

# **AECL's Radioactive Waste Management Activities: Programs, Plans and Challenges**

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# Presentation Outline

- ❖ What wastes we are managing
- ❖ Our facilities, practices and programs
- ❖ Moving Forward: Plans & Challenges

# Canada's Nuclear Beginnings

## ZEEP

First controlled nuclear chain reaction outside the United States



1945

## NRX

Research reactor generated highest neutron flux in the world



1947

## Cobalt-60

Pioneered the use of the radioisotope for medical diagnosis



1951

## NRU

World's most powerful research reactor and first online refueling



1957

## NPD

Canada's first power generating reactor proves the CANDU concept



1962

## WR-1

World's first organic-cooled research reactor starts up in Whiteshell Labs



1964

# Radioactive Waste Management Activities

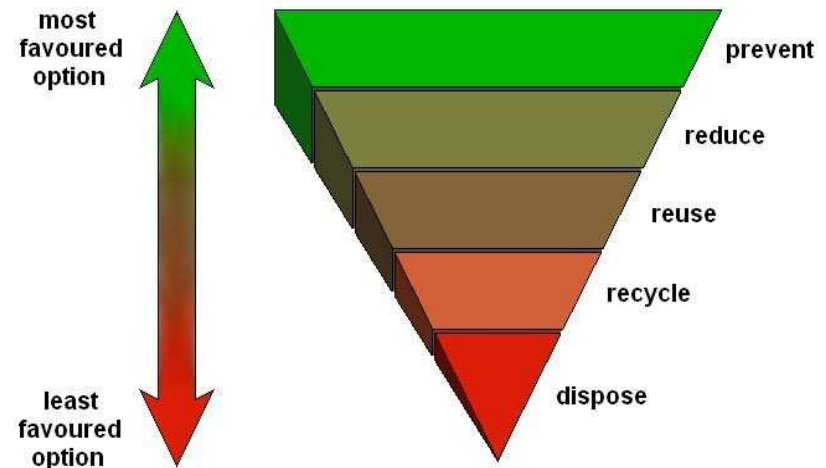
**AECL's Radioactive Waste Management activities include the following:**

- ❖ Waste Management Program
- ❖ Addressing Liabilities through Funded Programs
  - Nuclear Legacy Liabilities Program (at AECL sites)
  - Canada's Historic Waste Program
    - Port Hope Area Initiative
    - Low Level Radioactive Waste Management Office
- ❖ Waste Management Operations
- ❖ Technology Development
  - Currently limited to support programs



# Waste Management Program (est. 2007)

- ❖ Requirements established for all waste management activities
  - Meets regulatory requirements
- ❖ Program Objectives:
  - Life-cycle improvements
  - Assisting/training waste generators: focus on minimization
  - Oversight to ensure activities meet regulatory requirements



**Waste Minimization Hierarchy**

# Nuclear Legacy Liabilities Program



1945

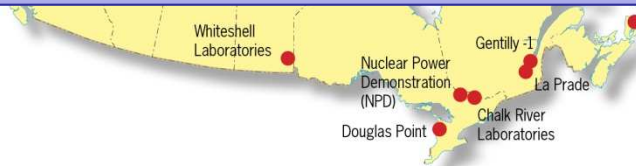
Chalk River Laboratories (CRL)



1962

Whiteshell Laboratories (WL)

## Environmental Restoration of the Government of Canada's Nuclear Sites



1962

Nuclear Power Demonstration (NPD)



Gently-1 (G1)



Douglas Point (DP)

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# Port Hope Area Initiative

*The purpose of the Port Hope Area Initiative is the cleanup and safe storage of historic low-level radioactive waste in the Municipality of Port Hope and Municipality of Clarington, leaving an honourable legacy for future generations.*

- ❖ The final long-term waste management facilities are above-ground, engineered mounds, and are community-based solutions
- ❖ Project delivery is led by AECL through the PHAI Management Office, with Public Works & Government Services and Natural Resources Canada staff carrying out defined work scope



# Radioactive Waste Storage at CRL: 1945 – Today

Past Practice: Below-ground storage

Today: Continued safe storage with monitoring, and intervention as required





# Radioactive Waste Storage at CRL: Today & In Future

Current Practice: Moving to Above-ground Storage Facilities



MAGS



WMA "B"

Intermediate & High Level Waste

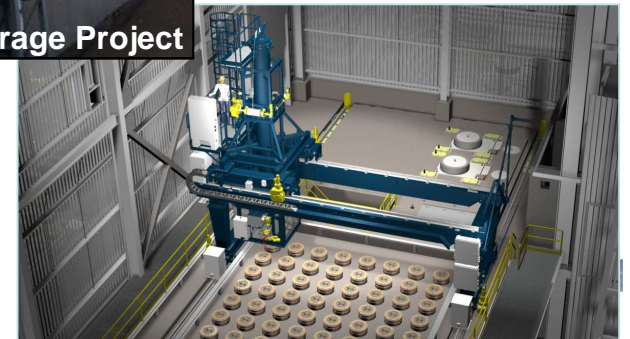
Low /Intermediate Level Waste



SMAGS



Fuel Packaging & Storage Project



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# Waste Generated from Site Decommissioning: New Considerations



**Building and Equipment  
Demolition &/or Removal**



Large components, large volumes,  
variable waste types

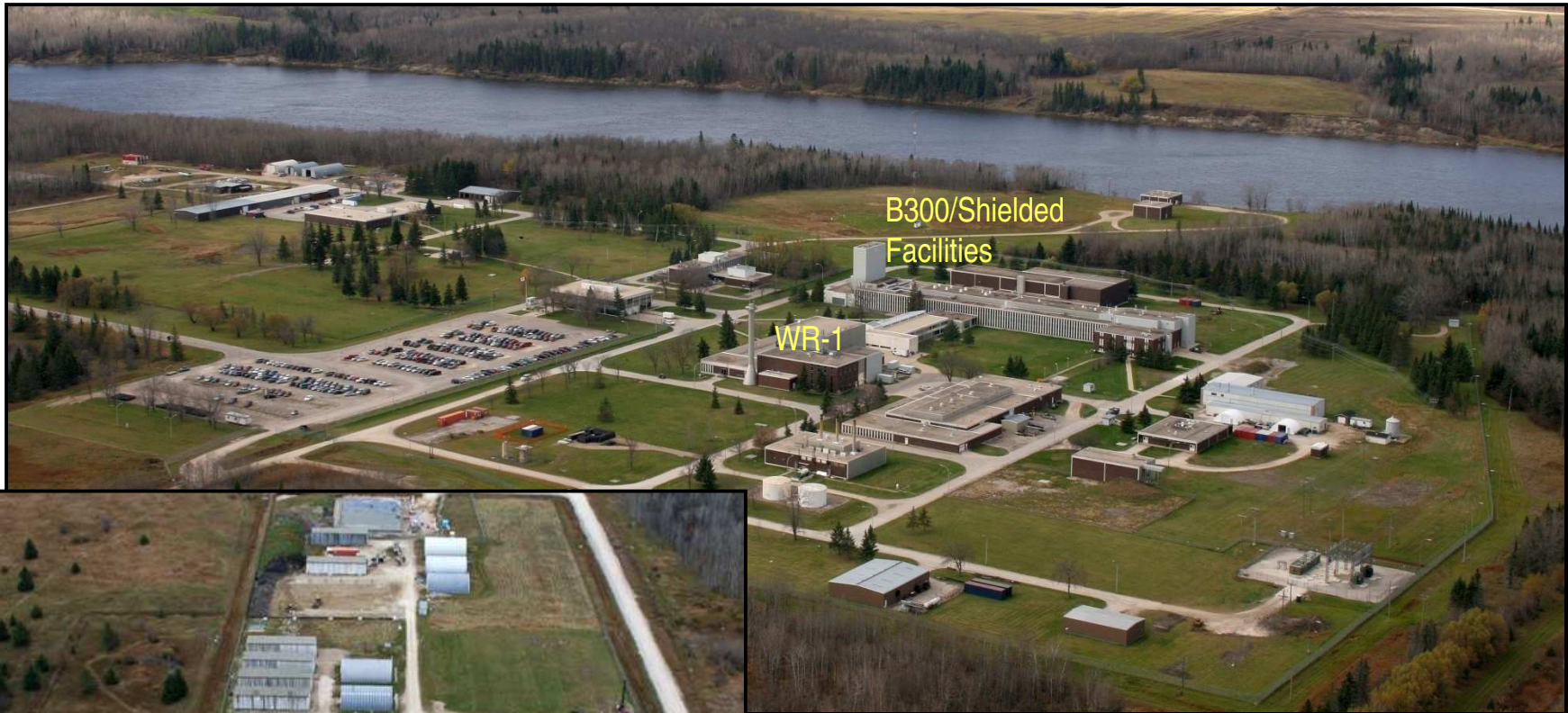


**Environmental Remediation**



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# Whiteshell Laboratories (WL) Decommissioning Project



**Main Campus from Northeast**

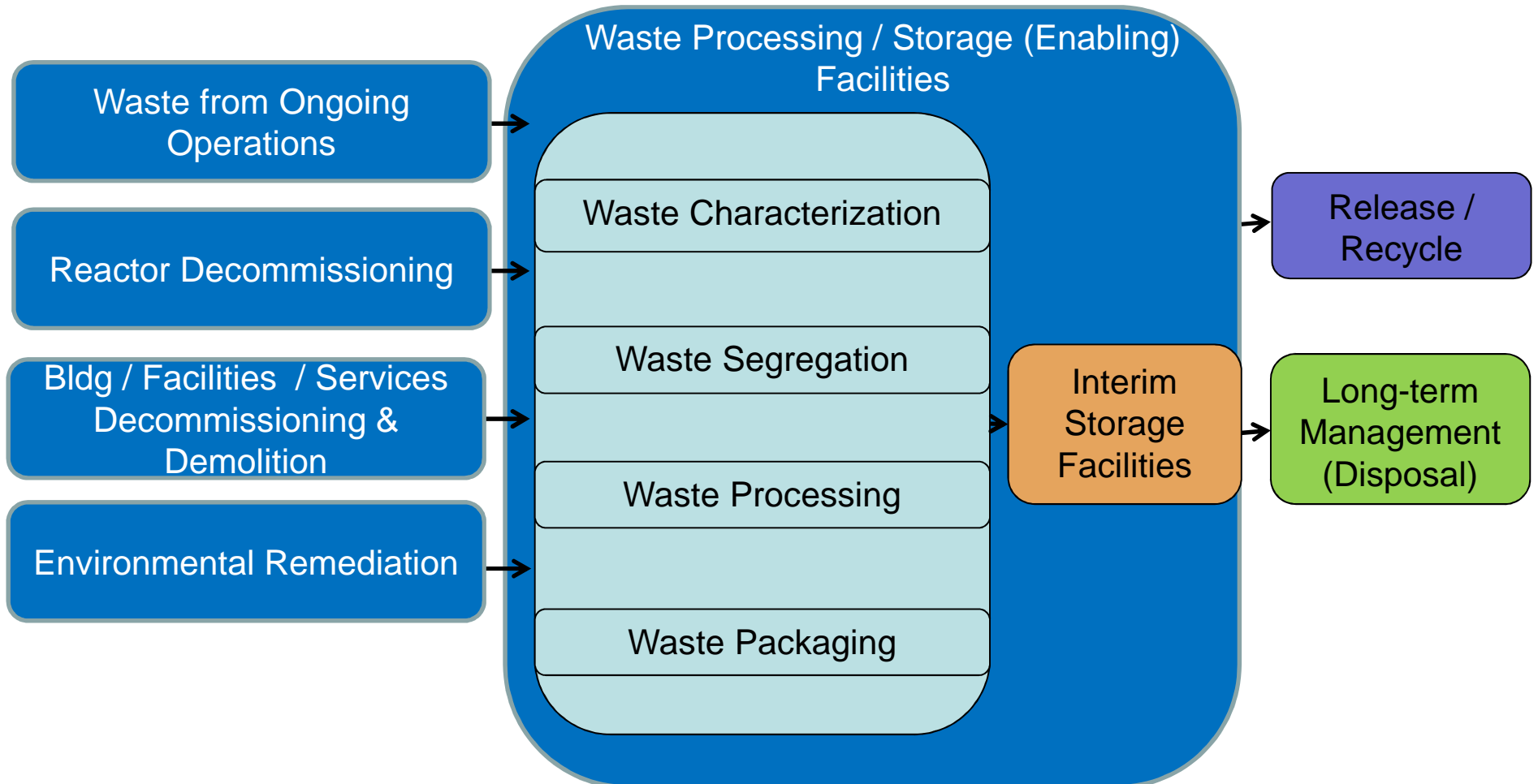


**Waste Management Area from South**

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# Waste Management Program Activities

An integrated view is required.....



# Integrated Waste Plan

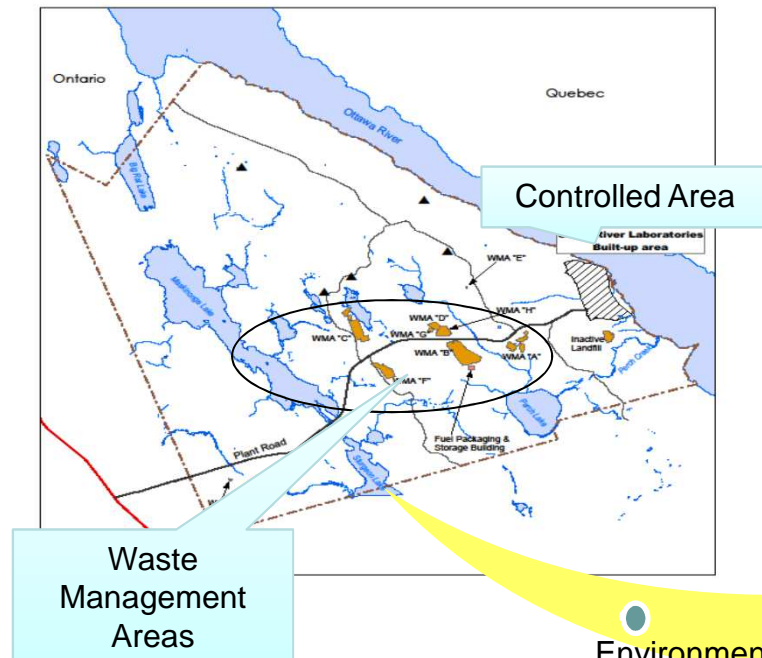
- ❖ Describes strategies for managing existing and future wastes; complete for CRL and to be extended to address all waste inventory
- ❖ Integrates interactions between waste types, facilities, and timelines
- ❖ For “enabling” facilities:
  - Illustrates what decisions need to be made, and when
  - Shows key interactions that need to be considered in options studies
- ❖ Based on a master data set, including:
  - All wastes currently in storage
  - Estimates of all wastes yet to be generated
- ❖ Modelled on the process used in the UK

# Long-Term Management

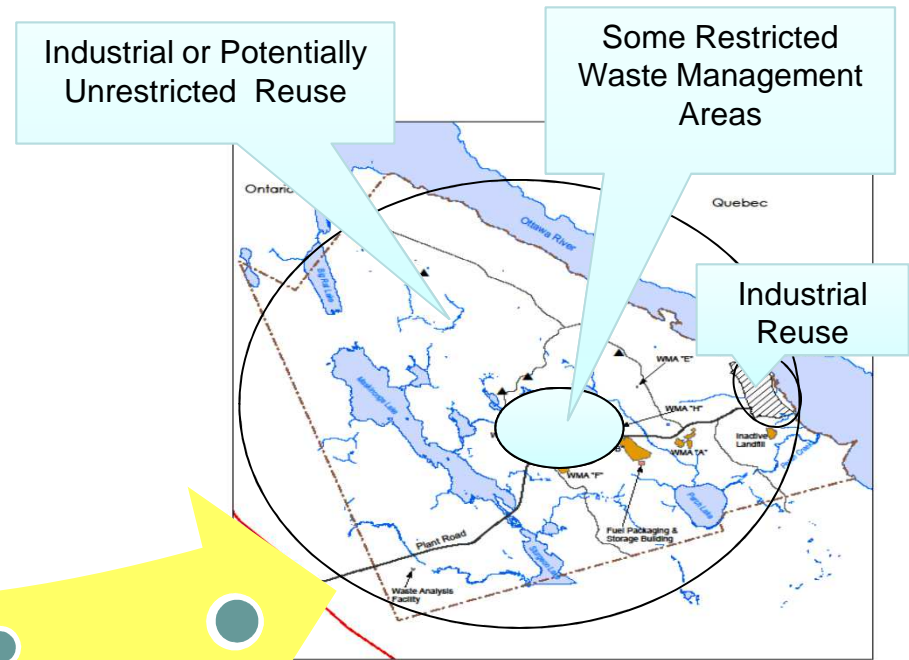
- ❖ Reference Strategy includes:
  - In-Situ Disposal
  - Very Low Level Waste (VLLW) Facility
  - Geologic Waste Management Facility
  
- ❖ Assessments, feasibility studies and pre-project planning in progress
  
- ❖ Integrated view includes:
  - Wastes from ongoing operations of a multi-mission R&D site
  - Decommissioning activities

# Long-Term Management Strategies: Integrate Site End-State Vision

## Current Situation (Entire Site = Restricted Use)



## End-State Vision



Environmental  
Restoration Plan

Integrated  
Decommissioning  
Plan

Integrated Waste  
Plan



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# Moving Forward: Addressing the Challenges

- ❖ Confirming adequacy of waste storage
  - Environmental monitoring and assessments
  - Field characterization studies
  - Condition assessments of waste storage structures
  - Condition assessments of facilities in “storage with surveillance”
  - Remediation as required
- ❖ Developing enabling facilities and services
  - Waste characterization
  - Waste volume reduction
  - Waste repackaging
- ❖ Reducing risk and liability
  - Legacy liquid waste solidification
  - Recovery of special waste emplacements
  - Infrastructure decommissioning/demolition



# Moving Forward: Strategic Initiatives

- ❖ Develop Waste Acceptance Criteria for future facilities
  - Characterize and package waste for storage today, which will be suitable for long-term management in future facilities without repackaging
- ❖ Advance strategies for public participation in the development and selection of long-term management options
  - Waste inventory & characteristics
  - Site end-state following decommissioning
- ❖ Move minimization and management of radioactive waste to an operational priority
  - Waste minimization (starts with design)
  - Integrated within comprehensive risk & cost assessments

# Conclusions

- ❖ A formalized Waste Management Program is in place to drive continuous improvement in the life-cycle management of radioactive waste
- ❖ An Integrated Waste Plan is in place to guide an iterative process to optimize future actions and activities
- ❖ Strategies for the selection and development of long-term management options are being advanced
  - Selected for the Historic Wastes addressed by the Port Hope Area Initiative
- ❖ Risk and liability reduction is being achieved via progress on infrastructure decommissioning, environmental remediation, and enabling facilities/activities associated with waste storage

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