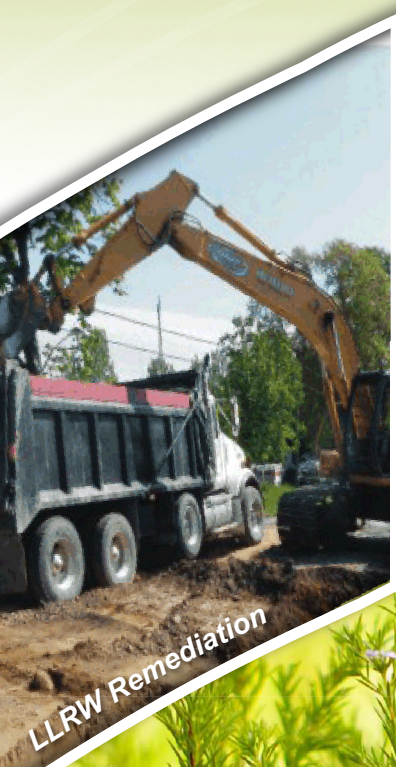
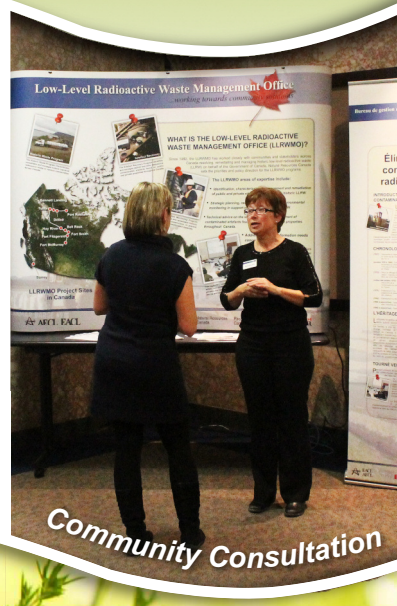
Low-Level Radioactive Waste Management Office

Annual Report 2012-2013


LLRW Remediation


WM2013 Conference


Site Investigation



Community Consultation

30 Years

Celebrating...

Working towards Community Solutions

AECL EACL

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Canada

LLRWMO-513430-041-04000
CC1-1/2013
ISO 9001:2008 certified

30 Years

Low-Level Radioactive Waste Management Office

Annual Report 2012-2013

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AECL EACL

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I am pleased to present the Annual Report of the Low-Level Radioactive Waste Management Office for the fiscal year ending 2013 March 31.

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

Sincerely,

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

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LLRWMO Acronyms

AECL: Atomic Energy of Canada Limited
CMP: Construction Monitoring Program
CNSC: Canadian Nuclear Safety Commission
CRL: Chalk River Laboratories
CSA: Canadian Standards Association
EMP: Environmental Monitoring Program
FPTFR: Federal-Provincial Task Force on Radioactivity
IAEA: International Atomic Energy Agency
IWM: Interim Waste Management
LLRW: Low-Level Radioactive Waste
LLRWMO: Low-Level Radioactive Waste Management Office
NEA: Nuclear Energy Agency
NRCan: Natural Resources Canada
NTR: Northern Transportation Route
OECD: Organisation for Economic Co-operation and Development
PCP: Property Compliance Program
PHAI: Port Hope Area Initiative
PHAI MO: Port Hope Area Initiative Management Office
PSE TSS: Pine Street Extension Temporary Storage Site
QEH&S: Quality, Environment, Health & Safety

DIRECTOR'S MESSAGE

In October 2012, the Low-Level Radioactive Waste Management Office (LLRWMO) celebrated its 30th anniversary, a significant milestone marked by many notable achievements. I shared in the excitement of our staff and partners as we continue to build on the success of previous years, managing Canada's historic low-level radioactive waste (LLRW) on behalf of the federal government. The LLRWMO's ongoing record of success continues to ensure that the Canadian public and the environment are protected.

The LLRWMO continued its active role in Northern Canada, holding fact-finding and planning meetings with First Nations representatives and other stakeholders in Fort Smith, NT, and Fort Fitzgerald, AB. These consultations laid the groundwork for the LLRWMO's current and future remediation projects in the South Slave region located along the Northern Transportation Route (NTR).

Celebrating 30 Years: Staff Past and Present

In Port Hope, the LLRWMO worked on many fronts, the foundation of which is the operation of its Interim Waste Management Program delivered through three program components; Environmental Monitoring, Construction Monitoring and Property Compliance Programs. LLRWMO support to the Port Hope Area Initiative (PHAI) continued through provision of knowledge and experience gained over its 30 year history delivering programs in the Port Hope area and across Canada. On the national program front, the LLRWMO continues to work with the public through the Historic Artefact Recovery Program. This program provides technical advice, including identification, recovery and management of radioactive artefacts found on public and private properties throughout Canada.

The LLRWMO also made a significant contribution to the WM2013 Symposia, an annual radioactive waste management conference held in Phoenix, Arizona. Our staff presented at the Managers Skills Training Workshop, contributed two technical papers and with other AECL colleagues, coordinated an impressive display at the Canadian booth. At this international conference, a notable impression was made by the LLRWMO on its delivery of Canada's commitment to the safe and effective management of LLRW.

Also on the international front, the LLRWMO contributed an article to the November 2012 edition of *Contrôle*, a journal of Autorité de sûreté nucléaire (ASN), the French nuclear safety organization, entitled: *"Managing the historic radioactive waste footprint: the Canadian Example."* This was a wonderful opportunity for the LLRWMO; to share with our contemporaries in France the knowledge and experience gained over the past 30 years.

I would like to extend my gratitude to LLRWMO staff, partners and stakeholders for your many years of support and I look forward to your future successes. The LLRWMO's best days are still to come!

Over the years, many have joined the LLRWMO, have made significant contributions, and some have moved on. Now with my retirement imminent in July (2013), my turn has come to follow them. It is with a great deal of pride in our collective accomplishments that I say farewell to each of you and job well done.

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

1. LLRWMO OVERVIEW

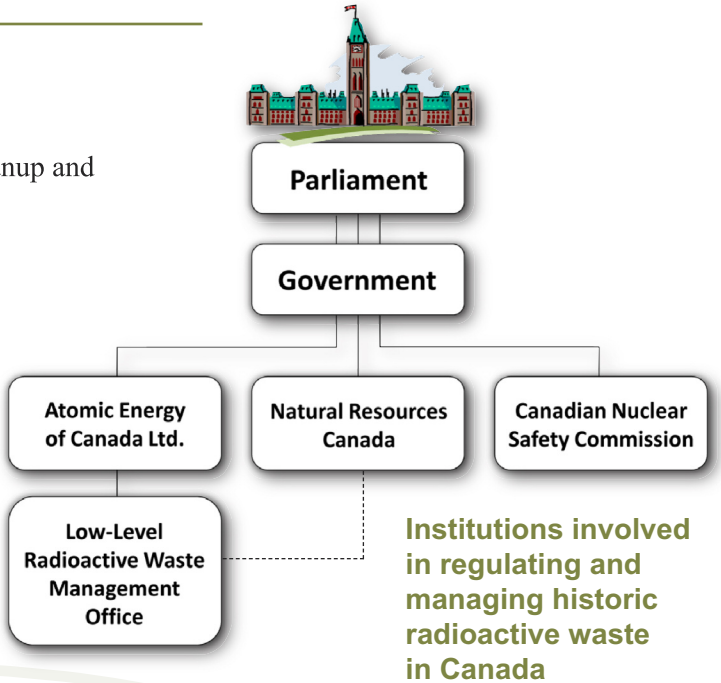
In 1982, the federal government established the Low-Level Radioactive Waste Management Office (LLRWMO) to carry out its responsibilities for the management of low-level radioactive waste (LLRW) in Canada. The Office is operated by Atomic Energy of Canada Limited (AECL) and receives its policy direction and funding from Natural Resources Canada (NRCan), the federal department that establishes national policy for radioactive waste management in Canada.

1.1 LLRWMO PROGRAMS

The LLRWMO delivers three major programs:

1) **Historic Waste Program** - The LLRWMO carries out cleanup and long term management of historic LLRW for the federal government as mandated in the 1990 Memorandum of Understanding between NRCan and AECL. Historic LLRW contamination has been found at various locations in Canada, including Alberta, British Columbia, the Northwest Territories, and Ontario. Historic waste artefacts continue to be recovered from numerous sites across the country.

2) **Ongoing Waste Program** - Producers and owners are responsible for managing their radioactive waste. Under the Ongoing Waste Program, the LLRWMO supports NRCan in its development and implementation of national strategic policies for the management of this waste. The LLRWMO also assists NRCan in meeting its commitment to international organizations, such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD).



Institutions involved in regulating and managing historic radioactive waste in Canada

3) **Information Program** - The LLRWMO provides information to the public regarding historic LLRW and the management of LLRW projects in Canada. The Office responds to enquiries from individuals and communities across Canada, and from interested parties worldwide.

What is Low-Level Radioactive Waste?

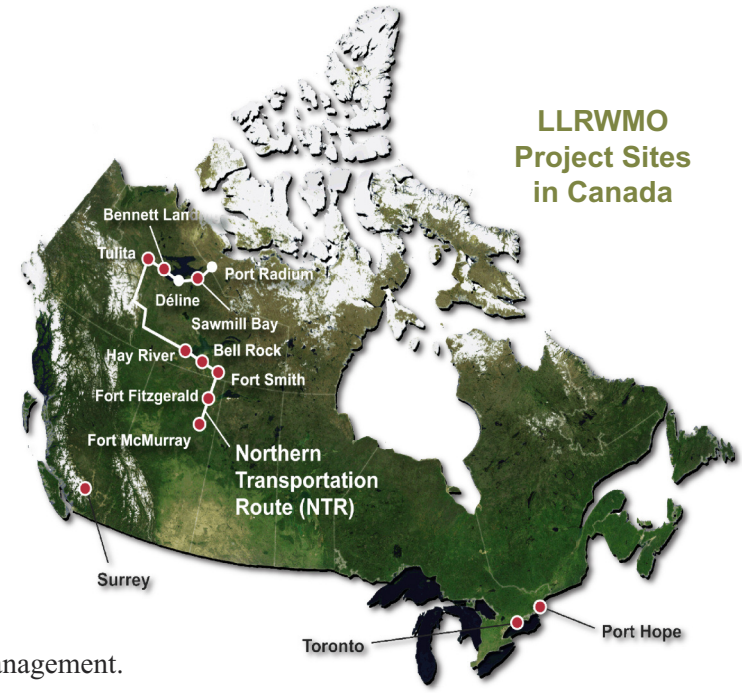
In Canada, LLRW is defined by exclusion. LLRW is radioactive waste that does not fit into the categorical definitions for intermediate-level waste (ILW), high-level waste (HLW) (also known as nuclear fuel waste), transuranic waste or certain by-product materials such as uranium mill tailings.

Most of Canada's LLRW consists of soil, that became contaminated over the past 80 years, and related waste resulting from the early operations associated with Canada's nuclear industry. The LLRW produced today is the result of activities relating to nuclear energy generation, nuclear research and development.

1. LLRWMO OVERVIEW

Classification of LLRW:

The Canadian Standards Association (CSA - *www.csa.ca*), in collaboration with industry, government and the Canadian Nuclear Safety Commission (CNSC- *nuclearsafety.gc.ca*), developed a more extensive sub-level classification of LLRW. This classification, as well as a broad description of radioactive waste management in Canada, are available in the 2012 Canadian National Report for the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.



LLRW is grouped into two broad categories for management purposes:

1) **Historic waste:**

LLRW that was managed in the past in a manner no longer considered acceptable, but for which the owner cannot reasonably be held responsible and for which the federal government has accepted responsibility for its long-term management.

2) **Ongoing Waste:**

LLRW that is generated from ongoing activities of organizations currently in operation, such as nuclear electricity generators. Owners of ongoing waste are responsible for its management.

1.2 LLRWMO SERVICES

In order to carry out its mandate, the LLRWMO provides the following services:

- *strategic planning and technical support, in collaboration with government departments and communities;*
- *removal of historic LLRW from contaminated sites and placement in temporary or long-term management facilities;*
- *identification, technical assessment and management of radioactive artefacts throughout Canada;*
- *management and monitoring of interim LLRW storage facilities and sites until long-term solutions are available;*
- *provision of information to the general public about historic waste management programs and LLRW in general;*
- *sharing of technical expertise and practical experience within the international community; and*
- *technical and management support to the Port Hope Area Initiative Management Office.*

2. HISTORIC WASTE PROGRAM

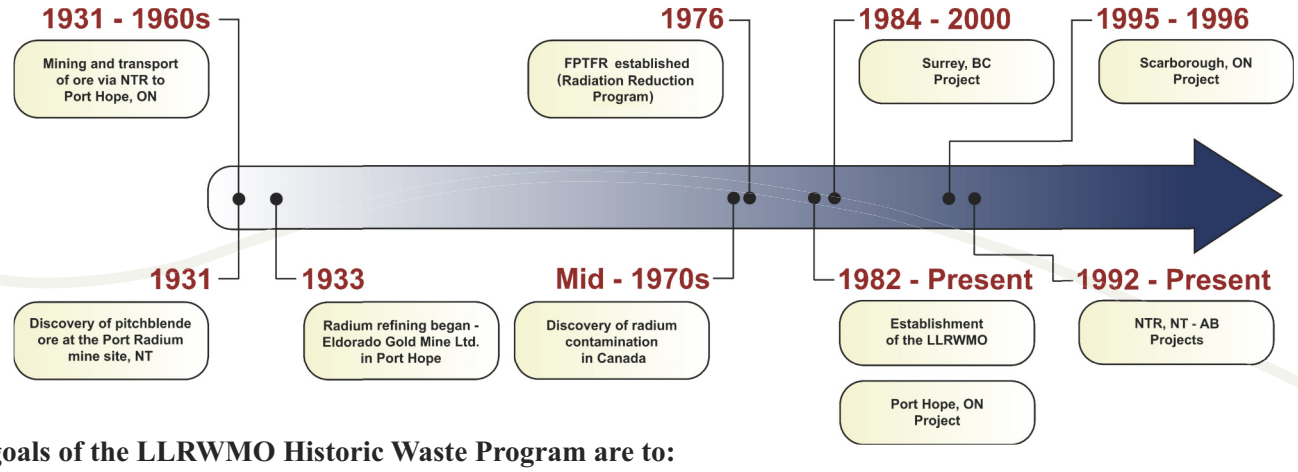
Through the Historic Waste Program, the LLRWMO carries out cleanup and long-term management of historic LLRW on behalf of the federal government. Historic LLRW contamination has been found at various locations in Canada, including Alberta, British Columbia, the Northwest Territories and Ontario.

What is "Historic" Low-Level Radioactive Waste?

Historic low-level radioactive waste is LLRW that was managed in the past in a manner no longer considered acceptable but for which the owner cannot reasonably be held responsible and for which the federal government has accepted responsibility for its long-term management.

Canada's historic LLRW mostly consists of soil mixed with process residues and contaminated material. It dates back to the 1930s when radium was mined and then refined for medical and industrial applications in Port Hope, Ontario, and the resulting waste deposited in numerous locations in the area. Historic waste also includes traces of radium-uranium ores spilled during transportation from the Northwest Territories along the Northern Transportation Route (NTR) to the refinery in Port Hope. Most of this waste is now stored safely at interim storage facilities located at or near the originally contaminated sites.

Radium Remediation in Canada - Timeline



The goals of the LLRWMO Historic Waste Program are to:

- *provide technical assessment and advice to NRCan on the development of government policies to manage historic LLRW in Canada;*
- *perform interim remediation and ongoing monitoring of contaminated sites, as required, to protect the health of Canadians and the environment in which they live prior to the availability of long-term management facilities;*
- *clean up and manage for the long term, Canada's historic LLRW at various locations in Alberta, British Columbia, the Northwest Territories and Ontario; and*
- *identify and provide technical consultation and management for radioactive artefacts found on public and private properties throughout Canada.*

2. HISTORIC WASTE PROGRAM

2.1 ENVIRONMENTAL REMEDIATION

Environmental remediation includes the identification and characterization of the contamination, the safe removal and transport of the contaminated materials to long-term or interim management sites, and restoration of the area. Since its creation in 1982, the LLRWMO has successfully developed and completed LLRW remediation projects in affected communities across Canada. Major remediation projects have been carried out in Tulita, NT and Fort McMurray, AB, along the NTR, and in Surrey, BC, as well as in Port Hope and Malvern (Scarborough), ON. A number of smaller remediation projects have been carried out in the Greater Toronto Area (GTA) and the Northwest Territories.

The LLRWMO's ongoing success depends largely on its ability to engage the public and municipal leaders through consultation and stakeholder involvement. A key component has been the LLRWMO's establishment of co-existence programs and partnerships to resolve LLRW issues in communities across Canada. The LLRWMO continues to apply these principles and practices in the environmental remediation and management of other sites along the NTR (Northwest Territories to Alberta) and in the Toronto and Port Hope areas of Ontario.

LLRWMO contractors conduct on-site sampling and analysis of excavated material.

2.2 INTERIM WASTE MANAGEMENT

The LLRWMO operates a long-established Interim Waste Management (IWM) Program to manage contaminated soil and other LLRW in communities across Canada, prior to identification and implementation of a long-term management solution. Interim waste management includes the creation of temporary waste management storage sites and facilities (licensing where applicable) and LLRW removal and placement at these locations. It also includes the inspection, monitoring and maintenance of the sites to ensure they present no hazard to local residents, workers or the environment.

LLRWMO preparing LLRW for transportation.

The IWM Program originated through the LLRWMO's work on projects throughout Canada. In collaboration with environmental management industry leaders, this program was developed to safely address and monitor LLRW in the interim, until a final management solution is available.

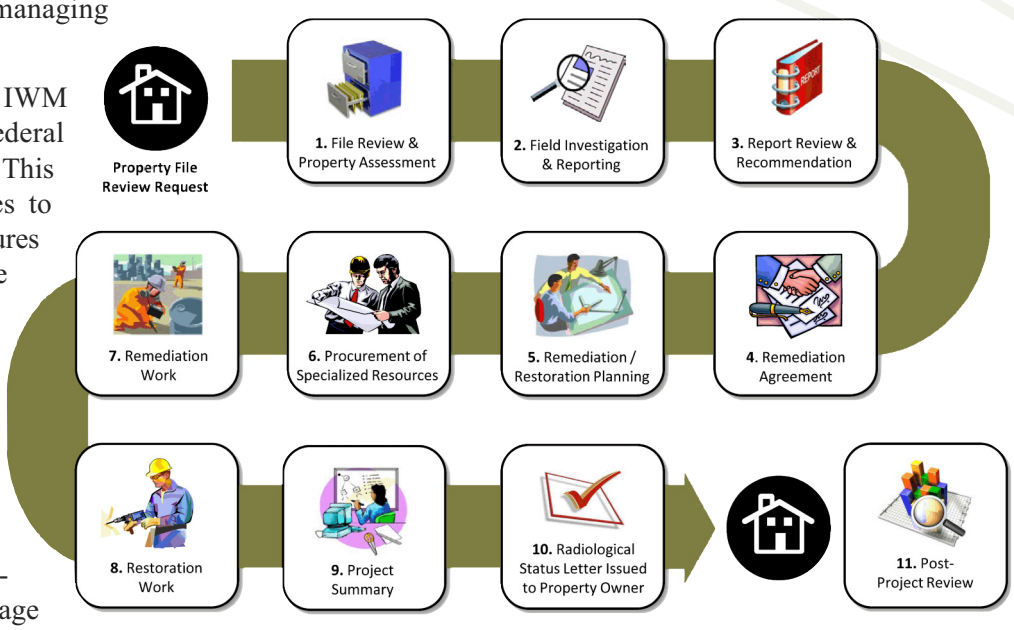
The LLRWMO continues to provide communities across Canada with its expertise developed by building on the knowledge gained from its predecessor, the Federal-Provincial Task Force on Radioactivity (FTPFR), and 30

2. HISTORIC WASTE PROGRAM

years of LLRWMO experience managing historic LLRW.

The LLRWMO has operated the IWM Program on behalf of the federal government since the late 1980s. This program has helped communities to use, develop or modify land/structures safely and with confidence while remediation planning and implementation occurred at contaminated sites. Much of the continuing success of these programs is due to co-existence programs established with the communities.

The LLRWMO uses a monitoring-through-surveillance mode to manage numerous sites in the Municipality of Port Hope, the Greater Toronto Area, Alberta and the Northwest Territories.



LLRWMO Property Remediation Process

The Interim Waste Management Program is delivered through three program components:

1) **Construction Monitoring Program (CMP)**

The purpose of the CMP is to minimize the spread of soil contaminated with historic LLRW and to reduce the risk to people and the environment that could arise from its presence during construction activities. When a property is found to be contaminated with LLRW, the contaminant is removed from the construction footprint, allowing development of the property to proceed.

2) **Property Compliance Program (PCP)**

The PCP was established to respond to owner enquiries regarding the radiological status of their properties, and to provide this information to the property owners, their lawyers or realtors. This information may be used to facilitate the sale or purchase of a property or to simply provide radiological information to the property owner.

3) **Environmental Monitoring Program (EMP)**

The LLRWMO regularly monitors the environment in the vicinity of its licensed or unlicensed historic LLRW sites through the EMP. Monitoring activities include visual inspections, gamma radiation surveys, radon measurements and water sampling. The results obtained at LLRWMO-operated licensed sites are reported annually to the CNSC.

2. HISTORIC WASTE PROGRAM

2.3 HISTORIC ARTEFACT RECOVERY

Under the Historic Artefact Recovery Program, the LLRWMO provides technical advice, including identification, recovery and management of radioactive artefacts found on public and private properties throughout Canada. Where necessary, the artefacts are characterized and transported to temporary or long-term CNSC-licensed storage facilities. Radioactive artefacts include radium-bearing dials, gauges, instruments, static eliminators, smoke detectors, thorium coated lenses and uranium ore samples.

Since the 1980s, the LLRWMO has responded to enquiries from diverse locations across Canada and internationally. The LLRWMO continues to build strong relationships with consultants, commercial recyclers and regional landfill operators in the operation of the Historic Artefact Recovery Program.

The CNSC has created a Radium Luminous Devices Program to inform the public of the identification, handling and disposal practices for the devices. The CNSC website identifies the LLRWMO as a key resource to accept the radium-luminous devices for transfer to a CNSC-licensed facility.

In 2012-2013, the LLRWMO processed requests, from Ontario, Quebec and New Brunswick, for assistance in the recovery and management of radioactive artefacts. Requests for assistance were diverse, including commercial metal recyclers, private collectors, a multi-lease commercial building owner, regional health units, a provincial college and multiple research labs.

Luminous dials contaminated with Radium paint is an example of radioactive artefacts recovered by the LLRWMO.

The LLRWMO receives many requests for recovery assistance that do not qualify for this program. Responses to these requests are beneficial to the public, consultants and government agencies since the LLRWMO provides direction and potential management options.

Examples of 2012–2013 Historic Artefact Recovery Activities:

- *Broken radium-luminous dials were collected, assessed and subsequently shipped from an electronics recycler in Stoney Creek, ON, to a licensed temporary storage facility in Mississauga, ON, to await final shipment to LLRWMO's licensed storage facility in Chalk River, ON. Because the dials were broken, additional surveys were undertaken to ensure radium contamination had not been spread about the property.*
- *Forty thorium-contaminated camera lenses, at the request of the CNSC, were assessed and collected from a non-ferrous trading company in Cambridge, ON. There were several requests for assistance with radioactive camera lenses in 2012–2013.*
- *Radium-luminous dial (gyroscope) collected from a commercial scrap recycler in Scoudouc, NB, were assessed, packaged and then transported to a licensed contractor-owned facility in Stittsville, ON, to await shipment to the LLRWMO's licensed storage facility in Chalk River, ON.*

3. ONGOING WASTE PROGRAM

Electrical utilities, nuclear research organizations, nuclear fuel manufacturers, and the producers and users of medical and other radioisotopes continue to generate LLRW. These producers are responsible for the waste they produce.

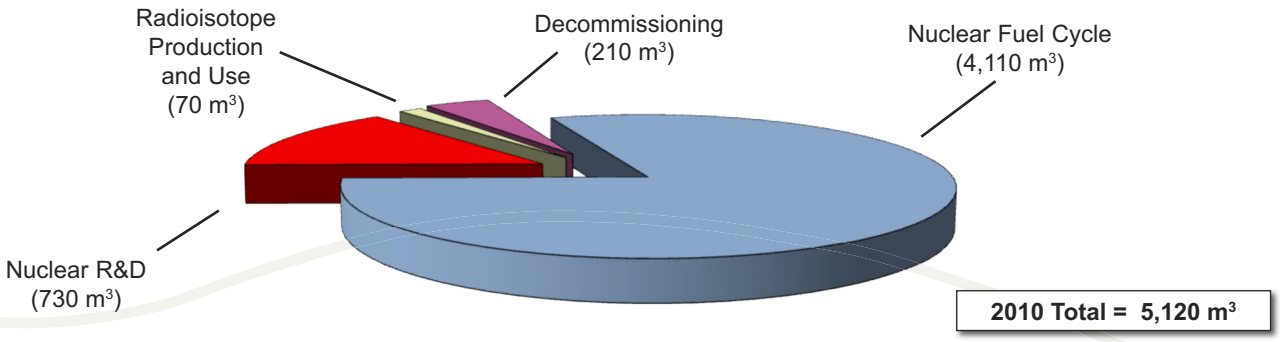
The LLRWMO assists NRCan; as required, in developing policies and strategies for the long-term management of this ongoing waste. The LLRWMO also provides assistance to NRCan in meeting its commitments to international organizations such as the International Atomic Energy Agency (IAEA) and the Nuclear Energy Agency (NEA) of the Organisation for Economic Co-operation and Development (OECD).

The fourth edition of the report "Inventory of Radioactive Waste in Canada" was distributed in Vienna, Austria at the International Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, held May 2012.

The "Inventory of Radioactive Waste in Canada" is the definitive report on the quantities of all categories of radioactive waste in Canada. The LLRWMO produces this publication every three years to correspond with the convention meetings. The LLRWMO also provided input to NRCan and AECL in response to questions by other member countries about Canada's report.

Ongoing LLRW Accumulation Rates - 2010

(Reference: Inventory of Radioactive Waste in Canada 2012)



How much radioactive waste is located in Canada?

In the 2010 calendar year, 298 m³ of nuclear fuel waste, 5,116 m³ of low-level radioactive waste, 208 m³ of intermediate-level radioactive waste, and 700,000 tonnes of uranium mine and mill tailings were produced in Canada.

The cumulative inventory at the beginning of 2011 showed 9,075 m³ of nuclear fuel waste, 2,338,000 m³ of low-level radioactive waste, 32,906 m³ of intermediate-level waste, and 214 million tonnes of uranium mine and mill tailings existing in Canada.

4. INFORMATION PROGRAM

The LLRWMO responds to enquiries and provides information about LLRW and its management to individuals and organizations in Canada and abroad. The LLRWMO offices in Port Hope and Ottawa respond by telephone, letter, email, through the website and in person. The Office also provides technical information through papers, presentations and attendance at conferences and other meetings.

In February 2013, the LLRWMO participated in the WM2013 Symposia conference held in Phoenix, Arizona.

The LLRWMO marked its 30th anniversary in 2012 by highlighting its achievements over the past three decades. The LLRWMO years of expertise and experience were clearly displayed in the brochures, posters and other display materials created to commemorate the event.

In June 2012, the LLRWMO held open houses in Fort Smith, NT and Fort Fitzgerald, AB to gather information, inform and update the respective communities on the LLRWMO's remediation and waste management activities in the area. The successful community interaction was further supported by the LLRWMO Information Program which provided information materials including large display panels, posters and brochures.

In February 2013, the LLRWMO participated in the WM2013 Symposia, an annual waste management conference held in Phoenix, Arizona. Canada was the featured country at the international conference. The LLRWMO contributed to the Managers Skills Training Workshop and delivered a presentation entitled "Remediation of Radiologically Contaminated Sites: A Canadian Perspective." The LLRWMO team also was involved in presenting two papers, titled "The Low-Level Radioactive Waste Management Office: Thirty Years of Experience in Canada – 13308" and "Case Study of Urban Residential Remediation in Port Hope, Canada – 13250." Canada's exhibit booth featured panels outlining LLRWMO activities, programs and projects and distributed various communication materials.

The LLRWMO contributed an article to *Contrôle*, a journal published by Autorité de sûreté nucléaire (France's nuclear safety organization). The article, entitled "Managing the Historic Radioactive Waste Footprint: A Canadian Perspective," was submitted in both French and English. The French version was printed in the November 2012 issue.

The LLRWMO website was redesigned, including updated and new content with more interactive user-friendly features. The website is the main point of contact with the general public. It received more than 60,000 visits during the year, or about 170 visits per day. About one-third of these visits originated outside North America, indicating the continuing high level of international interest in the LLRWMO's work.

LLRWMO marked its 30th anniversary with celebrations highlighting LLRWMO achievements over the past three decades.

5. LLRWMO PROJECTS

5.1 NORTHERN TRANSPORTATION ROUTE

Environmental Remediation

In the early 1990s, the LLRWMO identified contaminated sites along the Northern Transportation Route (NTR), a 2,200-km route, used in the past to transport uranium ore concentrates from the Northwest Territories to northern Alberta. The NTR extends from the Port Radium Mine site on Great Bear Lake via a system of lakes and rivers (including the Great Bear and Great Slave lakes and the Great Bear, Mackenzie, Slave and Athabasca rivers) south to Fort McMurray, AB.

Following the surveys of the historic transfer points along the NTR, the LLRWMO removed and consolidated contaminated soil at a number of the sites. Remediation and consolidation activities have also taken place at NT residential properties in Fort Smith and Tulita and from other uranium-ore impacted sites in Fort McMurray, AB. The LLRWMO continues to develop remediation plans with communities along the NTR, specifically in the Sahtu and South Slave regions.

In June 2012, the LLRWMO held community open houses in Fort Smith, NT and Fort Fitzgerald, AB.

For the remaining sites potentially in need of remediation, a human health risk assessment based on conservative surface gamma radiation exposure scenarios was completed and results captured in the report entitled "Northern Transportation Route Federal Assessment". The report concluded that surface gamma radiation exposure levels posed no health risk to public health and safety based on

Arial view of Fort Smith, Northwest Territories.

Canadian and International standards for the protection of public health. The report also concluded, based on a pre-screening level assessment, that ecological receptors would also not be negatively affected given the low observed gamma radiation levels.

In June 2012, the LLRWMO held open houses in Fort Smith, NT and Fort Fitzgerald, AB to inform community members about environmental remediation activities in the South Slave Region of the NTR. Although several meetings have been held since 2009 with the Smith's Landing First Nation Council, the Salt River First Nation Council and Fort Smith municipal leaders, the open houses were the first meetings in the area to focus on the overall community. The meetings were also used to solicit new data from community members, on areas of potential concern, previously unidentified. Some of the attending community members provided personal knowledge and information on the NTR, which LLRWMO staff noted for future investigation.

The LLRWMO also conducted gamma surveys at three private properties in Fort Fitzgerald, at the owners' requests. All reports indicated acceptable radiation levels.

5. LLRWMO PROJECTS

These sessions followed earlier fact-finding community meetings in Déline and Tulita in the Sahtu Region of the Northwest Territories, related to the characterization of Great Bear River sites. A detailed characterization of the Great Bear River sites is being planned for fiscal year 2013/14. Other activity in the Sahtu region included completion of a Draft Remedial Action Plan for Sawmill Bay.

LLRWMO realigned some of its remediation planning activities during the year in response to leadership changes in various levels of government, including the municipality of Fort Smith, the Smith's Landing First Nation and Salt River First Nation councils, as well as the Déline First Nation in the Sahtu Region.

Interim Waste Management

Following the discovery of uranium-ore contamination along the NTR (including former transfer sites and residential properties in Tulita and Fort Smith, NT and in Fort McMurray, AB), contaminated soil was removed and placed in interim storage facilities established in the local communities. Annual monitoring and inspections are conducted at these interim sites to ensure there is no impact on the environment or local residents. The LLRWMO also conducts inspections and environmental monitoring activities at known affected sites along the NTR that are awaiting final remediation.

In 2012, annual environmental monitoring was completed at the Beacon Hill long-term management facility in Fort McMurray, Fort Smith landfill site, Fort Fitzgerald interim storage area and the Bell Rock site. This included monitoring of a Department of Fisheries and Oceans location, where an oil container and associated waste had recently been moved.

5.2 PORT HOPE AREA

Environmental Remediation

The Port Hope area in Ontario contains more than 1.7 million cubic metres of Canada's historic LLRW. The presence of LLRW in the Port Hope area dates back to the 1930s, when radium was extracted from pitchblende ore at the Eldorado refinery in the municipality, mainly for medical and industrial applications.

From 1982 to 2008, the LLRWMO was responsible for remediation in the Port Hope area. In 2008, the Port Hope Area Initiative Management Office (PHAI MO) was established to focus exclusively on the advancement and completion of the Port Hope area remediation, based on a 2001 legal agreement between the Government of Canada and Port Hope area municipalities.

Although the LLRWMO continues to provide support to the PHAI MO, its primary focus in the Port Hope Area is to continue operating the established program that facilitates the safe use and development of land/structures in the community.

Arial view of Port Hope, Ontario.

During 2012–2013, the LLRWMO provided technical support to the PHAI MO by conducting radiological surveys

5. LLRWMO PROJECTS

of the Welcome site and Port Granby site, as well as investigative drilling and sampling programs along Lakeshore Road in Port Granby. Extensive support was provided to the investigation and verification of soils in the

LLRWMO monitors various municipal construction activities.

footprint of the new water treatment plant site at the Welcome Waste Management Facility (WWMF) and the site of the future Port Hope long-term waste management facility. LLRWMO's support was also provided to the radiation protection group through provision of contamination monitoring services and function checks of radiation protection instrumentation. The LLRWMO supplied soil samples and dilutions to determine the specifications of the field-portable technology, required by PHAI MO in support of the project.

The LLRWMO provided support to the environmental group through calculation of radon and dust concentrations.

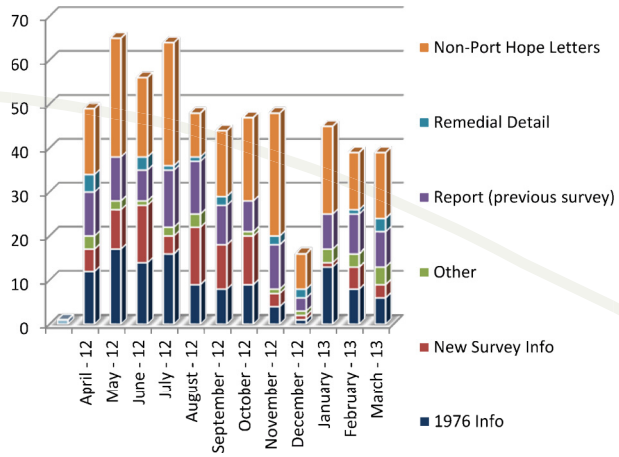
Several remediation projects on private properties were completed in Port Hope and others were advanced to the remediation planning stage.

Interim Waste Management

Since 1989, the LLRWMO has overseen the interim management of historic LLRW in the Port Hope area through its Interim Waste Management Program. The LLRWMO has a long history of operating a co-existence program within the Municipality of Port Hope, ON. The LLRWMO manages a sample preparation and analysis laboratory in Port Hope to conduct radiation surveys in support of remediation and restoration activities. This laboratory is also used to prepare material for packaging and transport, facilitating interim waste management activities across Canada.

During 2012–2013 fiscal year (FY), LLRWMO staff responded to approximately 300 requests for Construction Monitoring Program (CMP) services. Most requests were related to the ongoing construction of two new residential developments and other regular CMP activities related to additions, new decking, pool installation, etc. A total of 815 cubic metres of contaminated soil was removed from municipal and residential properties and transferred to the licensed Pine Street Extension Temporary Storage Site (PSE TSS) in the Municipality of Port Hope.

PCP Radiological Status Letter Requests (FY 2012-2013)



This work included oversight of the reconstruction and installation of infrastructure of a roadway in Port Hope (requiring daily radiation surveys during May and June of 2012), the removal of contaminated soils to PSE TSS and

5. LLRWMO PROJECTS

remediation work on excavations for water main replacement in Port Hope.

Over the years, the CMP has responded to more than 4,180 applications for construction monitoring services, of which approximately more than one-quarter were from the Municipal Public Works Department or utility companies. The accumulated volume stored at the PSE TSS is now approximately 9,150 cubic metres, just over 75% of the licensed capacity of 12,000 cubic metres. With an average of 600 cubic metres received at the storage site each year, the LLRWMO began considerations in 2012–2013 regarding alternative storage options for LLRW, pending the opening of the PHAI's Port Hope facility.

Under the Property Compliance Program (PCP), the LLRWMO also issued a total of 560 radiological status letters during the year. Of these, 216 dealt with properties outside Port Hope; mostly in the Greater Toronto Area and other locations in southern Ontario. The LLRWMO also conducted 82 property surveys; up 38 from the previous year. Surveys included exterior gamma radiation surveys with a few interior gamma and radon surveys. These surveys provide information that helps facilitate private and commercial applications and the sale of properties in the municipality.

The LLRWMO conducted its Environmental Monitoring Program (EMP) at both licensed and unlicensed sites in Port Hope throughout the year. Testing included radon in air, gamma radiation, radium/uranium/arsenic in ground and surface water, and groundwater levels. Regular visual inspections were also performed at these sites. The CNSC conducted annual inspections of the LLRWMO licensed sites to confirm the sites are being operated safely in compliance with their licences.

In 2012–2013, the LLRWMO and the PHAI MO worked to develop a joint program to continue CMP and PCP services as the PHAI remediation activities advance.

5.3 TORONTO AREA

Environmental Remediation

The LLRWMO provides radiological inspections and assessments on public and private properties, with removal of historic LLRW contamination where required, providing the owners with information, guidance and support regarding the radiological status of their properties.

In 1990, contaminated soil was removed from a site in the urban community of Malvern (Scarborough) in Toronto. In 1995-1996, the LLRWMO undertook a full-scale remediation of property sites and development lands in the community that contained radium-contaminated soil and artefacts. Since that time, a number of other sites in the Toronto area have been found to be contaminated and were remediated.

During the year, the LLRWMO completed work at a downtown Toronto site (former radium dial painting facility); an activity that was prompted by the owner in order to facilitate the renovation of the main floor by a new tenant. In May 2012, the LLRWMO completed the site assessment and remedial planning; resulting in the removal of radium contaminated building materials.

Toronto building assessment and subsequent LLRW removal.

5. LLRWMO PROJECTS

In July 2012, the LLRWMO returned to this Toronto building as the roof required replacement. Assessment and remedial planning resulted in the removal of contaminated material. At the request of this owner, the LLRWMO also provided monitoring services during the installation of duct work to upgrade existing HVAC system. No historic waste was generated during this activity period.

The contaminated material from this site was transported to a licensed storage facility, operated by an external consultant under contract to the LLRWMO, where it awaits shipment to our storage facility at AECL's Chalk River Laboratories (CRL) in Chalk River, ON.

During this year, at the request of the CNSC, the LLRWMO also completed multiple radiological assessments of two other Toronto area buildings. These assessments were used to determine the extent of radium contamination in the buildings from former radium dial painting operations, prior to their planned demolition.

Interim Waste Management

A number of known historic radium-impacted properties await remediation in the Greater Toronto Area. The LLRWMO may, if required, take possession of contaminated materials on a site-specific basis. Contamination of these sites often resulted from past radium recovery and radium-luminous dial painting activities. Regular inspections of these sites by the CNSC, attended by the LLRWMO, ensure that they are being safely managed and that the property owners continue to be aware of the regulatory requirements.

Past remedial operations, in support of property owner requirements, have resulted in the development of two historic waste consolidation mounds in the Toronto area: the Passmore Avenue Temporary Storage Site (an engineered storage mound developed by the LLRWMO that contains the marginally contaminated soil from the Malvern Remedial Project), and the Lakeshore Road Consolidation Mound (a facility under the management of the Toronto and Region Conservation Authority).

Several properties in the Greater Toronto Area are currently under licensing exemption by the CNSC. Provision of information on the property owners' obligations are regularly provided by the CNSC; in accordance with the Nuclear Safety and Control Act. The property owners have agreed to notify the CNSC and the LLRWMO if they wish to renovate, excavate or construct in the contaminated areas.

In 2012–2013, annual environmental monitoring continued at the Passmore Avenue Storage Site under the terms of a cost-recovery agreement with the Province of Ontario. The LLRWMO submitted a report entitled "2012 Annual Report - Passmore Site Environmental Monitoring and Malvern Construction Monitoring" to Infrastructure Ontario, the CNSC and the Malvern Public Library. The monitoring results included gamma radiation, radon in air, radium and uranium in groundwater, and radium in the leachate collection system. The results indicate that the site continues to perform satisfactorily and indicates no adverse impact of the site on residents or the local environment.

Passmore Avenue Temporary Storage Site (an engineered storage mound developed by the LLRWMO.)

6. FACILITIES AND LICENSING

The LLRWMO manages LLRW at a number of historic waste sites located throughout Canada, including locations in Ontario, Alberta and the Northwest Territories. Small volumes of LLRW are transported to the LLRWMO storage buildings at AECL's Chalk River Laboratories (CRL), whereas larger volumes are managed at or near their sites of origin. At some of the historic waste sites, materials have been placed in interim storage pending the development and implementation of long-term management solutions.

The LLRWMO conducts ongoing monitoring, inspection and maintenance at these interim storage sites. The historic waste at these sites includes uranium- and/or radium-contaminated soil, building materials and other contaminated items.

To enable it to carry out its responsibilities for interim management of LLRW and the associated technical activities, the LLRWMO currently holds four Waste Nuclear Substance Licences issued by the CNSC for various facilities. The table below summarizes the current licences and their descriptions.

The LLRWMO maintains and monitors the sites on a regular basis to ensure that they are being managed safely and comply with the licence requirements. All annual compliance reports were completed and forwarded to the CNSC in 2012-2013.

During 2012-2013, the LLRWMO prepared a Waste Acceptance Criteria document which provides detailed instruction in determining the requirements for the receipt of historic LLRW at designated LLRWMO storage buildings located in the Waste Management Area "D" site at CRL.

Pine Street Extension Temporary Storage Site, Port Hope, Ontario.

Facility	Licence # and Type	Description	Expiration Date
Pine Street Extension Temporary Storage Site	WNSL-W1-182.0/2021, Waste Nuclear Substance Licence	Licence for the Pine Street Extension Temporary Storage Site in Port Hope, ON	2021 December 31
Port Hope Waste Management Facility	WNSL-W1-344-1.5/ind, Waste Nuclear Substance Licence	Licence for the Pine Street Extension Consolidation Site, Strachan Street Consolidation Site & Sewage Treatment Plant Temporary Storage Site in Port Hope, ON	Indefinite from date of issue
LLRWMO Environmental Laboratory	20004-7-16.1 Nuclear Substances & Radiation Devices Licence	Licence for the LLRWMO Environmental Laboratory in Port Hope, ON	2016 September 30
Historic Waste Remediation Operations	WNSL-W2-2202.3/2016, Waste Nuclear Substance Licence	Historic low-level radioactive waste management at sites in Canada	2016 November 30

7. QUALITY, SAFETY, COMPLIANCE

In November 2006, the LLRWMO implemented an integrated Quality, Environment, Health and Safety (QEH&S) Management program, based on ISO 9001:2008, ISO 14001:2004, and CSA Z1000-06. The QEH&S program ensured optimum control of the environmental impacts of LLRWMO activities, while protecting the health and safety of the public and operational staff. It accomplished this by assisting in the maintenance of regulatory compliance and conformance with AECL's Emergency Preparedness and Response, Radiation Protection, and Radioactive Materials Shipping programs.

In 2009, the LLRWMO ISO 9001 registration was incorporated within the scope of the AECL Nuclear Laboratories Division registration. In October 2012, the LLRWMO successfully passed the ISO 9001:2008 recertification audit performed by the Quality Management Institute. This registration is valid until 2015.

The results of an Environmental Aspect Assessment Report and a draft Operational Control Assessment Report for Significant Environmental Aspects were entered into the AECL Environmental Management System (EMS) database. An Environmental Management and Protection Guideline was drafted to deal with the field activities of the LLRWMO.

A Self-Assessment gap analysis reviewed the degree to which the LLRWMO management system documentation was integrated into the AECL management system, while also addressing the unique aspects of the LLRWMO operations. As a result, LLRWMO staff worked on a new framework and format for the governing management system. Draft Organization/Overview and Governing Documentation Index documents are being developed and will be completed in the 2013/14 fiscal year.

An internal Management Performance and Program Review report for fiscal years 2010/11 and 2011/12 was completed March 2013. This review noted that the LLRWMO continued to receive excellent feedback from customers and public stakeholders. Follow-up actions in the 2013/14 fiscal year, based on some of the Program Review recommendations, include:

- *reviewing the EMP on at least a five year frequency; and*
- *revising the LLRWMO management system documentation to better align with AECL corporate systems while considering the unique operations and responsibilities of the LLRWMO.*

In March 2013, the LLRWMO was the subject of a Nuclear Oversight conformance audit. The key observation identified the need to support oversight and procedural documentation including additional LLRWMO process management tools.

In summary, the results of the gap analysis, program review and conformance audit, indicate the need to revise the LLRWMO management system documentation to better align with AECL processes in order to enhance efficiency and effectiveness of program delivery. Actions will be taken next year to better align LLRWMO management system and process documentation with the corporate AECL approach.

The QEH&S Management program is structured to satisfy the following requirements:

- **Quality** - ISO 9001:2008
- **Environment** - ISO 14001:2004
- **Health and Safety Standards** - CSA Z1000:2006

8. FINANCIAL REVIEW

The LLRWMO is a division of Atomic Energy of Canada Limited (AECL) and is separately funded by Natural Resources Canada (NRCan) through a cost-recovery agreement with AECL. Supplementary funding in FY 2012-2013 was generated through cost-recovery activities supporting other AECL divisions and external organizations. The LLRWMO's accounts and financial control systems conform to those of AECL.

LLRWMO National Program	Total Expenditure ($ thousands)	
	2011-2012	2012-2013
Historic Waste Program		
Northern Sites Initiatives		
Fort McMurray	32	26
Northern Transportation Route	594	247
Subtotal: Northern Sites Initiatives	**626**	**273**
Other Historic Waste Initiatives		
Malvern (Scarborough)	6	7
Historic Waste at Other Locations	28	108
Port Hope Area Interim Waste Management	920	779
Subtotal: Other Historic Waste Initiatives	**954**	**894**
Port Hope Area Initiatives		
Support to PHAI MO	76	81
Subtotal: Port Hope Area Initiative	**76**	**81**
Other Mandated Activities		
Ongoing Waste Program	38	1
Information Program	257	177
Environmental Operations and Support	190	245
Management, Administration and Support	919	1,283
Subtotal: Other Mandated Activities	**1,404**	**1,705**
Total LLRWMO Activities:	**3,060**	**2,953**
Cost Recovery		
Less Cost Recovery from PHAI MO	(76)	(81)
Less Cost Recovery from Infrastructure Ontario for Malvern (Scarborough)	(6)	(7)
Total Cost Recovery:	**(82)**	**(87)**
Total expenditures for NRCan funding:	**2,978**	**2,865**

8. FINANCIAL REVIEW

In accordance with past practice, the LLRWMO submitted a Business Plan for FY 2012-2013 to NRCan for approval. The plan described how the LLRWMO planned to carry out NRCan's priorities with the available funding. Each quarter, LLRWMO staff and representatives from NRCan's Uranium and Radioactive Waste Division reviewed and adjusted the Plan as necessary.

The financial statements in this annual report detail the LLRWMO's financial performance for the fiscal year ending 2013 March 31. The table illustrates how funding provided by NRCan was allocated to the LLRWMO's mandated business lines in 2012-2013. For comparison, funding for FY 2011-2012 is also provided.

8.1 AUDIT STATEMENT

Atomic Energy of Canada Limited is audited annually by the Office of the Auditor General of Canada and KPMG LLP. The audit is conducted in accordance with generally accepted auditing standards. The review of the LLRWMO's financial statements falls within the scope of that audit and the opinions expressed in the AECL audit report are equally applicable to the LLRWMO's financial results.

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