Outline

- Canadian Regulatory Framework
- Categories of Wastes
- Waste Management Programs in Canada
- Managing of industrial Wastes
- Concluding Remarks
Canadian Nuclear Safety Commission
Regulatory Framework
Mandate and Legislative Requirements

• Nuclear regulation falls under federal jurisdiction
• CNSC is Canada’s single nuclear regulator
• Regulate the use of nuclear energy and materials
• Implement Canada's international commitments
• Disseminate information to the public
• Composed of 800 staff and the Commission

70 years of nuclear safety
The Commission

• Independent, quasi-judicial tribunal and court of record
• Supported by scientific, technical and professional staff
• In-house or in communities
• Written and/or oral interventions
  • CNSC staff, applicant and interveners
  • teleconferencing / videoconferencing available
• Webcast live in English and French
  • translated for Indigenous communities, as required
• Transcripts and archived webcasts available on-line
• All decisions are made available to the public

Transparent, science-based decision-making
CNSC Regulatory Framework and Philosophy

- The Nuclear Safety and Control Act is the enabling legislation
- The Commission makes regulations through a transparent process
- Regulatory requirements are continuously updated based on a systematic and transparent process
  - Reflected in a comprehensive 10-year plan
  - Aligned with IAEA safety standards
  - Adoption of national and international standards in regulatory framework
- Extensive consultation is held with all stakeholders
  - Starts with discussion papers that are open and transparent
  - Public comments solicited for draft regulatory documents

Regulatory philosophy is risk-informed
CNSC regulates all nuclear-related facilities and activities

- Uranium mines and mills
- Uranium fuel fabricators and processing
- Nuclear power plants
- Nuclear substance processing
- Industrial and medical applications
- Nuclear research and educational
- Transportation
- Export/import control
- Security and Safeguard
- Waste management facilities

From Cradle to Grave

nuclearsafety.gc.ca
Categories and Types of Wastes
There are four classes of radioactive waste in Canada

Classes of radioactive waste are organized according to the containment and isolation required to ensure safety in the short and long term and take into consideration the risk to the health and safety of humans and the environment.

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Uranium mine and mill waste</strong></td>
<td>Includes tailings and waste rock generated by the mining and milling of uranium ore.</td>
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<tr>
<td><strong>Low-level radioactive waste</strong></td>
<td>Is more radioactive than clearance levels and exemption quantities. Examples include: mop heads, rags and paper towels.</td>
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<tr>
<td><strong>Intermediate-level radioactive waste</strong></td>
<td>Contains enough long-lived radionuclides to require isolation and containment. Examples include: filters, resins and used reactor components.</td>
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<tr>
<td><strong>High-level radioactive waste</strong></td>
<td>Is primarily used nuclear fuel, along with small amounts of waste that generate significant heat.</td>
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Radioactive Waste Streams in Canada

Licensed Facilities in Canada

**Intermediate-Level Radioactive Waste**
- **Ongoing**
  - Canadian Nuclear Laboratories (CNL)
  - Nordion
- **Legacy**
  - AECL
  - CNL

**Low-Level Radioactive Waste**
- **Ongoing**
  - CNL
  - Cameco
  - Waste Nuclear Substances Licensees
- **Legacy**
  - AECL
  - CNL
- **Historic**
  - Low-Level Radioactive Waste Management Office (LLRWMO)

**Uranium Mine and Mill Tailings**
- **Operating**
  - Cameco
  - AREVA
- **Inactive**
  - Former operators

**CNSC Independent Regulator**

**Licensed Facilities in Canada**
- AECL
- CNL
- Cameco
- AREVA
Uranium Mines and Tailings Sites

Active
1 - Key Lake
2 - Rabbit Lake
3 - McArthur
4 - McClean Lake
5 - Cigar Lake

Inactive / Decommissioned
1 - Key Lake
2 - Rabbit Lake
6 - Beaver Lodge
7 - Gunnar
8 - Lorado
9 - Port radium
10 - Rayrock
11 to 18 - Elliot Lake Area Sites:
Quirke, Panel, Denison, Lancor, Nordic, Pronto, Spanish-American, Stanrock, Stanleigh
19 - Agnew Lake
20 to 22 - Bancroft Area Sites:
Madawaska, Bicroft, Dyno
23 - Cluff Lake
24 - Deloro

Radioactive Waste Sites

Active Sites
25 - Blind River
26 - Bruce NGS
27 - Pickering
28 – Darlington
29 - Point Lepreau
30 - Chalk River Laboratories

Inactive / Decommissioned
31 - Douglas Point
32 - Rolphton NPD
33 - Gentilly 1, Gentilly 2 NGS
34 - Whiteshell Laboratories
35 - Port Hope, Port Granby, Welcome

Waste Management Facilities/Areas

Low Level
Intermediate Level
High Level
Waste Management Programs
CNSC Principles for Waste Management

Waste Management Programs are required at all CNSC-licensed facilities

This waste program should encompass

- Reduce, reuse, recycle
- Reduction of environmental footprint through recycling
- Plan for the complete life of the facility including financial guarantee
- Defence in depth – never rely on a single system or process for protection
Waste Management Program

- Per Regulatory direction, requirements and processes established for waste management activities

- Program objectives:
  - Lifecycle improvements
  - Assisting/training waste generators: focus on segregation and minimization
  - Oversight to ensure activities meet regulatory requirements

- Continuous improvement in waste reduction, recycling and reuse, expanding characterization capabilities

Reduce, Reuse, Recycle
Minimization Efforts for Low-Level Waste

- **Waste Reduction at Source**
  - Focus on pre-job briefings
  - Segregation of metal waste
  - Segregation of launderable Personal Protective Equipment (PPE)
  - Communication campaigns

- **Waste diversion**
  - Use of launderable/washable PPE
  - Free release of clean waste and metals
  - De-packaging of materials

- **Volume Reduction and minimizing of interim storage space requirements**

  - Compaction – 75 percent reduction
  - Incineration – 95 percent reduction
Management of Industrial Waste
EnergySolutions Canada Corp. Installation Highlights

• Low-risk installation that manages the handling and processing of LLW from licensed nuclear facilities

• Radioactive material is either:
  - sorted and/or repackaged at the installation
  - directly shipped to the United States for processing via incineration or recycling

• Resultant ash from incineration is returned to this installation and then routed to a licensed Canadian waste management facility
UniTech Services Canada Ltd.
Installation Highlights

- Low-risk installation providing decontamination services for clothing, tooling and equipment for Canadian licensees

- UniTech’s activities involve:
  - Picking up prepackaged contaminated clothing and tools from Canadian licensees
  - Exporting to UniTech’s facilities in the United States for decontamination
  - Returning the items to the owner following decontamination
Chalk River Laboratories (CRL)

The Chalk River Laboratories (CRL) manages a total of 8 types of waste, here is a list of the non-nuclear waste managed:

- Isotope production and usage wastes
- Hot cell operations wastes
- Decontamination and decommissioning wastes
- Remediation wastes
- CRL and offsite misc. wastes
- Liquid wastes

Chalk River Laboratories

Aerial View of Chalk River Laboratories, Ontario
Photo courtesy of AECL
CNL is proposing a near surface disposal facility for its low and intermediate wastes. The facility is expected to be operational for approximately 50 years and will be expanded as required to receive up to 1,000,000 cubic meters of radioactive waste over its operational lifetime.
Nordion (Canada) Inc.

Industry implemented sealed source design to facilitate sustainable return mechanism

• Uniform design
• Optimized for recycling
Concluding Remarks
Conclusions

Canada continues to demonstrate

- Its openness and transparency
- Its commitment to the safety of human health and the environment
- Its commitment to the improvement of the safety of radioactive waste management

All categories of radioactive waste are currently managed in storage facilities that are safe, secure and environmentally sound