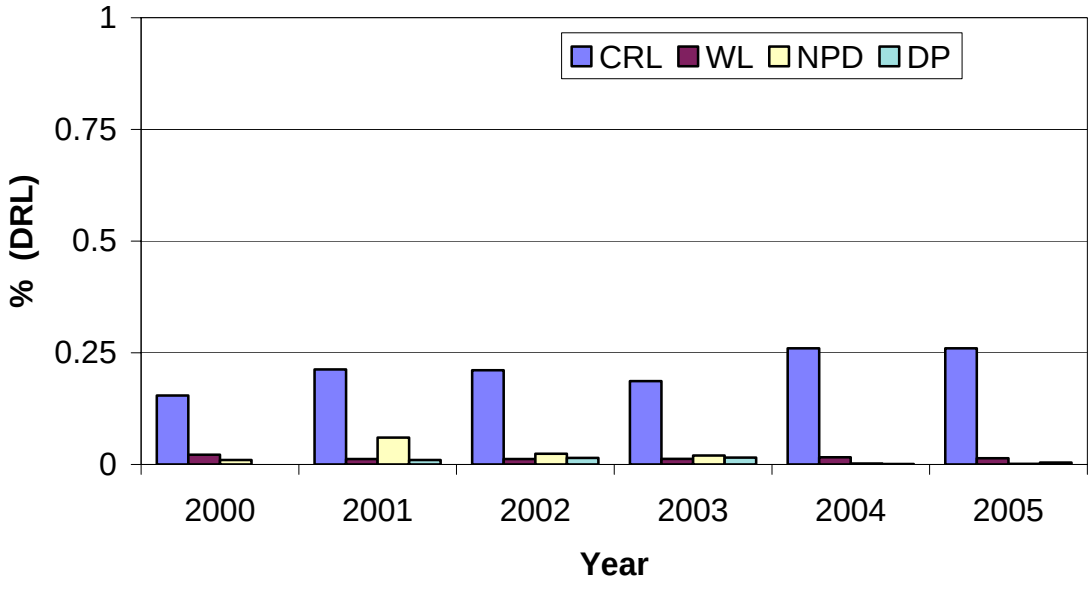


Figure 2: Radioactive Liquid Releases From AECL Sites (2000-2005)

In 2005, the CRL site continued to account for the majority of liquid radioactive effluents from AECL sites. A more detailed breakdown of CRL liquid effluent emissions for the current and

past five years is illustrated in Figure 3.

All radioactive liquid effluent emissions from CRL in 2005 were small fractions of the respective DRLs for each parameter monitored. Average monthly releases totalled 0.26% of the DRL, indicating no change from 2004 and a slight increase compared to the past five years' average of 0.21% of the DRL. The CRL Process Sewer that discharges decontaminated wastewater from the Waste Treatment Centre and some process cooling and sump waters to the Ottawa River was the major contributor. The releases averaged 0.21% of the DRL. Compared with the respective DRLs, the most significant nuclide in the Process Sewer releases in 2005 was phosphorus-32, averaging 0.11% of the DRL. Phosphorus-32 and other short-lived activation products were detected during the period between September and December. They are attributed to once through cooling of defueled NRU experimental loop test sections with Ottawa River water, resulting in activation of the cooling water during passage through the in-reactor segment of the loop. Tritium releases from the Process Sewer averaged 0.0014% of the DRL, a decrease compared to 2004 and to the average for the previous five years.

Releases from CRL liquid effluent streams discharging directly to the Ottawa River, other than the Process Sewer, averaged 0.01% of the DRL, a value consistent with that in previous years.

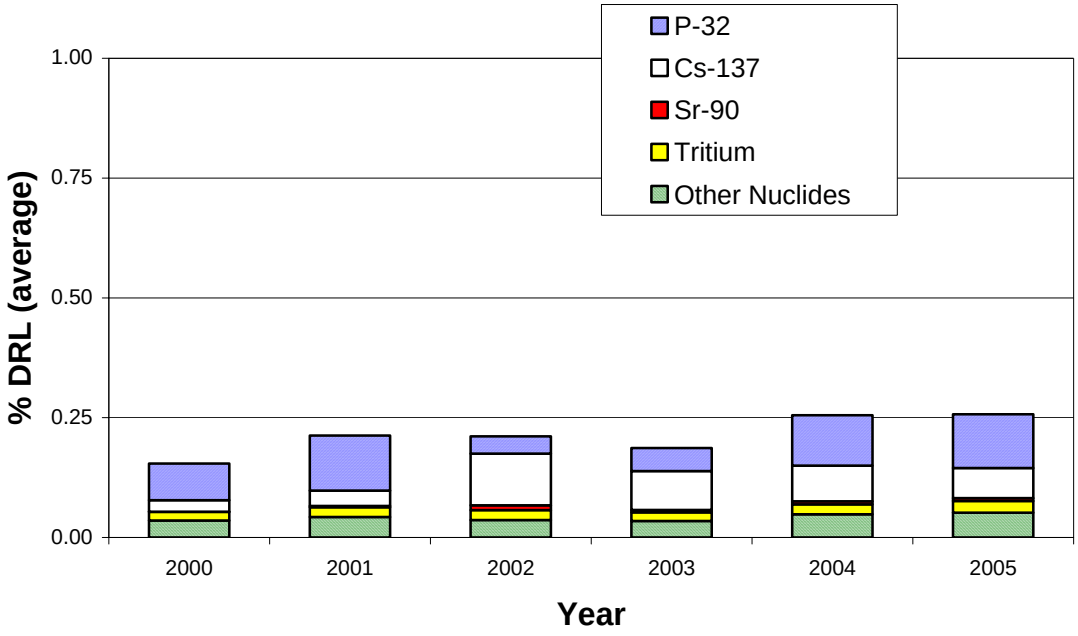


Figure 3: Summary of Radionuclides in CRL Liquid Effluents (2000 – 2005)

For WL, the sum of average monthly releases of all monitored parameters was about 0.014% of the DRL in 2005. Cesium-137 was the most abundant isotope emitted from the outfall and sewage lagoon, averaging 0.009% and 0.0001% of the DRL, respectively (see Figure 4).

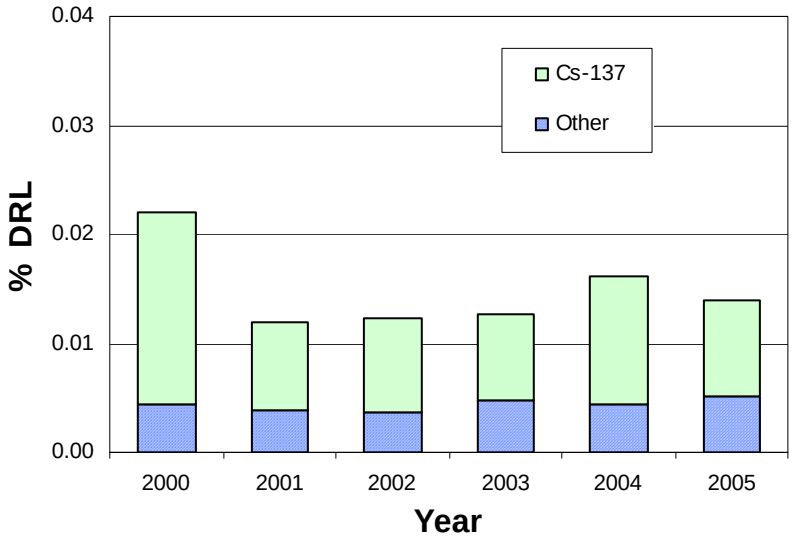


Figure 4: Summary of Radionuclides in WL Liquid Effluents (2000 – 2005) % DRL (average)

3.1.1.4 Monitoring of Radioactivity in the Environment

In addition to monitoring of effluents released from the sites, AECL continued to maintain extensive programs to monitor radioactivity in the environment at and around the major licensed sites, CRL and WL, to verify effluent monitoring results. Monitoring included, for example, measurement of ambient gamma radiation, as well as sampling and analysis of drinking water, air, milk, fish, garden produce, and beach/river sediments. The results of the environmental monitoring continued to confirm that radiation doses resulting from AECL operations were below the regulatory dose limit for members of the public, 1 mSv per year, and below the typical background dose from natural radiation in Canada (see Table 4).

At CRL, the highest dose to the public (0.078 mSv) continued to be due to external exposure to radioactive noble gases (mainly argon-41) from the NRU reactor operations, and the second highest from consumption of meat of game animals that have had historical access to water and vegetation in swamps and streams adjacent to the CRL Waste Management Areas (WMAs) (0.012 mSv). In 2005, the calculated maximum dose from game animal meat ingestion decreased rather significantly, mainly because of comparatively higher tritium contamination in three animals found close to the WMAs in 2004. Both of these contributions stem from historical factors rather than the current practices, i.e. old reactor design and past waste management practices at the WMAs. Steps continue to be taken aimed at reducing argon-41 production to the extent possible. In addition, those areas of the swamps and streams that can give rise to concentrations of man-made radionuclides in game animals have now been fenced

thus preventing future access by large game animals (e.g. deer and moose).

At WL, monitoring of potential liquid effluent exposure pathways has confirmed small but measurable contributions from operations/decommissioning activities of cesium-137 and strontium-90. These appear in WL downstream concentrations in Winnipeg River water, fish and garden produce. Radioactive contaminants in Winnipeg River water remained very small fractions of allowable levels defined in the Canadian Drinking Water Standard. The sum of the average monthly releases of all monitored parameters was about 0.014% of the DRL in 2005.

Monitoring of potential atmospheric effluent exposure pathways did not indicate any measurable dose contributions from the WL site activities in excess of natural background levels. This is also consistent with effluent monitoring results, which indicated that airborne emissions were very small ($<1 \times 10^{-5}$ mSv/a).

The 2005 environmental monitoring results correlate with the operational and decommissioning activities that were conducted during the current year and previous years.

The estimated dose (0.0016 mSv/a) to the most exposed members of the public due to radioactivity in WL effluents, based on the environmental monitoring results, was very small compared with the regulatory public dose limit (< 0.2%), and with doses to the Canadian public from natural background radiation (< 0.06%). The contributors to the total dose are near the detection levels and therefore have a relatively high uncertainty, so caution must be used in any interpretations of the data. However, it does appear that the decommissioning operations conducted in 2005 did result in a small but measurable increase in the dose to members of the public.

Table 4: Total Estimated Doses to Critical Groups at CRL and WL Based on Environmental Monitoring – 1999 - 2005

Site	**CRL**		**WL***	
Effluent Pathways	Airborne	Liquid	Airborne*	Liquid
Critical Group	Infant living at Upriver Boundary	Adult living Downstream	Infant living at Boundary	Adult living Downstream
2005 Total Effective Dose (mSv/a):	0.086	0.018	0.000008	0.0016
– as % of annual public dose limit, 1 mSv	8.6	1.8	0.60	0.16
– as % of typical average background radiation dose in Canada	2.7	0.6	0.40	0.051
2004 Total Effective Dose (mSv/a)	0.075	0.045	0.000007	0.00037
2003 Total Effective Dose (mSv/a)	0.098	0.021	0.000009	0.00078
2002 Total Effective Dose (mSv/a)	0.100	0.033	0.000008	0.00061
2001 Total Effective Dose (mSv/a)	0.073	0.100	0.000020	0.00096
2000 Total Effective Dose (mSv/a)	0.101	0.054	0.000008	0.00083

- DRLs for the WL site were revised in March 2001 and approved for use in 2002 January. The revised document (RC-2303) states that the critical group for airborne DRLs consists of adults and infants at the boundary and, as such, data in this table have been revised to reflect the new values. (The DRLs used for CRL are those in effect as of 2000 November 01).
- *Data corrected for error in release factor (See Section 3.1.1.2)

3.1.2 Emissions of Non-Radioactive Substances

3.1.2.1 Airborne Emissions

3.1.2.1.1 Acid Gas Emissions

The main non-radioactive airborne emissions from stationary sources at AECL sites are combustion products that result from the burning of fuel oil to produce steam and hot water for heating and process uses at CRL and WL. Additionally, some emissions of nitrogen oxides (NO_x) are emitted from the use of propane for heating in some remote locations at both sites. Total estimated emissions of NO_x and sulphur oxides (SO_x) for these research sites are given in Table 5 and compared to previous years' emissions. The estimated emissions for the past five years are also illustrated in Figure 5.

The NO_x emissions for CRL shown in Table 5 are based on emission factors determined through direct measurements of stack emissions following installation of new boilers in the CRL Power House. The NO_x emissions for WL and for previous years at CRL were estimated using the US-EPA [5] emission factors for the particular type of fuel and boiler design.

The SO_x emission estimates in Table 5 for both CRL and WL are calculated using the US-EPA emission factors, based on the sulphur content of each fuel.

Commencing in 2002, under the National Pollutants Release Inventory (NPRI) program, Criteria Air Contaminants (CACs) arising from the burning of fuels are to be reported to Environment Canada, provided the emissions exceed specific threshold limits. CACs consist of Carbon Monoxide (CO), oxides of sulphur and nitrogen (SO_x and NO_x), Total Particulate Matter (TPM), Particulate Matter below 10 microns (PM_{10}), Particulate Matter below 2.5 microns ($PM_{2.5}$), and Volatile Organic Compounds (VOCs). The amounts are calculated from fuel consumption data using recommended emission factors. In 2005, CRL's SO_x, NO_x, PM_{10} and $PM_{2.5}$ emissions were above the threshold limits and therefore reported to the NPRI program. They were all below threshold for WL. Data for CAC emissions are included in Table 5.

[5] US Environmental Protection Agency, *Compilation of Air Pollutant Emission Factors, Vol 1: Stationary Point and Area Sources,* AP-42, 5th Edition (1996).

Table 5: Acid Gas Emissions from CRL and WL Site Heating Boilers and Propane Use

Site	Emission	Total Annual Emissions (tonnes)						
		2000	2001	2002	2003	2004	5-year average	2005
CRL	NO_x	57*	51*	55.6	55.5	59.4	55.7	57.5
	SO_x	389**	348**	250	246	260	299	214
	CO	-	-	6.15	6.33	6.61	-	6.35
	TPM	-	-	18.5	18.3	19.6	-	19.2
	PM_{10}	-	-	16.0	15.8	16.9	-	16.4
	$PM_{2.5}$	-	-	10.4	10.3	11.0	-	10.6
	VOC	-	-	0.370	0.373	0.396	-	0.457
	HDD	4745	4313	4601	4890	4864	4683	4864
WL	NO_x[2]	11.1	10.0	10.6	10.4	10.6	10.5	9.9
	SO_x***	3.3	2.9	3.1	3.1	3.1	3.1	2.9
	CO	-	-	2.2	2.2	2.2	-	2.1
	TPM	-	-	0.88	0.87	0.88	-	0.83
	PM_{10}	-	-	0.44	0.43	0.44	-	0.41
	$PM_{2.5}$	-	-	0.11	0.11	0.11	-	0.10
	VOC	-	-	0.09	0.09	0.09	-	0.08
	HDD	5611.6	5311.5	5750.0	5369.6	6215.9	5651.7	5369.3

Notes: * With the installation of the new boilers, starting in CY 2000, emissions of NO_x for CRL are based on emission factors calculated from stack measurements on each boiler. All other emissions are estimated using the US-EPA emission factors given in AP-42.

** SO_x estimates based on sulphur content specification of <2%. In 2002, 2003, 2004 and 2005 the actual content of S in the fuel was measured to be 1.34%, 1.32%, 1.30%, and 1.11%, respectively.

*** Estimates of SO_x emissions are based on the specified maximum sulphur content in the #2 fuel of 0.05% by wt.

[1] Value corrected from 2003 report.

[2] NOx values for WL were recalculated in 2004 using a new emission factor for #2 Fuel Oil (changed from 20 to 24 lb/1000 US gal).

HDD – Heating Degree Days for normalization of data.

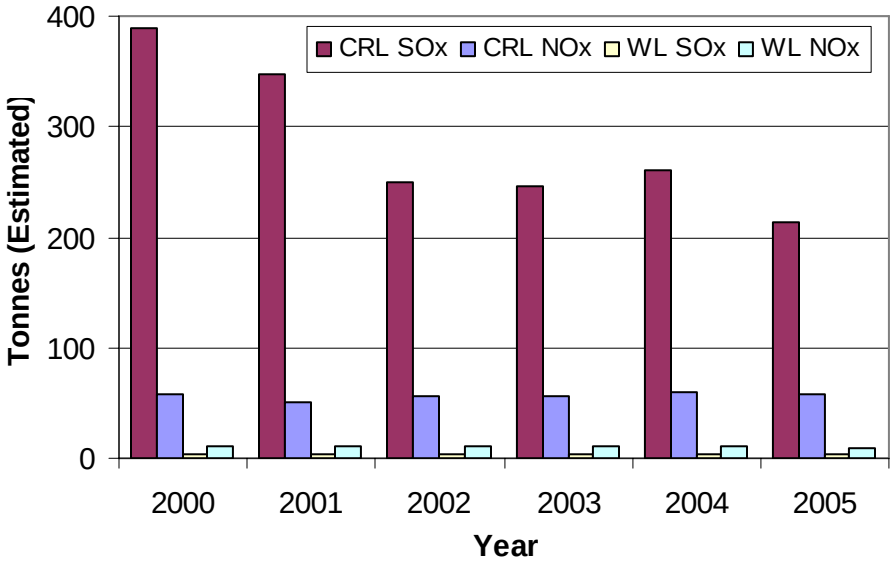


Figure 5: Acid Gas Emissions for CRL and WL (2000 – 2005)

The use of the US EPA emission factors for estimating emissions commenced with the 2001 Annual Environmental Performance Report. As a result, the estimates for 2000 in Table 5 were revised at that time using the same method for consistency. The target for CRL and WL sites specified in the 2005 EnvPI, for the combined emissions of NO_x and SO_x under normal operating conditions, was 320 tonnes and 11.5 tonnes, respectively. The combined emissions of NO_x and SO_x for CRL and WL sites were 272 tonnes and 12.8 tonnes, respectively, which were less than the past 5-year averages, with the CRL site below the 2005 target. Emissions of SO_x decreased at CRL in 2005, due to lower sulphur content in the fuel oil and less fuel oil consumed.

3.1.2.1.2 Greenhouse Gas Emissions

Operation of the industrial heating boilers and use of propane for heating in remote areas at CRL and WL also represents the major source of CO_2 emissions from AECL sites. Estimates of CO_2 emissions from these sources in 2005 and the five previous years are shown in Table 6, and are illustrated in Figure 6. For both sites, emissions were estimated using the US-EPA emission factors (see previous section). The CO_2 emissions for the CRL and WL sites were 31,500 tonnes and 9,210 tonnes, respectively. The actual emissions were slightly above the 5-year averages and 2005 targets for CRL, but below for WL (due partly to a milder than usual winter in Manitoba).

Table 6: Estimated Carbon Dioxide Emissions* from CRL and WL Site Heating Boilers and Propane Use

Site	Emission	Total Annual Emissions (tonnes)						
		2000	2001	2002	2003	2004	5-year average	2005
CRL	CO_2	31,100	27,800	30,300	31,700	32,800	30,500	31,500
WL	CO_2	10,270	9,310	9,850	9,680	9,840	9,790	9,210

Note: * Emissions were estimated using the US-EPA AP-42 emission factor of 70.3 kg/GJ for #6 fuel oil, 35.2 kg/GJ for propane, and 69.1 kg/GJ for #2 fuel oil.

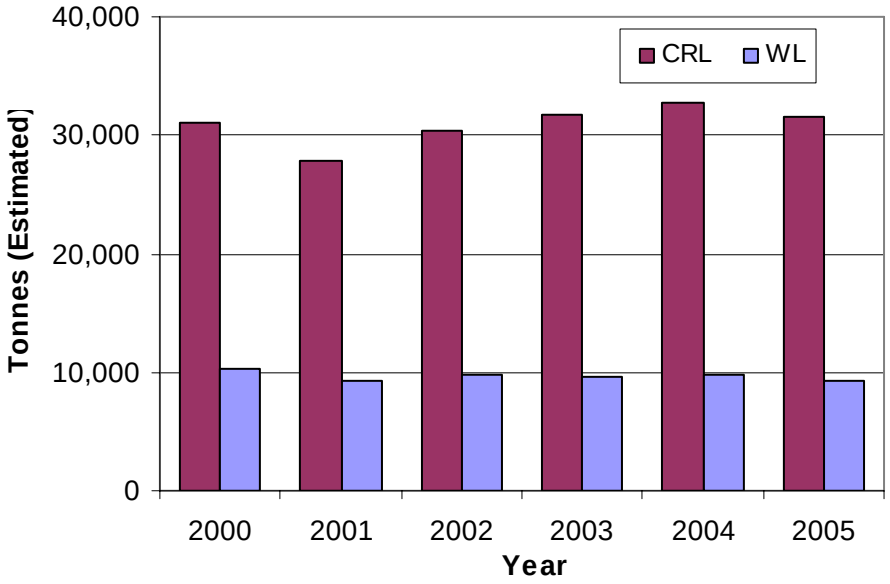


Figure 6: Carbon Dioxide Emissions (2000 - 2005)

Emissions of halocarbons due to losses from various systems at AECL sites are given in Table 7. The relative global warming potentials and ozone depleting potentials of these substances and the calculated CO_2 equivalents are also shown in Table 7. Data for CRL from the previous five years, as well as the current year, are included in Table 7.

There was a loss of Halons (97 kg) at WL in 2002. At other sites, there have been no emissions in the past five years. Halons are still being used in some fire suppression systems, however plans are in progress to replace all such systems at CRL by 2008. HFC (R-134a) emissions are heavily influenced by the refilling requirements of the thermal hydraulics loop, which has an inventory that can vary between 4,500 and 6,000 kg, depending on the piping configuration. The loop is typically refilled in approximately 800 kg increments, but because the loop did not require refilling in 2005, emissions of R-134a are nil for that year. It should be noted that R-134a has no Ozone Depleting Potential and a relatively low Global Warming Potential when compared to other halocarbons used on site.

Table 7: Emissions of ODS from AECL Sites (kg)

Type	Global Warming Potential*	Ozone Depleting Potential**	CRL						Other Sites
			2000	2001	2002	2003	2004	2005	2005
Halons (1301)	5600	10	0	0	0	0	0	0	0
CFC (R-11, R-12)	(R 11: 4000) (R 12: 8500)	1	0	0	0	0	18.14 (R-12)	0 (R-12)	0
HCFC (R-22)	1700	0.055	236	49	115.5	114.3	258.31	162.40	42.9
HFC (R-134a)	1300	0	475	475	1,500	200	1652.6	0	0.23
CO_2 e (tonnes)			1,019	181	2,146	454	2,742	276	73

Notes: * Global warming potential (GWP) per unit mass relative to CO_2 = 1
** Ozone depleting potential (ODP) per unit mass relative to CFC-11 = 1

3.1.2.2 Liquid Effluents

Liquid effluents from AECL sites are monitored for non-radioactive contaminants in order to measure conformance with AECL's internal guidelines for chemical substances in liquid effluents, or with directly applicable limits or guidelines established by regulatory authorities. The AECL guidelines are comparable with Environment Canada effluent guidelines for federal facilities and various other federal and provincial effluent guidelines.

The non-radiological effluent-monitoring program originally set up voluntarily by AECL, based on the Ontario Ministry of the Environment's Municipal Industrial Strategy for Abatement (MISA) program, became a CNSC regulatory requirement as of 2000. This program continues to supply valuable information on the potential non-radiological environmental impacts of CRL's operations to the Ottawa River and the local environment. The two process effluent streams, the Power House Drain and the Sanitary Sewer, are the main contributors to estimated loadings. The target in the 2005 EnvPI for the number of exceedances of the guidelines for the CRL and WL sites was 17 and 12, respectively. The total number of exceedances at CRL and WL, for all monitored criteria and streams, compared to the applicable annual target for the current year, is summarized in Table 8.

Table 8: Exceedances of Monthly Guidelines for Non-Radiological Liquid Effluents

Site		Exceedances of Monthly Guidelines					
		2000	**2001**	**2002**	**2003**	**2004**	**2005**
CRL	Number (annual target)	40 (--)	44 (--)	42 (--)	29* (42)	27* (20)	30 (17)
WL	Number (annual target)	134 (180)	107 (144)	70 (108)	44 (72)	26 (36)	48 (12)

*Values for 2003 and 2004 for the CRL site revised.

3.1.2.2.1 CRL site

The Sanitary Sewer or Sewage Treatment Plant (STP) at CRL collects domestic wastewater from over 80 buildings on site. It also receives small amounts of low-toxicity, soluble and biodegradable chemicals from a number of laboratories. The STP effluent is the stream with the most comprehensive monitoring schedule of all the streams monitored on site. Emissions periodically exceed AECL internal guidelines for some parameters. In 2005, the STP effluents exceeded the monthly guideline four times for total suspended solids (TSS). Although there has been deterioration in performance for TSS at the STP in 2004 and 2005 compared to 2003, the overall results remain below the 5-year average. Data for TSS at CRL are found in Figure 7.

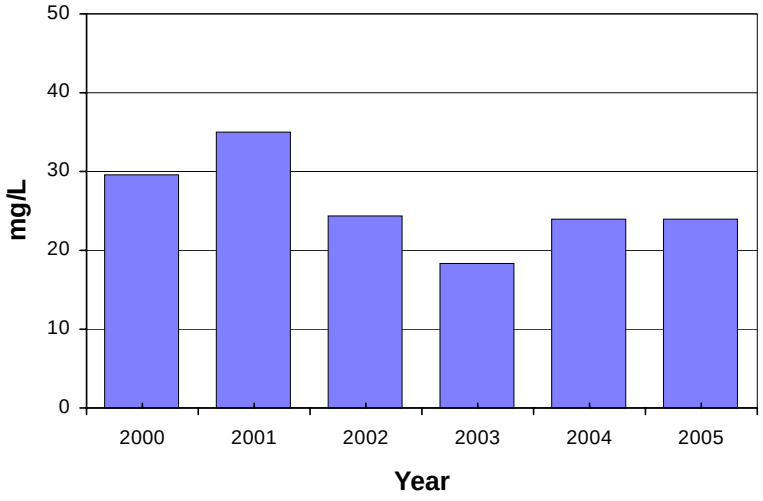


Figure 7: Yearly Average Concentration of Suspended Solids in CRL Sanitary Sewer

Waste Treatment Centre (WTC) effluents exceeded AECL's daily guideline for mercury in 2005; the guideline for pH was exceeded for seven months out of twelve, and that for phenolics was exceeded nine months out of twelve.

The average concentration of mercury released from the WTC to the process sewer has continued to decrease, with the eight months of results in 2005 being the lowest reported in the past six years. However, it is still marginally above the AECL guideline. (Mercury is not added at the WTC, but the facility's current liquid treatment processes do not totally remove it from waste streams.) Despite efforts to remove mercury using a demonstration mercury removal skid in 2004, the degree of removal was not sufficient to consistently meet AECL guidelines. A second removal skid, which is expected to further reduce mercury levels in WTC effluent, is currently in the design stage.

2005 was the second consecutive year in which phenolics concentrations were observed, slightly exceeding the AECL monthly guideline. The WTC has reviewed a number of possible sources for the phenolics. In 2005 the distillate flash tank was fully drained to remove any accumulation of oil, and the solidification operation was improved.

There is a significant increase in the number of months when pH met the AECL guidelines in 2005. It should be noted that the process sewer, into which the WTC discharges, in turn discharges directly to the Ottawa River. The process sewer continues to be consistently within the AECL guidelines for pH. Along with this improvement, the WTC is continuing to look further into ways to address pH exceedances.

Additional sampling for phenolics was performed throughout the year and was completed in December of 2005. Preliminary assessments have not identified the exact source of the high phenolics but some potential areas were eliminated. The WTC has reviewed a number of possible sources. In 2005, the distillate flash tank was fully drained to remove any accumulation of oil and the solidification operation was reviewed and improved.

In 2004, a set of Control Levels, Internal Investigative Levels (IILs) and Investigative Control Levels (ICLs), for non-radiological contaminants from process effluents on the CRL site was proposed based on historical data and accounting for data provided by the EER to further improve our ability to respond to and monitor results. These IILs and ICLs were developed following a similar approach to that for radiological releases and are meant to be somewhat parallel to radiological Administrative and Action Levels. Along with a historical evaluation, EER benchmark values for contaminants of potential environmental concern (COPECs) were considered in the development of these levels. This system of levels will be introduced in conjunction with the emLine data management system in 2006. Plans for implementation of the new levels are being made, and the levels will be in use in 2007.

3.1.2.2.2 WL and URL sites

Measurements of non-radiological parameters in WL effluents were also conducted. The

Lagoon and Outfall are the only significant sources of effluent that discharge to surface waters. Two site drainage ditches only contribute during heavy rainfall events. All emission guidelines were met by the Outfall, and by the two ditches. For the Lagoon, a single pH measurement in spring (one out of fourteen days) was slightly above the AECL daily guideline of 9.5. This was attributed to the effects of an algal bloom at that time.

Overall, 92.4% of the non-radiological measurements site-wide met the monthly guidelines. Inside the site boundaries, for liquids leaving the Active Liquid Waste Treatment Centre to join the process sewer, 88.1% of monthly guidelines were met. For various reasons, this proportion was not as high as in 2003 or 2004. Total Suspended Solids, iron and phosphorus were the most common parameters exceeding guidelines, originating largely from the Decontamination Centre and WR-1 waste tanks. In most cases, sources were identified and steps taken to remove or mitigate them.

Loadings of non-radiological parameters to the Winnipeg River were calculated for assessment, and trends were identified by comparing the year 2005 to the previous five. Overall, typical performance was found, with only one parameter (phenolics) higher than usual. Using analytical data for WL intake water, it was shown that a significant part of apparent total site loading to the environment comes from the Winnipeg River (and is returned).

At the nearby Underground Research Laboratory (URL), uranium concentrations in the holding-pond water remained below the discharge criterion (0.1 mg/L), and off-site surface waters did not have enhanced levels. Although Total Dissolved Solids (TDS) just exceeded the discharge criterion (500 mg/L) in January, levels remained below the limit for the rest of the year. The remediation plans to address elevated TDS in holding pond discharges have had a positive effect overall. For the most part, holding pond releases of other non-radioactive parameters proceeded in accordance with the Federal-Provincial Review Committee (FPRC) release criteria.

Gamma and isotopic uranium results for blueberry samples from upstream and downstream sampling locations were similar. There is no indication of a negative effect on berries as a result of URL operations. Moreover, most of the chemical parameters of the off-site surface waters were below the FPRC holding-pond water release criteria, with the exception of iron and one excursion of TSS. These exceptions appear to relate to natural phenomena, and not to URL operations. In spite of TDS in the holding pond, the off-site surface waters remain well within regulatory limits.

Ambient radiation levels in air were at background levels. Similarly, underground radon levels and exposures were well below their corresponding action or intervention levels, even with a reduction in ventilation flow.

3.1.2.2.3 SP site

Periodic monitoring results of Sheridan Park sewer effluents by the Region of Peel during 2005 were consistently below the limits for the parameters for wastewater streams.

3.1.2.3 CRL Thermal Emissions

Figure 8 shows the temperature of the discharge of the Process Sewer on the CRL site. The temperature rise is primarily from once through cooling of the 125-megawatt thermal NRU Reactor. Also discharging to this Process Sewer are streams from the NRX Reactor, the Heavy Water Upgrading Plant, the Waste Treatment Centre and the cooling water from the Dedicated Isotope Facility (DIF). There is currently work being completed on the thermal plume of NRU cooling water discharges to the Ottawa River and delineation of the mixing zone.

The study of the thermal plume of NRU cooling water in the river began in the winter of 2005 and is ongoing. The purpose of this study is to provide empirical information on the volume of River that can be expected to be warmed by the existing cooling water system, the trajectory of this water near the discharge and the dimensions of the mixing zone.

To date (2006 Fall), the results of this study show that the plume is small and does not cause temperature changes of more than about 2ºC above ambient at any point on the surface or on the riverbed at any time of the year and therefore, there are likely no ecological impacts. The engineering design of the discharge pipe and its position in the River result in local and nearly complete mixing, thereby reducing any impact on the River.

The Environment Canada *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments, 1976* contains a specific temperature limit for effluent discharge, stating that the effluent should not alter the ambient water temperature by more than 1ºC at the perimeter of the mixing zone of the discharge. The above mentioned thermal plume work has confirmed that due to the very effective mixing from the engineering design of the Process Sewer discharge pipe, CRL's Process Sewer effluent meets this federal guideline.

Also in 2005, the CNSC contracted the consultant Golder Associates Ltd. to assess the thermal effluent mitigation of six Canadian Nuclear Power Plants as a "fact-finding exercise." Golder and Associates visited CRL and met with EnvP Program staff for an information session during which the current thermal plume work being completed on the Ottawa River was presented. Golder's final report results concluded that any impact from the thermal plume is expected to be minimal because of the small size of the plume. It was also noted that the plume is not likely to be in a fish spawning area nor does it act as a barrier for fish movement up or down the Ottawa River.

The mean effluent temperature rise between ambient river and Process Sewer discharge at CRL in 2005 is consistent with the 5-year average.

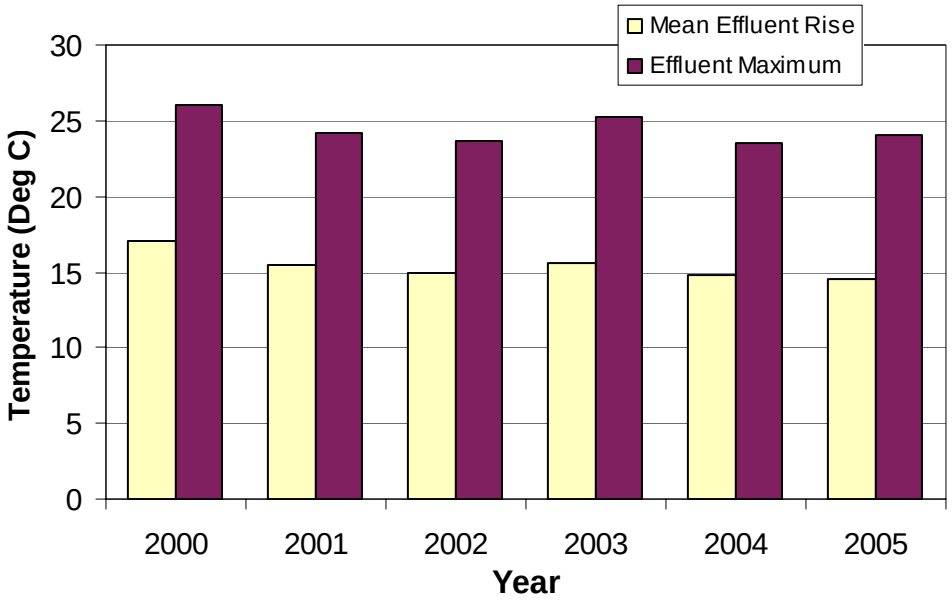


Figure 8: Temperature at the Process Sewer Discharge

3.2 Waste Generation and Management

It is AECL's practice to minimize waste generation, and to manage both radioactive and non-radioactive wastes in a safe and responsible manner, meeting the requirements of applicable environmental regulations and standards.

AECL generates a variety of radioactive and non-radioactive wastes in the course of operating, and in some cases decommissioning, its sites and facilities. In addition, AECL provides a service by accepting and managing radioactive wastes from numerous Canadian universities, medical institutions, and industries, as well as providing interim safe storage for wastes resulting from the remediation of some non-AECL sites historically contaminated with radioactive material. The principal regulatory requirements applicable to the generation and management of radioactive wastes are those of the Canadian Nuclear Safety and Control Act (NSCA) and its associated Regulations, and the regulatory policies of the CNSC. Radioactive waste management facilities on AECL sites are operated in accordance with licences issued by the CNSC.

3.2.1 Solid Radioactive Waste Generation and Management

AECL continued to manage all solid radioactive wastes generated at facilities on AECL sites, as

well as wastes received from external generators by emplacing them in monitored storage facilities located on AECL sites. Wastes generated and received at AECL sites in 2005 were stored in appropriate facilities, based on the potential hazard they represent to people and the environment.

3.2.1.1 Radioactive Waste Generation - CRL

As shown in Table 9, activities at the CRL site continued to account for the largest volumes of radioactive waste generated and placed in storage within AECL sites in 2005. The CRL site houses the majority of AECL's waste management facilities and the largest inventory of stored radioactive wastes. In addition, the CRL site serves as the destination for much of the radioactive waste generated at other AECL sites, and the majority of wastes received by AECL from external organizations. Annual volumes of low-level radioactive wastes generated at CRL and stored in the CRL Waste Management Areas (WMAs) during the current and for each of the past five years are shown in Figure 9. This figure has been updated to include the waste placed in the low-level storage buildings (MAGS), beginning in 2002. In 2005, the ~635m^3 of stockpiled material consisted primarily of sand and gravel reused on site in various construction projects.

For comparative purposes, the total low-level solid waste generated through normal operations at AECL sites is included in Table 9. This total includes the waste stored in the Sand Trench, Low-Level Storage Buildings and in Bunkers, but does not include waste designated as Stockpile since this waste is re-used on the site, and the volume varies considerably from year to year. Waste diversion programs associated with the operation of the Waste Management Areas at CRL, designed to minimize the quantities of low-level solid waste, operated efficiently in 2005, and have achieved their maximum effectiveness in terms of waste reduction capability. Further reductions in the volume of low-level radioactive waste will require changes to processes and procedures on the part of the Generators of the waste at the CRL site.

Table 9: Volume of Solid Radioactive Wastes Produced and Handled by AECL

Waste Generator Site	*Type of Activity*	*Destination of Waste*	*Volumes to Destination Facilities (m^3)*					
			Sand Trench (CRL)	*Low Level Storage Buildings*	*Above Ground Stockpile (Soils, etc.)*	*Low Level Engineered Structures (Bunkers)*	*High Level Engineered Structures (Tile Hole, Canisters)*	*Total Low Level Waste (m3)*
NON-AECL WASTE – 2005								
Commercial	**Operation**	CRL	10.6	244.1	0	38.6	6.8	293.3
Historic Sites	**Remed.**	LLRWMO*		2.0	195.8			
(LLRWMO)	**Remed.**	CRL		7.0		0		
AECL GENERATED WASTE – 2005								
AECL CRL	**Operation**	CRL	0	1207.4	416	197.4	40.3	1404.8
	Construction	CRL						
	Decomm.	CRL						
AECL WL	**Operation**	WL	0	0.4	0	48.8	0.45	49.7
	Decomm.	WL	0	0.4	0	48.8	0.45	49.7
AECL G1	**Decomm.**	G-1						
AECL Doug Pt	**Decomm.**	DP						
AECL NPD	**Decomm.**	CRL						
AECL SP	**Operation**	CRL						
TOTAL ANNUAL AECL GENERATED WASTE								
Total AECL Waste - 2004**	**Operation**		9.2	995.5	635.0	277.6	32.7	1282
	Construction							
	Decommiss		0	7.9	0	33.4	0.22	
Total AECL Waste – 2003**	**Operation**		46.2	648.6	0	347.4	37.4	1042
	Construction				366			
	Decommiss.		0	73.8		65.7	0.39	
Total AECL Waste – 2002**	**Operation**		135.1	73.9	2630.8	566.3	35.52	775
	Construction							
	Decommiss.							
Total AECL Waste – 2001**	**Operation**		237	5.0	993	471.6	22.9	714
	Construction		8.1		139	1.8		
	Decommiss.					28.5	0.5	
Total AECL Waste – 2000**	**Operation**		408.5	199	92.5	489.8	14.8	1097
	Construction							
	Decommiss.		12.9		0.5	43.7	0.39	

Notes: * The LLRWMO maintains several licensed and unlicensed sites across Canada for interim storage of waste generated through clean up of historically contaminated (non-AECL) sites on behalf of Natural Resources Canada.

[a] The increase in the low level waste from the G1 Facility is due to the addition of material not included on the original waste inventory consisting of material dismantled during the initial decommissioning activity in the 1980's.

** Total, excluding waste received from organizations external to AECL, and historic wastes accepted for management by the LLRWMO.

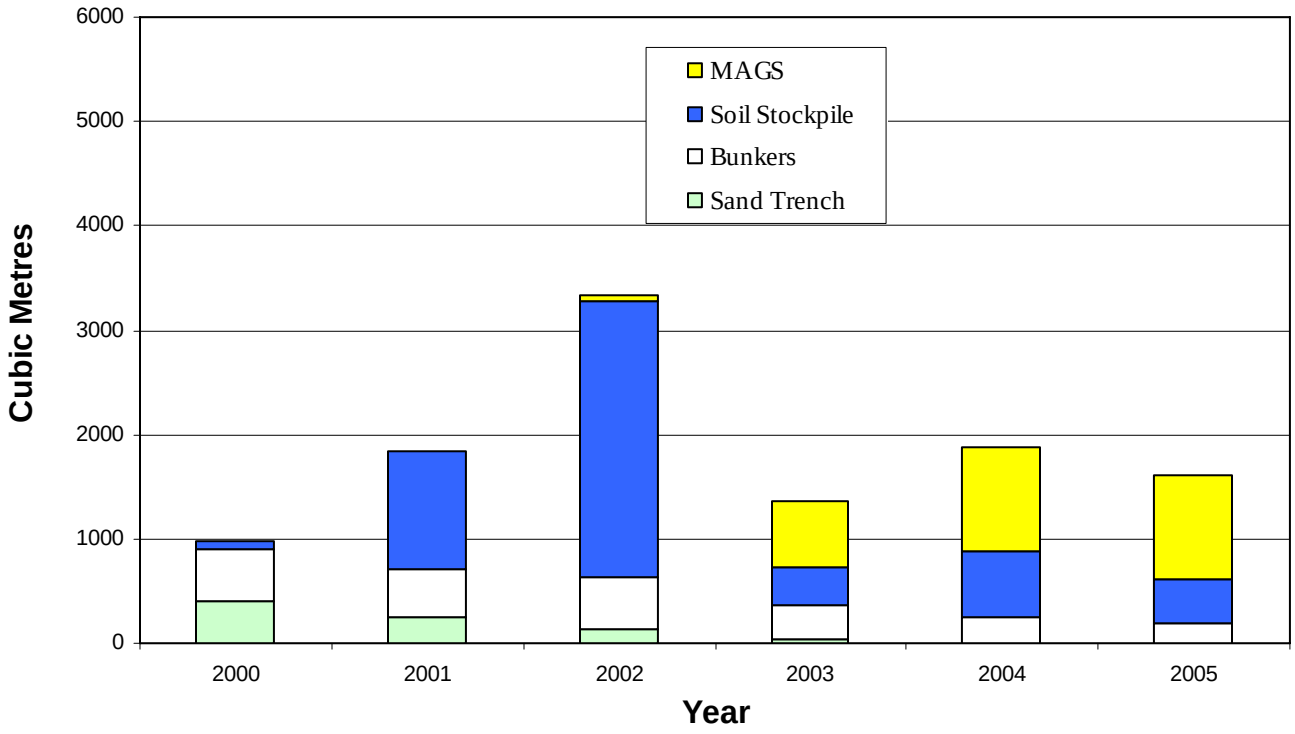


Figure 9: Total CRL Generated Low Level Waste Emplaced in CRL WMAs

3.2.1.2 Radioactive Waste Management – CRL

Very-low-level and low-hazard radioactive wastes were placed in sand trenches (at the CRL site only), in unshielded storage buildings, or in aboveground covered and monitored stockpiles. Biological low-level radioactive waste continued to be emplaced in sand trenches. As noted previously CRL sewage sludge was no longer emplaced in sand trenches as of 2004 November. After de-watering it was stored in containers above ground. At year-end 2005 there were 10 containers each holding 16 m^3.

Low-level radioactive wastes representing moderate hazard were stored in engineered containment structures, either above or below ground, typically having some limited radiation shielding. High-level, high-hazard wastes were stored in heavily radiation-shielded engineered containment structures either above or in-ground

CRL Waste Management Operations staff also continued to work with CRL facilities to improve the characterization, segregation and minimization of wastes being generated. Operation of a proactive waste-segregation program at CRL continued throughout 2005. The program employs segregation at source and thorough monitoring to divert wastes, which might otherwise be stored as “suspect” radioactive waste, to non-radioactive waste facilities or recycling. The waste-diversion program resulted in the diversion of about 2779 m^3 of waste from radioactive

waste storage (see Table 10).

Table 10: Waste Diverted from Radioactive Waste Storage Disposal at CRL (m^3)

Year	Waste Diverted to Landfill		Waste Diverted to Reuse or Recycle	
	On-Site	Off-Site (Municipal)	On-Site	Off-Site
2005	2,779	0	0	350
2004	3,166	243	0	290
2003	2,006.5	0	0	180.2
2002	2,267	0	1	190.5
2001	2,701	0	8	227
2000	4,589	26.0	13.6	567.9

3.2.2 Solid Radioactive Waste Generation and Management – WL

All solid radioactive wastes generated at WL during 2005 were stored at the Whiteshell Waste Management Area (WMA) facilities. Annual volumes of low-level radioactive waste stored during 2005 and for each of the past five years are shown in Figure 10. The high waste volume sent to bunker storage during 2000 resulted from clean-ups associated with getting the WL facilities into a safe state for decommissioning. Increases observed again in 2004 and 2005 reflect work primarily associated with cleanout of WL Hot Cells #6-11, transfer of the Amine Liquid Waste from the WMA to the Shielded Facilities, and decontamination of shutdown laboratories in Building 300.

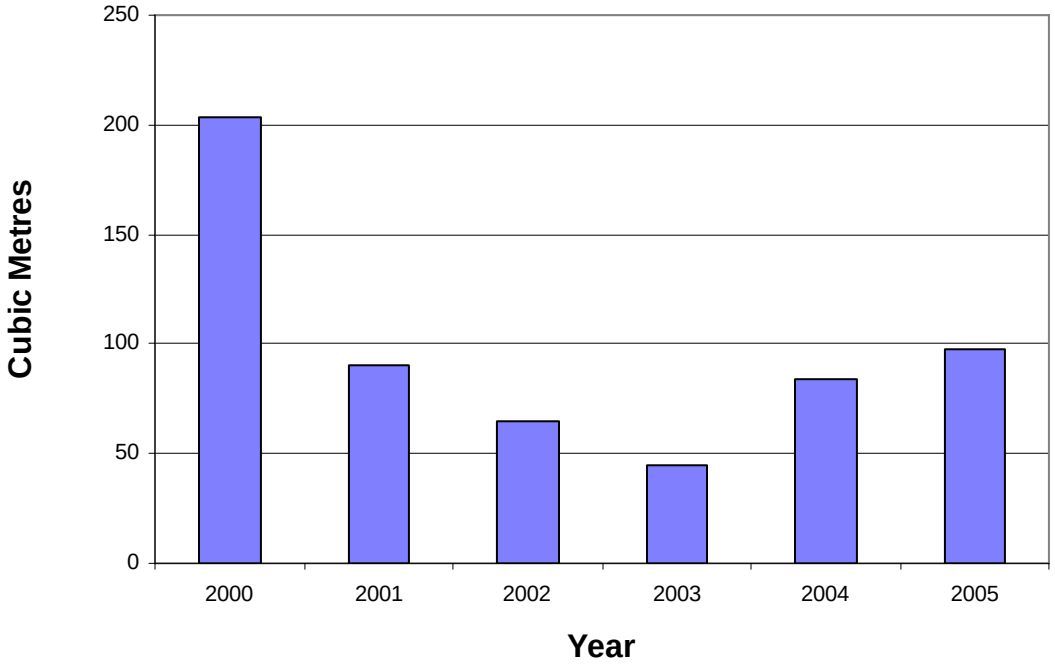


Figure 10: Low Level Solid Radioactive Waste Emplaced In WL WMA

3.2.3 Solid Radioactive Waste Management – Other Sites

The Low Level Radioactive Waste Management Office (LLRWMO) continued to manage radioactive wastes as a result of remediation of various historically contaminated (non-AECL) sites within Canada. In September 2005, the LLRWMO conducted an over-packing operation within the two LLRWMO storage warehouses at Chalk River (Waste Management Area "D"). Work was performed according to an approved drum handling, inspection and over-packing procedure. In all, 60 deteriorated drums were repackaged into 10 six-barrel over-packs. The area was left in a clean and safer condition.

3.2.4 Liquid Radioactive Waste Generation and Management

3.2.4.1 Liquid Radioactive Waste Generation

Liquid radioactive wastes generated at AECL sites, other than those wastes solidified at source, are managed by one of the following means:

- Collection and treatment of low-level radioactive wastewater to remove and solidify contaminants (at CRL this is collected by the Active Drain System and treated by the Waste

Treatment Centre on site) prior to controlled discharge of the treated waste-water to local surface waters via the process sewer;

- Monitored discharge of very low-level radioactive wastewater to local surface waters via the process sewer system;
- Interim storage of low-level liquid wastes in tanks or drums;
- Interim storage of high-level liquid wastes in engineered tanks pending transfer to or development of appropriate treatment or processing facilities; and
- Interim storage of high & low-level radioactive hazardous chemical liquid wastes.

The volumes of low-level liquid radioactive waste produced, treated and stored in 2005 by AECL are shown in Table 11. Results of monitoring of the radioactive content of discharged wastewater are included in the data in Section 3.1.1 above. At CRL, all low-level liquid wastes are treated prior to discharge.

Table 11: Volume of Low-Level Liquid Radioactive Wastes Produced and Handled

Waste Producer	Volumes (m^3)			
	Treated and Monitored Prior to Discharge to Surface Water	**Monitored Discharge* to Surface Water**	**Monitored Ground Dispersal**	**Total Low Level Liquid Wastes**
CRL	3,220	3,910	0	7,130
WL	0	1,421	0	1,421
SP	0	0	0	0
NPD	0	21.4	0	21.4
Douglas Pt.	0	0	0	0
Gentilly-1	0	15.5	0	15.5
Total 2005	3,220	5,368	0	8,588
Total 2004	3,916	4,514	0	8,900
Total 2003	4,386	4,257	0	8,643
Total 2002	3,235	5,278	0	8,513
Total 2001	3,751	4,961	0	8,712
Total 2000	6,193	6,268	169	12,630

Notes: * Treatment not required. Excludes cooling water. These are discharges to the Process Sewer from the CRL B205 Tanks 46-E/F/G, or WL B200 ALWTC.

3.2.4.1.1 CRL Site

The Liquid Waste Transfer and Storage (LWTS) Project, initiated in 2003 to deal with approximately 280 m^3 of high-level and intermediate-level liquid radioactive waste stored in 21 tanks on the CRL site, progressed to 32% completion in 2005. The technical specification for the Waste Storage System (WSS) was completed, and bids were received from qualified contractors for the design, construction and commissioning of the new waste storage system. The bids were under evaluation at the end of 2005. A waste composition database was completed, and a mock-up test rig was designed for the retrieval and transfer of the Mo-99 liquid wastes. The Environmental Assessment Study Report for the LWTS Project was completed and submitted to the CNSC in 2005 April; a Commission hearing to consider the EA Screening was pending. Conditional construction approval documentation was submitted to the CNSC in 2005 December

Management of low-level liquid wastewaters generated at CRL during 2005 is summarized in Figure 11, which shows the quantities of CRL wastewater discharged to the Ottawa River during the current and past five years. There were no discharges of wastewater to engineered in-ground dispersal pits in the CRL Liquid Dispersal Area during 2005, and none are expected to be made in the future.

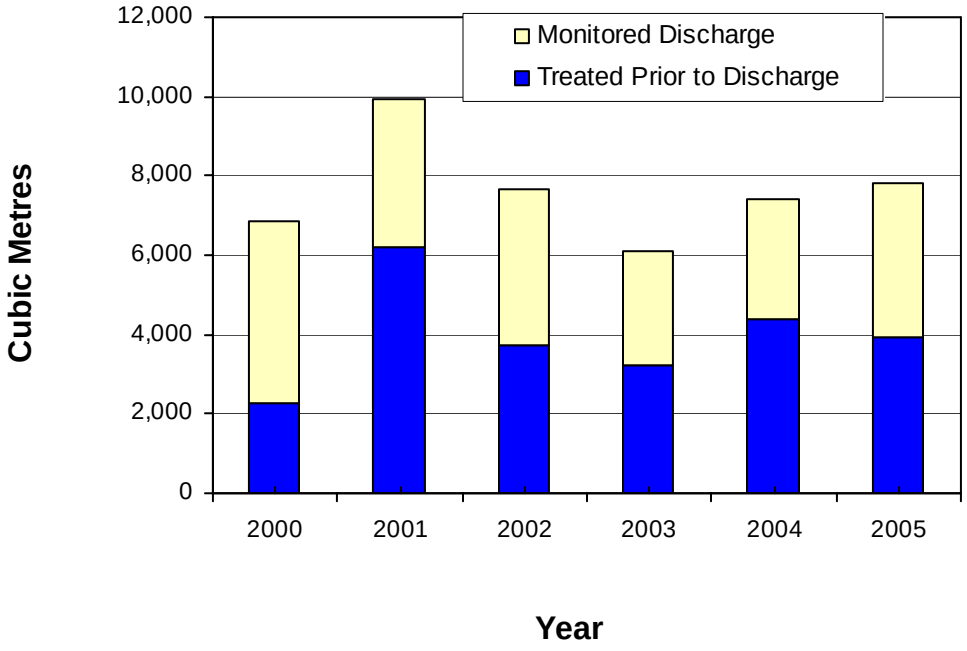


Figure 11: Discharges of Low Level Radioactive Wastewater at CRL

In 2005 the WTC processed 100% of the low level radioactive wastewater fed to the facility. Work on upgrading Waste Treatment Centre systems continued. The Liquid Waste Volume Reduction System was overhauled as a maintenance activity to ensure the continued availability, as this system as a back up for the Liquid Waste Evaporator. The reliability of the Liquid Waste Immobilization System was improved by procuring additional Thin Film Evaporators and associated equipment. These upgrades improved the overall efficiency for removal of radioactive contaminants.

3.2.4.1.2 WL Site

The annual volumes of low-level radioactive wastewater collected at the WL Active Liquid Waste Treatment Centre (ALWTC), and monitored prior to controlled discharge to the Winnipeg River, is shown in Figure 12. As can be seen, the volume has remained relatively constant over the past six years. Approximately 80% of the total comes from washing contaminated rubbers and other protective clothing, which is required both for operations or decommissioning activities.

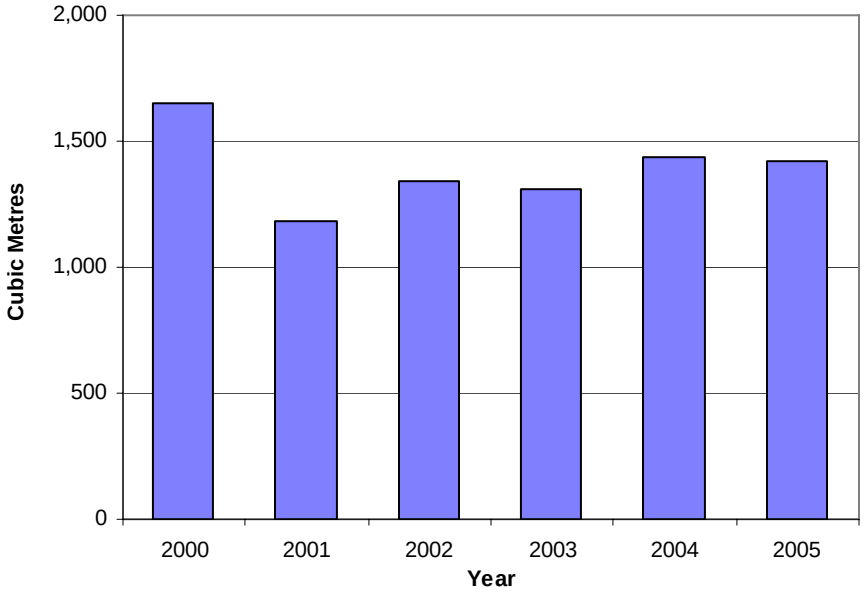


Figure 12: WL Discharges of Low Level Wastewater to the Winnipeg River

Efforts continue towards achieving a system to provide treatment for all low-level liquid wastes prior to discharge from WL. Currently, very little can be done to remove radiological or non-radiological contaminants. The importance of doing so during decommissioning operations has become more apparent in 2005, as the number of guideline exceedances (non-rad only) has increased two-fold. Although a feasibility study to add new comprehensive processing capability into the ALWTC facility (in Building 200) was conducted earlier, the cost was difficult to justify. Consideration had to be given to the fact that installed new equipment would have to be abandoned during a future move to another enabling facility, so that Building 200 itself could be decommissioned. The timetable for that move was uncertain, as the optimum order of building decommissioning was still under discussion.

During 2005, it was determined that favoured accelerated site decommissioning would not leave much time to operate (and then abandon) a new comprehensive treatment system in Building 200. An alternative approach was proposed, therefore, to make minor modifications to the existing ALWTC, permitting at least manual waste processing by physical and chemical means. This interim measure could remove the most common contaminants from waste streams where they are anticipated. To that end, modification options are now under engineering assessment. Meanwhile, the best use is being made of existing capabilities, passive absorbers, as well as detective work to try to trace the source of each excursion back to its source.

3.2.4.2 Liquid Radioactive Waste Management

AECL continued in 2005 to maintain inventories of stored high-level and low-level radioactive liquid wastes that have accumulated at the CRL and WL sites, awaiting the development of appropriate treatment processes. The year-end inventory for each of the current and past five years is shown in Table 12 and Figure 13.

As shown in the data in Table 12, medium and high level liquid wastes stored in tanks at CRL continue to be processed and treated with added volumes remaining relatively low. The overall volumes have remained relatively constant over the past five years.

Table 12: Inventory of Radioactive Liquid Wastes in Interim Storage at AECL Sites in 2005

	Interim Tank Storage* (Medium and high level liquids) (m^3)			**Interim Drum Storage (Organic & Misc.) (m^3)**		
	Added	Removed/ Processed	Year-End Inventory	Added	Processed/ Treated	Year-End Inventory
CRL	2.0	6.4	306.3	90.8	26.5	305.2
WL	2.2	1.5	11.8	2.2	4.0	0.2
Total 2005	4.2	7.9	318.1	93.0	30.5	64.6
Total 2004	6.8	3.8	321.9	40.6	9.5	242.7
Total 2003	12.1	13.1	318.9	7.1	5.0	199.8
Total 2002	5.3	13.2	320.6	6.0	98.4	197.7
Total 2001	1.4	0.1	326	1.2	9.7	287.0
Total 2000	6.4	3.7	331	3.1	70.0	295.5

Notes: * Does not include wastewater stored in tanks within waste treatment facilities waiting processing.

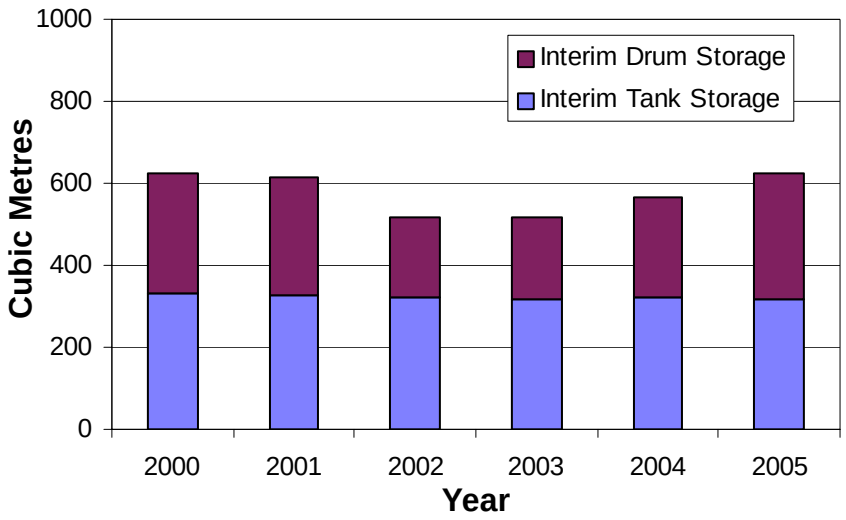


Figure 13: Year End Inventory of Stored Radioactive Liquid Waste in Tanks and Drums at AECL

3.2.5 Non-Radioactive Waste Management

AECL also generates a variety of non-radioactive wastes in the course of operating and decommissioning its sites and facilities. To minimize the quantities of non-radioactive waste requiring disposal, AECL sites continued to operate recycling programs. Residual wastes were either managed on-site or were shipped off-site to appropriately licensed waste management facilities. The total weight of batteries recycled at CRL is now tracked and reported in Table 13, rather than the total number of individual items. Table 13 summarizes the quantities and destinations of non-radioactive wastes generated at AECL sites, including quantities of wastes recycled. AECL is working towards achieving by 2015 a benchmark value of recycling 35% of its annual non-radioactive waste generated.

Table 13: Non-Radioactive Waste Management at AECL Sites in 2005

	Non-Hazardous Solid Waste			*Hazardous & Liquid Industrial Waste*		
Site Generating Waste	***To On-Site Landfill***	***To Municipal Landfill***	***Recycled Off-Site***	***Off-Site Disposal***	***Recycled Off-Site***	***Incinerated On-Site (WL only)***
CRL*	4521m^3	121 m^3	1162 m^3	1,007 kg & 3,321 L (Solvents & Oils)	1,501 kg (batteries) & 36,625 L (solvents & oils)	-
CRL (Decommiss)	0 m^3	0 m^3	0 m^3	-	-	-
WL (& URL)	921 m^3	239 m^3	499 m^3	1,042 kg & 2,305 L (liquids)	0	4000 L
SP	0	175.3 tonnes	254.7 tonnes	120 kg & 19,000 L (solvents + oils)	0	-
Other Sites LaPrade, Glace Bay, NPD	< 1 m^3	1 m^3	1 2 m^3	None	None	-

Note: * Waste totals for CRL include wastes from the Waste Diversion Project (see Table 9).

AECL continued to operate landfill sites for non-hazardous solid waste at the WL and CRL sites in conformance with the applicable Ministry of the Environment guidelines and in compliance with Federal regulations. Some wastes from each site are also sent to local municipal landfill sites, where appropriate.

Non-radioactive hazardous and liquid industrial wastes generated at AECL sites continued to be collected for off-site disposal or for recycling. All off-site disposal or recycling was carried out in conformance with applicable Provincial regulations. Non-radioactive waste volumes generated from other AECL sites not included above were negligible in 2005.

3.2.6 Recycling

AECL continued in 2005 to strive to conserve resources through application of the "3 R's" - reduce, reuse and recycle. AECL sites continued to operate recycling programs in 2005 in order to reduce the quantities of waste requiring disposal. Table 14 summarizes the types and quantities of materials recycled from major AECL sites during the year.

Table 14: Recycling at AECL Sites in 2005

Description	CRL	WL	URL	SP*
Paper	97 m^3	64 m^3	2.48 m^3	35.2 tonnes
Cardboard	362 m^3	11 m^3	2.73 m^3	11.2 tonnes
Glass & Aluminium Cans	38 m^3	68 kg	0.22 m^3	110.2 tonnes
Scrap Metal	611 m^3	9,994 kg	Included in the WL amount	57.9 tonnes
Plastics	10 m^3	0 m^3	0 m^3	Nil
Wood & Building Materials	44 m^3	72 m^3	0	27.6 tonnes
Other	0	0	0	12.6 tonnes
Batteries**	-	-	-	-

Note: *Computers and monitors are recycled but not tracked.
**Total weight of batteries rather than the total number is now tracked (see Table 13).

3.3 Nuclear Legacy Liability Management

AECL created the Liability Management Unit on 2005 April 1, with the mandate to manage AECL's and the Government of Canada's program to address the nation's nuclear legacy liability obligations. The program has a long-term focus on safely addressing nuclear facility liabilities and managing the associated wastes. The facilities include those from the early years of Canada's nuclear program, prior to the creation of AECL in 1952. LMU-managed activities include the monitoring and stabilization of shutdown facilities and contaminated lands, decontamination and dismantling projects, and storage and disposal of the residual wastes. These activities require the construction of major enabling facilities for waste analysis, treatment, packaging, storage and disposal. The program is designed to achieve health, safety and environmental protection objectives in accordance with CNSC regulations and the objectives of AECL's Environmental Protection Program. The LMU maintains formal decommissioning plans that guide the execution of the work and address decommissioning obligations extending several decades into the future. Short-term planning is based on periodic reviews of program priorities for critical decommissioning and waste management activities, based on environmental and other risk factors.

Progress in LMU-managed activities in 2005 included the continuation of two major multi-year projects to construct long-term storage facilities for radioactive liquids and used fuel wastes. Design and construction options were evaluated for the new storage facility in the Liquid Waste Transfer and Storage Project, and a Technical Scope of work was prepared for tendering the waste retrieval and transport equipment. Internal approval was received of the safety assessment documentation and environmental assessment report for the Fuel Storage and Packaging Project. These two major projects are expected to be commissioned in late 2008 and 2010, respectively. Other activities in 2005 included the dismantling of redundant and aging experimental facilities and buildings, as well as the ongoing monitoring and surveillance of facilities no longer in operation at CRL and WL, and the prototype CANDU reactors at Rolphton and Douglas Point, Ontario and Gentilly, Quebec.

3.3.1 Chalk River Laboratories Site

Groundwater Treatment

Two automated treatment systems and one passive system continued to remove radioactivity, primarily Sr-90, from intercepted groundwater in three plumes. Approximately 2.6 million litres of groundwater from a plume discharging to the east of WMA B (referred to as the Spring B Groundwater Treatment Plant) were treated to remove greater than 99% of the Sr-90. A total of 4.6 GBq of Sr-90 was removed and solidified with cement in sixteen 205-L drums for storage. Approximately 3.55 million litres of groundwater from a plume from the now-closed Chemical Pit, situated northeast of WMA A, was treated to remove 3.13 GBq of activity. This liquid was captured as secondary waste in five 205-L drums.

Study is now underway for a fourth treatment facility which will treat water from the south swamp.

The passive wall & curtain remediation system continued to channel groundwater flows containing Sr-90 from the shut down Ammonium Nitrate Decomposition Plant, capturing 99% of the Sr-90 present in the groundwater plume. In 2005 more than 12 million litres passed through the curtain avoiding the discharge of 8.5E+09 Bq Sr-90 of activity into the nearby swamp.

Decommissioning Operations

Decommissioning at CRL encompasses (i) legacy waste areas, and (ii) facilities and buildings that have been shut down and formally turned over to Decommissioning, including both those in a passive Storage-With-Surveillance (SWS) state and those in which projects are being conducted. In 2005, 20 buildings were within the Nuclear Legacy Liabilities Program. Major accomplishments in 2005 included:

- Treatment of contaminated groundwater (Legacy Waste Areas – see above)
- Initiation of decontamination and demolition activities for Bldg 107
- Landlord preparation for safe shutdown of Bldg 464
- Initiation of work in support of determining feasibility of the establishment of a geological disposal facility at the CRL site
- Preparation for the decontamination and removal of a lysimeter research site (Legacy Waste Areas)
- Removal of a solvent bunker from WMA B
- Site selection and geotechnical investigations in support of the Waste Analysis Facility
- Preparation of the Conceptual Preliminary Decommissioning Plan (CPDP) for the CRL site by the CNSC and receipt of financial guarantees for the CRL site
- Initiation of characterization and analysis activities for the sediment near the AECL process sewer outfall in the Ottawa River (Legacy Waste Areas)
- Investigation of approaches for the treatment of contaminated groundwater affecting the South Swamp

In summary, documented Decommissioning Plans are in place for all facilities as required by the CNSC. By the end of 2005, three buildings were in a safe shutdown state, 16 buildings were in preparation for Storage with Surveillance, and one building was in an advanced state of dismantling and demolition. In addition, substantial initiatives had been completed to address decommissioning tasks as outlined above.

3.3.2 Whiteshell Laboratories Site

No permanent facilities were constructed or demolished during the year.

A solar wall, installed on Bldg 100, was integrated into the existing ventilation system to enhance energy efficiency at the WL site

There were no major excavation or construction activities undertaken at the URL during 2005, although considerable progress was made in the closure of the URL.

3.3.3 Other Sites

NRCan continued to fund LLRWMO's major project, the Port Hope Area Initiative (PHAI). The PHAI is composed of two distinct projects, the Port Hope and Port Granby Low-Level Long-Term Radioactive Waste Management Projects, established to clean up various sites contaminated with historic low-level radioactive waste and to construct and operate facilities for the long-term management of the wastes. In its role as Proponent for the PHAI, the LLRWMO continued its technical work in support of an environmental screening, conducted at the comprehensive study level, pursuant to the Canadian Environmental Assessment Act (CEAA).

3.4 Incidents

In 2005, there were 64 environmental-related incidents logged for CRL and three for WL. There were no environmental incidents for SP, Gentilly-1 Waste Management Facility, the Nuclear Power Demonstration Waste Management Facility, the Douglas Point Waste Management Facility or, the areas under surveillance of and monitored by the LLRWMO.

Action was taken to investigate, correct, and prevent recurrence of the incidents, which occurred in 2005. None of the incidents represented a significant hazard to human health or the environment. As required, the appropriate regulatory authorities were notified, and appropriate corrective actions were taken to prevent recurrence of similar incidents.

All environmental incidents at both WL and CRL, which were reported as being environmental-related, were investigated as required, mitigated when possible, and corrective actions implemented when required in order to prevent the recurrence of similar incidents. Of the 64 reported at CRL, Event Notification Forms (ENFs) were generated for 49, and the remaining 15 were reported using other reporting mechanisms. A total of 11 incidents were reportable to external regulators (eight being Halocarbon releases reported semi-annually under the Federal

Halocarbon Regulations, and the other three being reported to the CNSC). The actual impacts to the environment had ratings of none or negligible with the exception of one incident which had an actual rating of minor. The potential impacts to the environment ranged from a potential of none to a single incident with a potential impact rating of major.

At WL, there was one event in 2005 with potentially minor consequences to the environment. In April, radioactively contaminated bristles and wood splinters were discovered, primarily on part of the roof of the Shielded Facilities (SF), with tiny amounts extending a few meters over the northern edge and onto surrounding grass. The source was traced back to the SF ventilation stack, in which a cleaning brush had apparently been inadvertently left, probably many years ago. When eventually dislodged, it was shredded and expelled by the SF exhaust fan. Contamination was recovered from the grass, and from the roof wherever it had not become deeply embedded in tar. All remaining contamination was marked, and will be removed during the next roof refurbishment.

There were no incidents in 2005 at Sheridan Park or other sites managed through SP (Montreal, Ottawa,).

3.5 Land Management (Stewardship)

3.5.1 Road Salt

As a safety measure salt was used as a de-icing agent on roadways within the various AECL sites during the winter season. A summary of the road salt usage at the AECL sites is given in Table 15.

As a result of the addition of road salt to Schedule 1 of the Canadian Environmental Protection Act (CEPA), the Department of the Environment issued a preliminary *Code of Practice for the Environmental Management of Road Salts* in 2004 April. The access road to the CRL site is not considered public therefore CRL is not obliged to prepare and implement a salt management plan. However, CRL has reviewed its salt storage practices and plans to prepare a Salt Management Plan by 2006 and construct a new salt storage facility by 2007/8. In addition, individuals responsible for the application of road salt on site will be attending best practice training.

Table 15: Summary of Road Salt Usage

Site	Approximate Distance (Roads, sidewalks etc.) (km)	Amount (tonnes)					
		2000	2001	2002	2003	2004	2005
CRL*	54	729	339	418	424	597	968
WL + URL	10	6	43.5**	2.26	9.9	7.43	8.92
SP**	41.7	30	30	120	120	225	150
NPD	2	-	0	0	0	0	0

Notes: * CRL includes two hectares of parking lots.
**Sand/salt mixture.

At CRL, salt was applied directly to the main plant road, a distance of about 7 km, and a mixture of sand and salt was used on a total of about 47 km of other roads within the property. At the other sites, sand/salt is applied to the roads, sidewalks and parking lots.-

3.6 Energy and Resources

3.6.1 Heat, Light and Processes

Energy consumption at AECL sites during 2005 is summarized in Table 16 along with totals for the five previous years for comparison. Using the appropriate conversion factors for the fuel oil, propane and electricity, the total consumption for the sites was calculated and is given in terajoules (TJ).

At CRL, recovery of some of the waste heat from the NRU Reactor provided 3.4 terajoules of energy for building heating purposes in 2005, reducing fuel oil consumption by an estimated 79,500L. In October of 2005, the NRU waste heat recovery heat exchanger was taken out of service which resulted in no further heat recovery from this system. The NRU U2 Loops supplied 14.7 million pounds of steam to the distribution system in 2005 resulting in a savings of 432,500 L of oil or 18.5 TJ. The amount of steam supplied by the NRU U2 Loops is less than previous years because the loops were taken out of service for maintenance in March 2005. The total amount of oil saved by NRU waste heat recovery was 512,000L equivalent to about 5% of the total CRL fuel oil consumption. This amount of waste heat recovery from NRU was down significantly from the 59.5 terajoules recovered in 2004 to a total of 21.9 terajoules in 2005. There is no expected heat recovery savings for 2006.

The propane consumption at CRL is a result of the heating requirements for the Biological Research Facility and several other small outer facilities. This propane use at the outer buildings is required because of the difficulties in transporting steam from the central plant to these buildings.

The target set in the 2003-2005 Environmental Plan and in the EnvPI was for a 10% reduction in

total equivalent energy from 2003 to 2004, and a 30% reduction from 2003 to 2015.

Building Energy End-Use-Intensity at AECL owned and operated sites in Canada is presented in Table 17. Even though the 2004 target has not been met, the 2003-2005 Environmental Plan energy management initiative target to procure an external consultant to complete an assessment of potential energy savings options at CRL, the site with the greatest energy consumption, is completed and implementation of recommendations is a target captured in the future Environmental Plan.

Table 16: Energy Consumption at AECL Sites for Heating, Lighting & Processing in 2005

Energy (Heat, light & Processes)	WL	URL	CRL	SP	Other Sites**	2005 Total	Annual Total Equivalent Energy in terajoules (TJ/y)					
							2005	2004	2003	2002	2001	2000
Electricity (kW.h)	14,426,190	3,006,970	66,843,800	11,439,494	1,250,000	96,966,454	349	361	374	389	351	394
Heating Oil (L)	3,430,501	0	10,253,806	0	0	13,684,307	570	598	565	566	531	592
Natural Gas (m^3)	0	0	23,586	681,280	0	704,866	24	27	32	22	24	21
Propane (L)	18,305	54,402	519,907	0	0	592,614	16	18	19	19	16	17
Total Equiv. Energy (TJ)	185.4	12.4	694	23.7	4.5	920	920	1005	990	996	925	1,023
Heated Floor Area -approx. total (m^2)	45,600	3,910	153,801	42,141	24,000	269,452						
NRU Waste Heat Recovered (TJ)	-	-	21.9	-	-	21.9	21.9	59.5	39.5	41	51	60

Notes: * 1 TJ = 1 terajoule = 1 x 10^{12} joules (1 watt = 1 joule/second)
** Other sites include LaPrade, NPD, Douglas Pt, and G-1.

Table 17: Energy End-Use-Intensity at AECL Sites

Energy (Heat, light & Processes)	2005	5-year average	2004	2003	2002	2001	2000
Total Equiv. Energy (TJ)	920	987.8	1,005	990	996	925	1,023
Heated Floor Area -approx. total (m^2)	269,452	268,060	265,700	270,000	270,000	267,300	267,300
Energy End-Use-Intensity $MJ/m^2/a$	3,399.5	3,684.8	3,780.7	3,666.7	3,688.9	3460.5	3,827.2

In accordance with Schedule II of the Registration of Storage Tank Systems for Petroleum Products and Allied Petroleum Products on Federal Lands Regulations, AECL is required to submit a Compliance Summary Report to Environment Canada annually. While some aboveground tanks still do not comply with Federal guidelines, all underground storage tanks are compliant with Federal Technical Guidelines. Work is continuing in this area, with AECL meeting its obligations to provide summary reports on an annual basis.

3.6.2 Vehicle Fuel Use

Consumption of fuels by AECL's vehicle fleet at AECL sites during 2005 is summarized in Table 18 along with totals for the five previous years.

Table 18: Vehicle Fuel Consumption at AECL Sites in 2005

Fuel Type	Units	WL	URL	CRL	SP	2005 Total	2004 Total	2003 Total*	2002 Total	2001 Total	2000 Total
Gasoline	L	43,452	15,963	153,442	5,344	218,201	212,841	268,151	162,234	184,816	198,756
Propane	L	0	0	0	0	0	5,400	5,400	4,543	5,717	32,921
Diesel	L	11,627	3,602	139,032	0	154,261	158,469	229,071	114,250	139,499	156,596

Notes: *Total includes data for other sites (LaPrade, Glace Bay, NPD, Douglas Pt, and G-1).

AECL continued to operate and maintain fleets of vehicles at the CRL and WL site and a small number of vehicles at some other sites for operational, maintenance and transportation purposes. At the end of 2005 AECL's fleet of owned or leased vehicles consisted of 119 automobiles, vans, light and medium duty trucks. Of these, 108 were fuelled with gasoline, and 11 were fuelled with diesel.

3.7 Management of Designated Toxic Substances

3.7.1 Ozone Depleting Substances

In accordance with the Montreal Protocol, Federal and AECL policies, AECL continued to phase-out and consider alternatives to the use of substances such as CFC's, HCFC's and Halons.

Approximate inventories of ozone-depleting substances (ODS's) in equipment and in storage at AECL sites as of the end of 2005 are summarized in Table 19. Also included in the table is a comparison with previous years' inventories. There are several targets in the EnvPI related to ODS's all of which are directed at eliminating all ODS's at AECL by 2020. While inventories have remained relatively constant over the past several years, work is continuing at all sites towards achieving these targets.

Table 19: Inventories of Ozone Depleting Substances And Related Halocarbons at AECL Sites, 1999 – 2005

Substance Type ***[Ozone Depleting Potential (ODP)]***	**Use/Application**	**2005**				**2004**	**2003**	**2002**	**2001**	**2000**
		CRL (kg)	**WL (kg)**	**SP (kg)**	**Total (kg)**	**Total (kg)**	**Total (kg)**	**Total (kg)**	**Total (kg)**	**Total (kg)**
Halons *[ODP ~ 3 - 10]*	Fire Suppression Systems	544.2	889	0	1433.2	1,475	1,475	1,239	1,239	1,291
CFC's & Blends (e.g. R-11, R-12, R-113, R-503) *[ODP ~ 0.5 - 1.0]*	Refrig. & Air Cond. Systems	84	1,822	0.79	1,907	1,926	2,169	1,723	1,732	1,760
	Storage (includes solvents)	85	380	0	465	465	480	1,204	1,207	1,214
	Thermalhydraulics Research*	0	0	0	0	0	0	0	0	0
HCFC's (e.g. R-22, R-123) *[ODP ~ 0.02-0.06]*	Refrig. & Air Cond. Systems	1,839	341	504	2684	2,683	2,597	2,761	2,840	1,840
	Storage (includes solvents)	366	165	0	531	463	931	493	788	595
	Thermalhydraulics Research*	0	0	0	0	0	0	0	0	0
HFC's (e.g. R-134a) *[ODP = zero]*	Refrig. & Air Cond. Systems	104	8	710	822	746	764	679	677	1
	Storage (includes solvents)	37	22	0	59	77	56	28	30	13
	Thermalhydraulics Research	5,500	0	0	5,500	5,500	5,500	4,900	4,900	5,400

Existing Halon fire-extinguishing systems in some critical areas, the NRU Reactor control room and RFFL facility, remain in place for safety reasons. Replacement systems offering equivalent levels of effectiveness and personnel safety will be investigated during 2005. As such, the number of CRL Halon fire-extinguishing systems remains unchanged from the previous year. During 2005, four Halon systems were not replaced when the WL Computer Centre was moved. In other locations, replacement systems offering equivalent levels of effectiveness and personnel safety are being investigated.

3.7.2 Poly-Chlorinated Biphenyls (PCBs)

AECL continued to maintain storage facilities for PCB waste at several of its sites, in compliance with federal regulations. A summary of PCB waste inventory remaining in storage at these sites along with PCBs still in service at AECL sites as of the end of 2005 is given in Table 20. Fire audits and updated inventories based on analysis of units taken out of service added slightly to the totals for 2005. Efforts directed at eliminating PCBs in storage continued throughout the year.

Table 20: 2005 Year-End Inventory of PCBs at AECL Sites

Site	Storage					In Service		
	Misc Solids & Debris (kg)	Liquids (L)	Light Ballasts (Items)	Capacitors or Misc. Equip (Items)	Transformer (Items)	Transformer (Items)	Light Ballasts (Estimated) (Items)	Capacitors (Items)
CRL	0	205	986 kg	12	0	12 (<25 ppm)	~150	-
CRL (Suspect Radioactive)	200	20,090	10					
WL	0	0	~400	0	0	1	~8,775	26
SP	0	0	0	0	0	1 (trace)	0	0

3.7.3 Chlorine

Chlorine was used for water treatment purposes at both the CRL and WL sites in 2005. Process and firewater systems were shock-chlorinated on a regular basis to prevent fouling of piping systems and heat exchangers by algal growth. Water for domestic use was continuously chlorinated for health purposes. At CRL, the effluent from the sewage treatment plant was continuously chlorinated for disinfection.

Total consumption of chlorine for these purposes in 2005 at CRL was 4,772 kg, consistent with the value for 2004. At WL, chlorine use to disinfect the process and domestic potable water supplies was 4,603 kg, nearly identical to 2004 (4,594 kg) and consistent with previous years.

4. PUBLIC COMMUNICATIONS

Efforts continued in 2005-2006 to ensure that the local communities and stakeholders were kept apprised of AECL's operations. In this regard, the following activities took place:

4.1 Interactions with Federal, Provincial and Municipal Elected Officials

As key stakeholders, elected officials were advised of AECL's ongoing operations through meetings, briefings, letters seeking input on projects and licensing requirements, and through informal discussions at community events during 2005. Some of these are noted below:

- Chalk River Laboratories held a breakfast briefing with elected officials from Pembroke, Petawawa, Pontiac on November 1 and with Deep River, Laurentian Hills and Head, Clara and Maria on November 15.

- Elected officials and Emergency Management Ontario were given advance notice of unscheduled siren testing at the Laboratories (May, June, July, August, November, December and January), of the Site-Wide Stay-in exercise on June 22, of the simulated transportation accident exercise on October 15.

- Interventions in support of AECL's financial guarantee and comprehensive preliminary decommissioning plan, the extension of the NRU operating licence and the CRL site operating licence were requested from community leaders and stakeholders.

- Community stakeholders including elected officials and Emergency Management Ontario were kept apprised of unplanned events.

Other opportunities were available during the period to informally meet with elected officials at off-site events such as an invited luncheon with John Tory, Leader of the Provincial PC Party (May) and at the Nuclear Waste Management Organization-sponsored Information and Discussions sessions (July).

In the Whiteshell area, Public Liaison Committee meetings continued with local communities and the Sagkeeng First Nation.

4.2 Positive Support from Communities for AECL and New CANDU Build Projects

AECL was pleased to receive copies of letters sent to the Premier of Ontario, the Provincial Minister of Energy, the Ontario Power Authority and other government departments indicating community support for continued funding to AECL and for including the NPD site at Rolphton as a possible site for new CANDU build. Resolutions of support were passed by the Town of Petawawa, the Town of Deep River, the Town of Laurentian Hills, the United Townships of Head, Clara and Maria and Renfrew County Council.

4.3 VIP Visits

A number of VIP tours of the Chalk River site featuring stops at the waste management areas, NRU, the hot cells and the fuel laboratory were provided during this period. The visits included:

- Renfrew County Warden, Bob Sweet; Deep River Mayor Ann Aikens; and Laurentian Hills Mayor, Vance Gutzman in May;
- Staff from a number of federal government departments, including the Privy Council Office, Natural Resources Canada and Finance in June;
- A three-day Environmental Field Study for University of Ottawa and University of Toronto Environmental Science students in August;
- Chalk River hosted the visit of more than 50 grade nine students for the annual Bring Our Kids to Work Day in November; and
- New Members of AECL's Board of Directors and federal departments, including Natural Resources Canada, and the National Research Council in December and January.

4.4 Participation in Community Events

AECL either supported and/or participated in more than 70 community events over the reporting period. This included a number of well-attended local fairs and festivals in Petawawa (Options 2005 skilled trades fair in April/Showcase 2005 in May/Petawawa Civic Centre Days in June), the 60th anniversary of the Town of Deep River in August, and the Chalk River Winter Carnival in February 2006. Participation at these events provided opportunities for members of the public to ask questions regarding the environmental and operational performance of AECL.

The highlight of the period was the safe and successful transfer and opening of the ZEEP exhibit at the Canada Museum of Science and Technology in Ottawa on October 21. The opening was the final event marking 2005 as the International Year of Physics.

In addition:

- AECL continued its participation in the preparation of a nomination document that will see the Ottawa River named as a Canadian Heritage River System. This included corporate sponsorship and the presentation of two papers at the Ontario Archaeological Society meeting in Petawawa in November;
- AECL attended the CFB Petawawa Base Commander's Open House in December and the MP/MPP New Year's Levee in January;
- AECL participated in a number of Chamber of Commerce events including corporate sponsorship of the 2nd Annual Upper Ottawa Valley Chamber of Commerce Awards Gala in January;
- Corporate sponsorship was provided to the 9th Annual Upper Ottawa Valley Ducks Unlimited Charity Auction and Dinner in February;
- AECL sits on a number of community Board of Directors including the Deep River and District Family Health Team, the Deep River and District Hospital Foundation; the Deep River and District United Way and the United Way/Centraide of the Upper Ottawa Valley Inc.
- Preliminary discussions with Nature Conservancy of Canada and Nova Scotia Nature Trust revealed that either of these organizations would be interested in further discussion

about the Glace Bay property. No further action was taken.
- Preliminary discussions were begun in December 2005 with the Nova Scotia Department of Natural Resources with regards to potential opportunities for conservation of parts of AECL's Glace Bay property. No further action; awaiting response from NS-DNR.

4.5 Public Consultation Activities

4.5.1 NRU Life Extension

Public consultation activities took place to support the Environmental Assessment for the continued operation of the NRU research reactor in May. Information on the NRU safety upgrades and the importance of the NRU reactor to Canada's scientific, commercial, medical and socio-economic programs was provided to the participants and posted on AECL's external website. As follow-up to the meetings, two evening tours of the NRU reactor were organized in August. AECL received positive feedback with two major initiatives resulting from the meetings and the tours:

- A Chichester, Quebec resident, attended the Chapeau meeting and subsequently intervened at the July CNSC Public Hearing on the Environmental Assessment for NRU with a request that AECL install additional tritium air monitors in Pontiac County. As a result, in August, AECL staff met with the gentleman to answer questions, to provide him with annual environmental reports and a copy of the Ecological Effects Review of Chalk River Laboratories and to take him on a tour of five monitoring locations in the Pontiac area. AECL subsequently installed additional passive tritium and carbon-14 air monitors in Demers Centre. A community briefing will be given in 2007 once enough comparative data has been collected.

- The tour of NRU resulted in a positive intervention from four Deep River gentlemen who presented their support for AECL's application for a seven-month extension of NRU and for the two-year licences for the MAPLE reactors and New Processing Facility during the October 18th Public Hearing.

4.5.2 Shielded Modular Above Ground Storage Project

Letters were issued to stakeholders announcing the Shielded Modular Above Ground Storage Project in August and information was posted on the external website. An article was published in the Daily Observer (Pembroke) and a letter of support was received from the Town of Deep River.

4.5.3 Liquid Wastes Transfer and Storage Project

An article was published in local papers announcing the Bidders Meeting for the Liquid Wastes Transfer and Storage Project in August. The information was also posted on the external website.

4.5.4 Sewage Sludge Landfill Project

AECL attended an update meeting on the sewage sludge management issue with the CNSC in November. Information on the project status was shared with elected officials at the breakfast briefings on November 1 and 15.

4.5.5 Riverbed Remediation Project

Also shared with elected officials during the breakfast briefings was the discovery of traces of active matter in the Ottawa River sediment bed.

4.5.6 Comprehensive Preliminary Decommissioning Plan

A revised Framework for a Communications and Public Consultation Plan on the Periodic Updating of the Public on the Comprehensive Preliminary Decommissioning Plan for Chalk River Laboratories was delivered as promised to the CNSC in December.

4.6 Disclosure Interactions

During this period, the following reports were issued to all community stakeholders at Chalk River and Whiteshell:

- AECL's Corporate Annual Report for 2004-2005 (also posted on the external website)
- AECL Annual Performance Report for 2004 (AECL MISC 387-04 Revision 0, 2005 December)
- Non-Radiological Emission Monitoring at CRL (Chalk River Laboratories): The Results for 2004" (AECL-MISC-421-04, Rev 0, 2005 March);
- "2004 Annual Report of Radiological Monitoring Results of the Chalk River and Whiteshell Laboratories Sites, Volume 2 – Effluent Monitoring – Chalk River" (AECL-MISC-362-04-CRL, Volume 2, Revision 0, 2005 March);
- "2004 Annual Report of Environmental Monitoring Results for the Underground Research Laboratory", (URL-GEN-R031, RC-261-17, Revision 0, 2005 May);
- "2004 Annual Report of Radiological Monitoring Results of the Chalk River and Whiteshell Laboratories Sites, Volume 3 – Environmental Monitoring – Whiteshell" (AECL-MISC-362-04-WL, Volume 3, Revision 0, 2005 April);
- "2004 Progress Report on Environmental Assessment Follow-Up Program for Whiteshell Laboratories" (WLDP-03704-REPT-002, Revision 0, 2005 April);
- "Non-Radiological Effluent Monitoring in 2004 at Whiteshell Laboratories" (AECL-MISC-390-04, Rev 0, 2005 March);

- "2004 Annual Report of Radiological Monitoring Results of the Chalk River and Whiteshell Laboratories Sites, Volume 2 – Effluent Monitoring;
- "2004 Annual Report of Radiological Monitoring Results for Chalk River and Whiteshell Laboratories Sites, Volume 3 – Environmental Monitoring – Chalk River" (AECL-MISC-362-04-CRL, Volume 3, Revision 0, 2005 April); and
- "NRU Improvement Initiative Program Plan" (report number NRU-507110-PGP-001 Revision 1, 2005 December).

Community stakeholders including elected officials and Emergency Management Ontario were advised of a number of unplanned events including:

- three very short duration voltage fluctuations in one of the several supplies of electrical power to the National Research Universal (NRU) reactor;
- an employee who received an electrical shock;
- a break in a firewater line that provides water to the National Research Universal (NRU) reactor's sprinkler systems and hose stations;
- elevated levels of airborne activity in NRU;
- the discovery of a small bottle containing material in an undesignated area for radioactive materials; and
- the discovery of leaking Bunker C oil, during a routine 12-hour inspection, from Tank 2 at AECL's Power House at Chalk River Laboratories.

No community concerns were raised as a result of information provided.

Discussions and actions were initiated to establish AECL's Environmental Stewardship Council that will comprise community and stakeholder representatives. To be in place by the end of the second quarter in 2006, the Council will be mandated to discuss issues of concern to the community and to look for solutions to address them in a timely and transparent manner.

4.7 Media coverage

An editorial board meeting was held with the Daily Observer on October 22, resulting in a number of positive stories about nuclear and AECL.

AECL's activities were tracked in the local papers. Environment-related articles included:

- coverage of the fish impingement concerns associated with the Environmental Assessment for the continued operation of NRU and the subsequent positive

announcement that the Environmental Assessment was accepted;

- the positive announcement that AECL had won the Pt. Lepreau refurbishment contract;
- the adjournment of the hearing related to AECL's financial guarantee and comprehensive preliminary decommissioning plan for Chalk River until the Spring of 2006;
- the appointment of Renfrew-Nipissing-Pembroke MPP John Yakabuski's appointment as provincial Energy Critic;
- coverage of the mid-term licensing review for Chalk River's site operating licence;
- the appointment of AECL's Chief Regulatory Officer;
- information on the new highway billboards installed around Chalk River Laboratories promoting the clean air message. This message has been mirrored on the Community Relations van to further broadcast the message that "It's time to clear the air."
- the partnership between the Deep River Scouts, AECL and K&T Trucking with respect to the planting and harvesting of Christmas trees on AECL property;
- the opening of ZEEP at the Canada Museum of Science and Technology in Ottawa;
- the re-appointment of Robert Van Adel as President and CEO as well as the appointment of Brian McGee as Vice-President of the Nuclear Laboratories;
- a public seminar on the benefits of keeping NRU operating;
- the announcement of the Bruce retube contract;
- community support for new build in Renfrew County;
- the renewal of operating licenses for MAPLE, NPF and NRU;
- the signing of a revised agreement for the use of Miller's Road landfill for construction wastes;
- discussions on changes to the primary zone for emergency preparedness planning; and
- summaries of the LLRWMO public communications activities were provided to NRCan. (The LLRWMO conducts an extensive Consultation & Communications program with Responsible Authorities (NRCan), other stakeholders and the general public especially in the Port Hope area).

5. ACRONYMS AND TERMINOLOGY

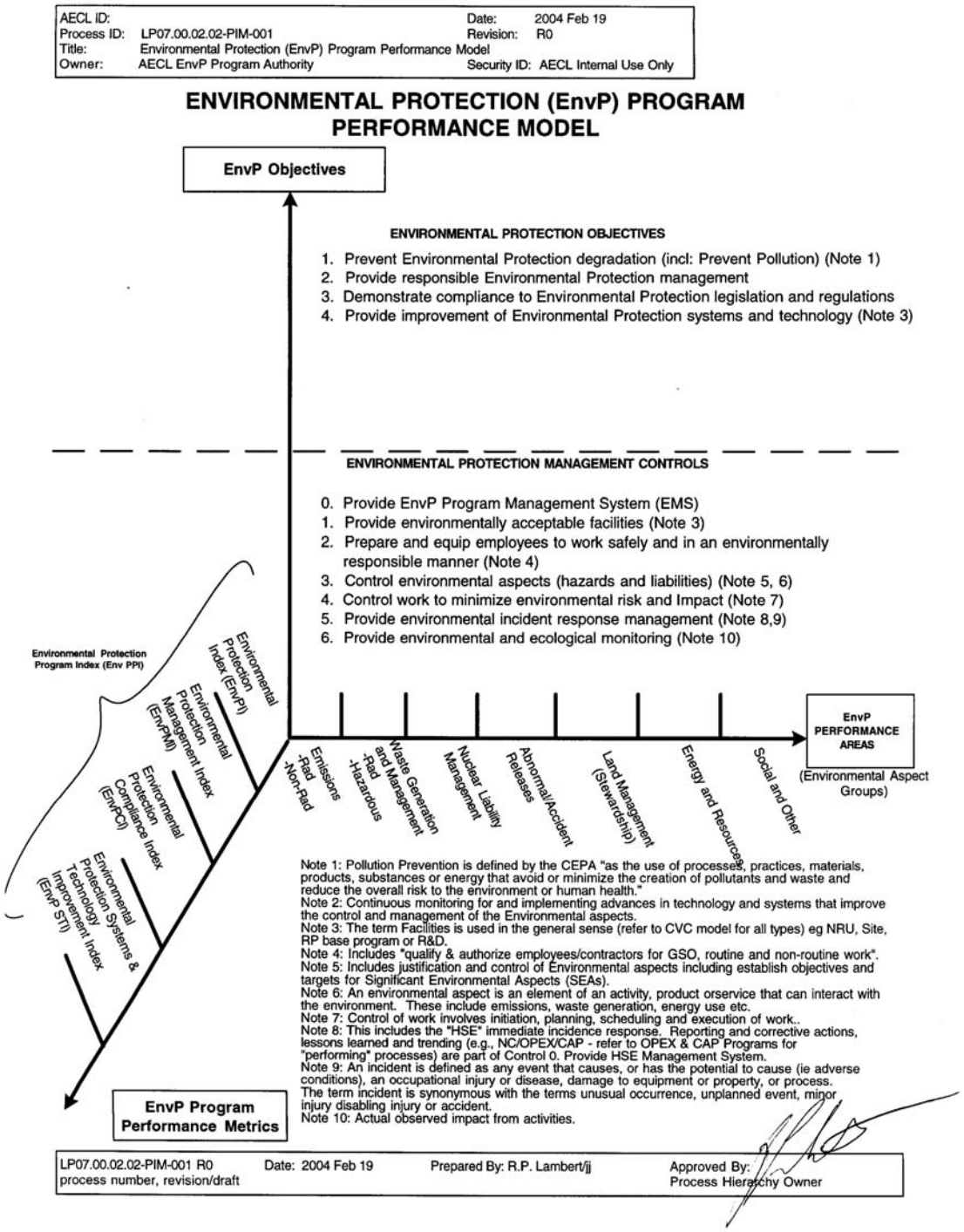
ALARA	The principle of maintaining emissions and radiation doses as low as reasonably achievable, social and economic factors being taken into account.
ALWTC	The Active Liquid Waste Treatment Centre at the Whiteshell Laboratories, which concentrates and solidifies medium level radioactive wastewater, and collects low level wastewater for controlled discharge.
ANL	An Action Level is a quantity or rate of radioactive emissions that, if reached, may represent a significant loss of control of a facility's environmental protection program or emission control systems, and triggers a requirement for specific actions to be taken.
CANDU	**CAN**ada **D**euterium **U**ranium nuclear power reactor system; registered trademark.
CEAA	Canadian Environmental Assessment Act
CFCs	Chlorofluorocarbons, used primarily as the working fluid in refrigeration and air conditioning systems, and harmful to the earth's ozone layer.
CNSC	Canadian Nuclear Safety Commission, the federal body responsible for regulating the Canadian nuclear industry in accordance with the Nuclear Safety & Control Act and associated regulations. This was formerly the Atomic Energy Control Board (AECB).
CPFS	Commercial Products and Field Services laboratory, located in Sheridan Park. This facility was formerly known as SPEL, Sheridan Park Engineering Laboratory.
CRL	AECL's Chalk River Laboratories research site, located beside the Ottawa River at Chalk River, Ontario.
DP	AECL's partially decommissioned Douglas Point nuclear generating station, located near Tiverton, Ontario.
DRL	Derived Release Limit for normal emissions of radioactive material in airborne or liquid effluents from nuclear facilities derived from the regulatory radiation dose limits for members of the public considering all significant environmental exposure pathways.
EER	Ecological Effects Review conducted at the CRL site of all waste streams based upon available risk assessment guidelines.
EMS	Environmental Management System
EnvPCI	A measure related to the strategic objective to demonstrate regulatory compliance. The measure is based upon feedback form the regulators, effectiveness in responding to regulator driven actions and any identified gaps with regulations or regulatory expectations.

Env PI	A measure of environmental performance related to the strategic objective to prevent environmental degradation (i.e. pollution prevention). The measure is based upon setting 2015 targets for each of the environmental aspect groups identified for CRL.
EnvPMI	A measure related to the strategic objective to provide an effective environmental management system. The measure is based upon the ISO-14001 environmental management standard.
EnvPSTI	A measure related to the strategic objective to provide continual improvement of systems and technology that help ensure AECL controls its environmental aspects and the prevention of pollution.
FNO	Facilities and Nuclear Operations
FOC	Fisheries and Oceans Canada
G-1	AECL's partially decommissioned Gentilly-1 nuclear generating station, located at Bécancour, Québec.
GWP	Global warming potential: a relative measure per unit mass of the potential for substances released into the atmosphere to contribute to global warming, based on carbon dioxide having a GWP = 1.0.
Halons	Brominated chlorofluorocarbons, used primarily as fire suppressants, and which are relatively more harmful to the earth's ozone layer than CFCs.
HCFCs	Hydrochlorofluorocarbons, used primarily as a working fluid for refrigeration and air conditioning systems, but which are less harmful to the earth's ozone layer than CFCs.
IFTF	Immobilized Fuel Test Facility, a laboratory complex containing instruments in shielded concrete canisters and warm cells for conducting used fuel storage experiments. The complex is part of the Shielded Facilities at WL.
LLRWMO	AECL's Low-Level Radioactive Waste Management Office, responsible for site remediation and waste management, on behalf of Natural Resources Canada (NRCan), at designated sites in Canada historically contaminated with radioactivity.
MAGS	Modular Above Ground Storage facility for low-level radioactive waste.
MAPLE	Multipurpose Applied Physics Lattice Experimental research reactor designed and marketed by AECL.
MMIR	MDS Nordion Medical Isotopes Reactor Project tasked with the construction and commissioning of the Dedicated Isotope Facilities at AECL.
MOX	Mixed Oxide Fuel
NLBU	Nuclear Laboratories Business Unit
NPD	AECL's partially decommissioned Nuclear Power Demonstration nuclear generating station, located at Rolphton, Ontario.

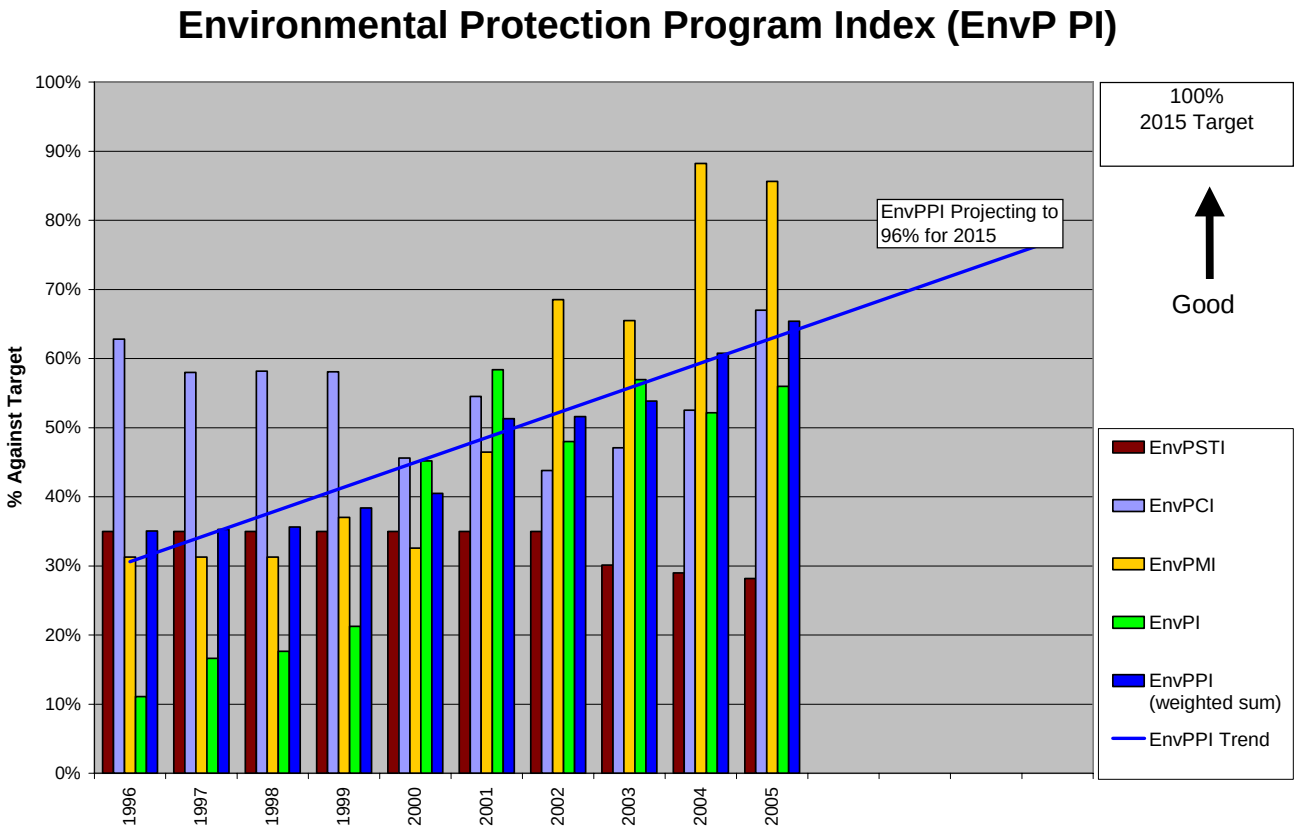
NRCan	Natural Resources Canada
NRU	The 125-megawatt, heavy water cooled and moderated National Research Universal nuclear research reactor located at the CRL site. NRU is currently used for both nuclear research and development, and for production of medical radioisotopes.
NRX	Heavy water moderated, 40 megawatt National Research Experimental reactor, cooled by once-through flow of river water. It is located on the CRL site, and is now shutdown awaiting decommissioning.
ODP	Ozone depleting potential: a relative measure of the potential for ODS's to cause damage to the earth's ozone layer, based on CFC-11 having an ODP = 1.0.
ODS	Ozone depleting substance: refers to halogenated hydrocarbons (CFCs, HCFCs, Halons, etc.) that are harmful to the earth's ozone when released to the atmosphere. In response to international agreements, federal and provincial policies and regulations call for control and phase-out of designated ODS's from manufacture and use.
PCBs	Poly-chlorinated biphenyls, used primarily as insulating fluids in electrical equipment. PCBs are environmentally persistent and bioaccumulative substances considered to be environmentally harmful.
SED	Safety and Environment Division
SF	Shielded Facilities, a complex of hot cells for radioactive handling located at WL.
SP	AECL's Sheridan Park site consisting of engineering offices and a laboratory, located in Mississauga, Ontario.
SRC	AECL Safety Review Committee, responsible for independent review to assure the AECL President that proposed and existing AECL facilities and activities are acceptable with respect to health, safety and protection of the environment, as defined in AECL Policy 40101.
STP	Sewage Treatment Plant
URL	AECL's Underground Research Laboratory, located near WL, which conducts research in support of the concept of deep geological disposal of high level nuclear wastes.
WL	AECL's Whiteshell Laboratories research site, located beside the Winnipeg River near Pinawa, Manitoba.
WMA	Waste Management Area containing facilities for storage of radioactive wastes. Licenced WMAs are maintained at both the CRL and WL sites.
WTC	The Waste Treatment Centre, located at the CRL site, which uses a large evaporator to remove contaminants from low-level radioactive wastewater for solidification.

WR-1	The Whiteshell Reactor -1 research reactor, which used organic liquids as the primary fuel coolant. It is located on the WL site, and is now maintained in a partially decommissioned state.

Appendix A: Environmental Protection Program Performance Model



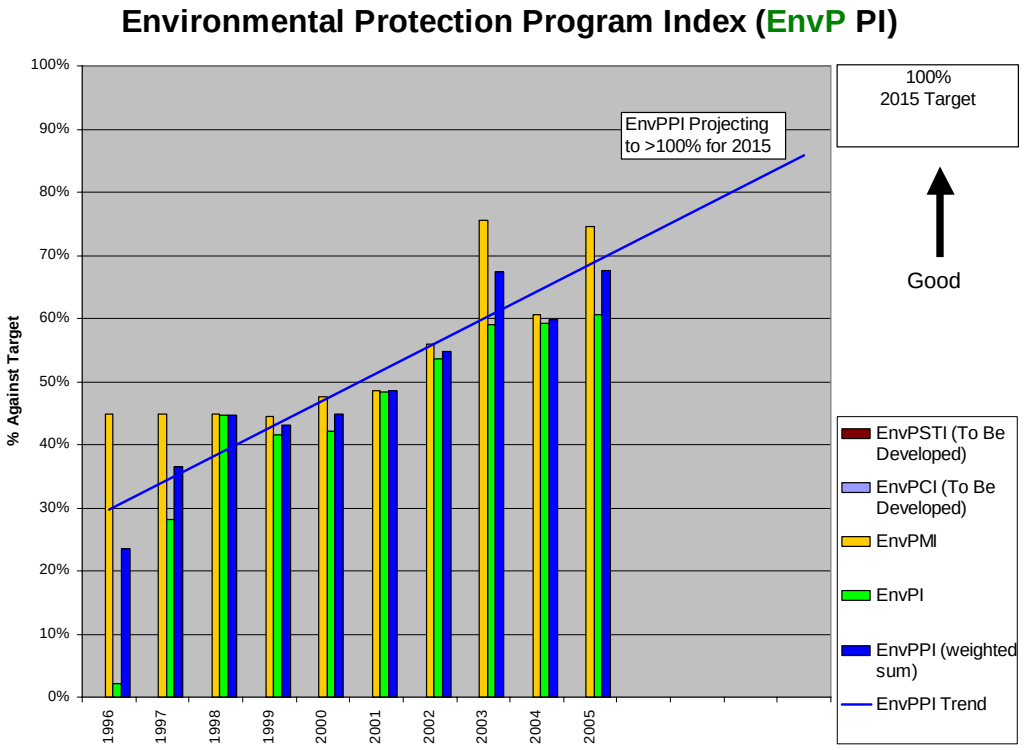
Appendix B: CRL Environmental Protection Program Index



EnvPPI = 0.3 x EnvPI + 0.3 EnvPMI + 0.3 EnvPCI + 0.1 EnvPSTI
EnvPPI: Environmental Protection Program index
EnvPI: Environmental Protection Index

EnvPMI: Environmental Protection Management Index
EnvPCI: Environmental Protection Compliance Index
EnvPSTI: Environmental Protection Systems & Technology Index

Appendix C: WL Environmental Protection Program Index



EnvPPI = 0.5 x EnvPI + 0.5 EnvPMI + 0 EnvPCI + 0 EnvPSTI
EnvPPI: Environmental Protection Program index
EnvPI: Environmental Protection Index
EnvPMI: Environmental Protection Management Index
EnvPCI: Environmental Protection Compliance Index (TBD)
EnvPSTI: Environmental Protection Systems & Technology Index (TBD)