



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Safety and Security Aspects of the Management of High Level Waste and Spent Fuel

Ramzi Jammal
Executive Vice-President and Chief Regulatory
Operations Officer
Canadian Nuclear Safety Commission

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Canadian Nuclear Safety Commission

Regulates the use of nuclear energy and materials to protect the **health, safety** and **security** of Canadians and the **environment**; and to **implement** Canada's **international commitments** on the peaceful use of nuclear energy.



*Celebrating 65 years
of nuclear safety!*

Canada's Legislative/Regulatory Framework for Radioactive Waste

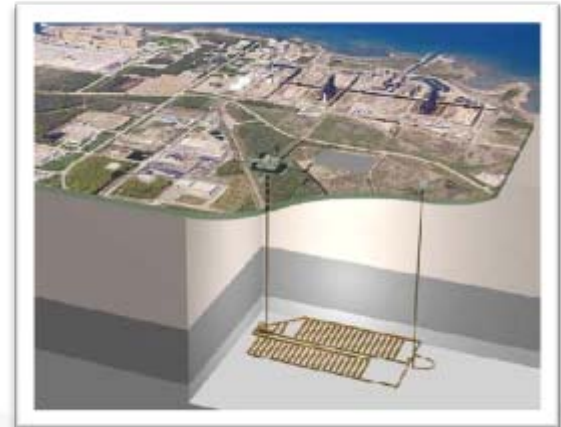
- ✦ CNSC Regulatory Policy P-290
“Managing Radioactive Waste” (2004)
- ✦ *Nuclear Fuel Waste Act* (2002)
- ✦ *Nuclear Safety and Control Act* and regulations (2000)
- ✦ *Policy Framework for Radioactive Waste* (1996)
- ✦ *Canadian Environmental Assessment Act* (1992)
- ✦ *Nuclear Liability Act* (1985)

A strong foundation for safe management of nuclear waste



CNSC Regulates All Nuclear-Related Facilities and Activities

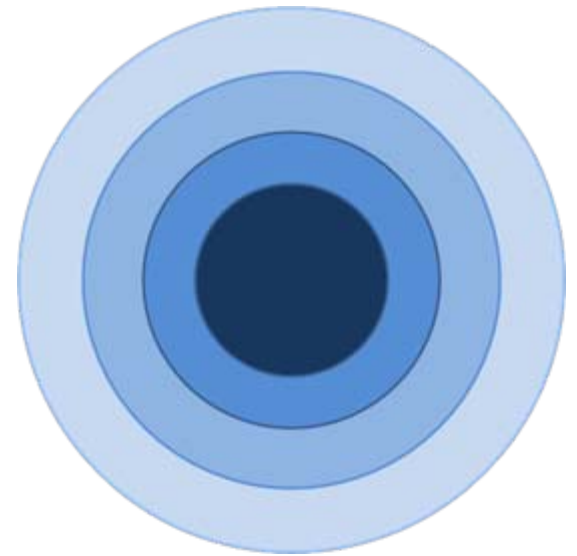
- 🇨🇦 Uranium mines and mills
- 🇨🇦 Uranium fuel fabricators and processing
- 🇨🇦 Nuclear power plants
- 🇨🇦 Radioactive waste management facilities
- 🇨🇦 Nuclear substance processing
- 🇨🇦 Industrial and medical applications
- 🇨🇦 Nuclear research and educational
- 🇨🇦 Export/import control



...From Cradle To Grave

Regulatory Approach for Radioactive Waste

- ❖ Approach stems from the *Nuclear Safety and Control Act (NSCA)* and CNSC regulations
- ❖ CNSC regulatory policy document ***P-290, Managing Radioactive Waste***
- ❖ Three principles:
 - Plan for the complete life of the facility
 - Multi-barriers between radioactive material and people/the environment
 - Defence in depth – never rely on a single system or process for protection



CNSC Regulatory Expectations regarding Waste Management

3 R's -International best practices must be met

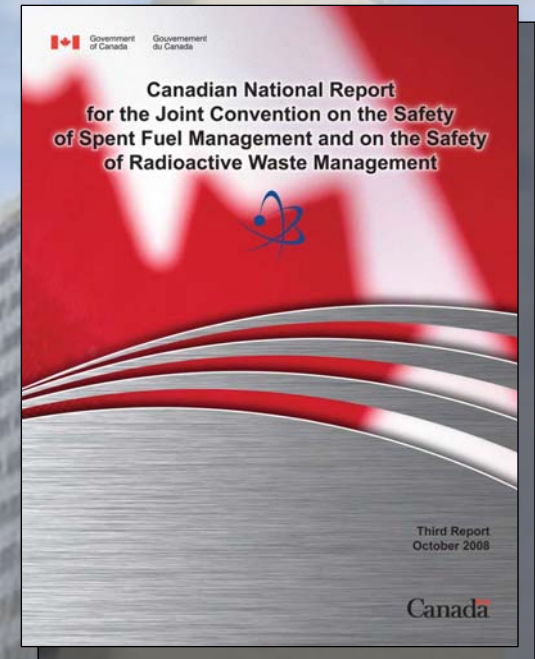
- Methods used must always ensure that the health and safety of persons and the environment are protected
- Some of the strategies to minimize volume of radioactive waste include:
 - reusing and recycling by separating radioactive components from non-radioactive ones
 - preventing contamination of materials by limiting amounts in radioactive areas
 - assessing technology advances in waste minimization
- Not clear where international community stands regarding recycling
 - Steam generators



Reduce, Reuse, Recycle

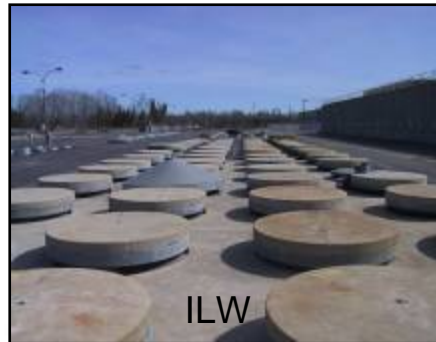
International and National Perspectives

- 🍁 Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- 🍁 International Atomic Energy Agency
 - Waste Safety Standards Committee
- 🍁 Canadian Standards Association (CSA)



Classification of Radioactive Waste

- 1) High-level radioactive waste (HLW)
- 2) Intermediate-level radioactive waste (ILW)
- 3) Low-level radioactive waste (LLW)
 - low-level short-lived radioactive waste (VSLLW)
 - very-low-level radioactive waste (VLLW)
- 4) Uranium mine and mill tailings
 - Classification specific to Canada

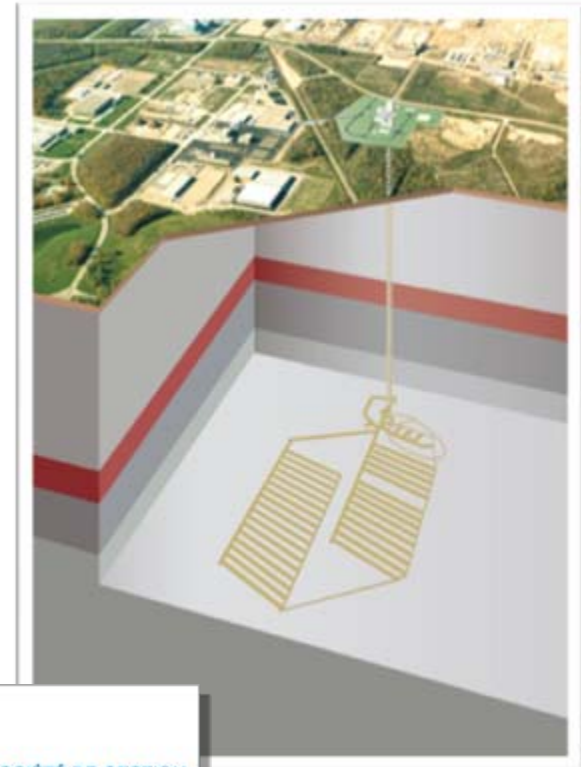


Interim Management of Spent Fuel (HLW)

- ❖ Each reactor site has wet storage pools for spent fuel storage (15 to 20 yrs of operation)
- ❖ After a period in wet storage (7 to 10 yrs), used nuclear fuel can be transferred to dry storage
- ❖ Each reactor site has facilities for the safe, dry storage of spent fuel
- ❖ Dry storage facilities:
 - are monitored and have no impact on the public and the environment
 - meet requirements for national security and international agreements

Long-term Management of Spent Fuel

- ❖ June 2007 – Adaptive Phased Management (APM) accepted by the Government of Canada for the long-term management of spent fuel
- ❖ May 2010 issuance of Site Selection Process
- ❖ Operational by 2035 (funding estimation)



<http://www.nwmo.ca/>



Government of Canada commitment for waste and legacy

- ❖ Nuclear Legacy Liabilities Program (NLLP)
 - New 70-year, long-term strategy adopted in 2006
 - Currently recognized as \$3.2 billion liability (Net Present Value) in Public Accounts of Canada
- ❖ Initiated in 2006 with \$520 million, 5-year start-up phase
- ❖ NLLP renewed in 2011 with 3-year, \$439 million second phase (to March 2014)



Leading the world.

The Fukushima Incident - Waste Management

- Spotlight on the nuclear industry
- Public confidence waning
 - Need to work harder to demonstrate safety record
- Raising questions about spent fuel bays
 - From wet to dry – a matter of timing
 - Significant contribution to the source term came from spent fuel
 - Seismic qualification
 - External hazards – combined events
 - Mitigation measures to stop the progression of the incident

Must reassess everything nuclear including waste

Concluding Comments

- ❖ Safe, secure and environmentally sound storage of radioactive waste
 - Life-cycle licensing, compliance and enforcement of radioactive waste management facilities
 - CNSC monitors and assesses physical security and implements the requirements of the Canada/IAEA safeguards agreements
 - Lessons learned from Fukushima have been applied to Canadian waste facilities
- ❖ Need to regain public confidence through our actions
- ❖ International focus on waste / spent fuel and messaging on managing waste



**We Will Never
Compromise
Safety...**

...It's In Our DNA!



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