



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

Canada

# The Canadian Nuclear Safety Commission

## *Nuclear and Energy Safety & Security Governance*

**Jason K. Cameron, Vice-President  
Regulatory Affairs Branch**

Canadian Nuclear Safety Commission

Centre for International Governance Innovation  
Central Asia Security Governance Conference  
May 15 – 17, 2017



CANADA 150



## *Canadian Nuclear Safety Commission*

- ▶ Regulates the use of nuclear energy and materials to protect **health, safety, security** and the **environment**
- ▶ Implements Canada's **international commitments** on the peaceful use of nuclear energy
- ▶ **Disseminates objective scientific, technical and regulatory information** to the public



***We will never compromise safety***



## *The CNSC regulates all nuclear facilities and activities in Canada*

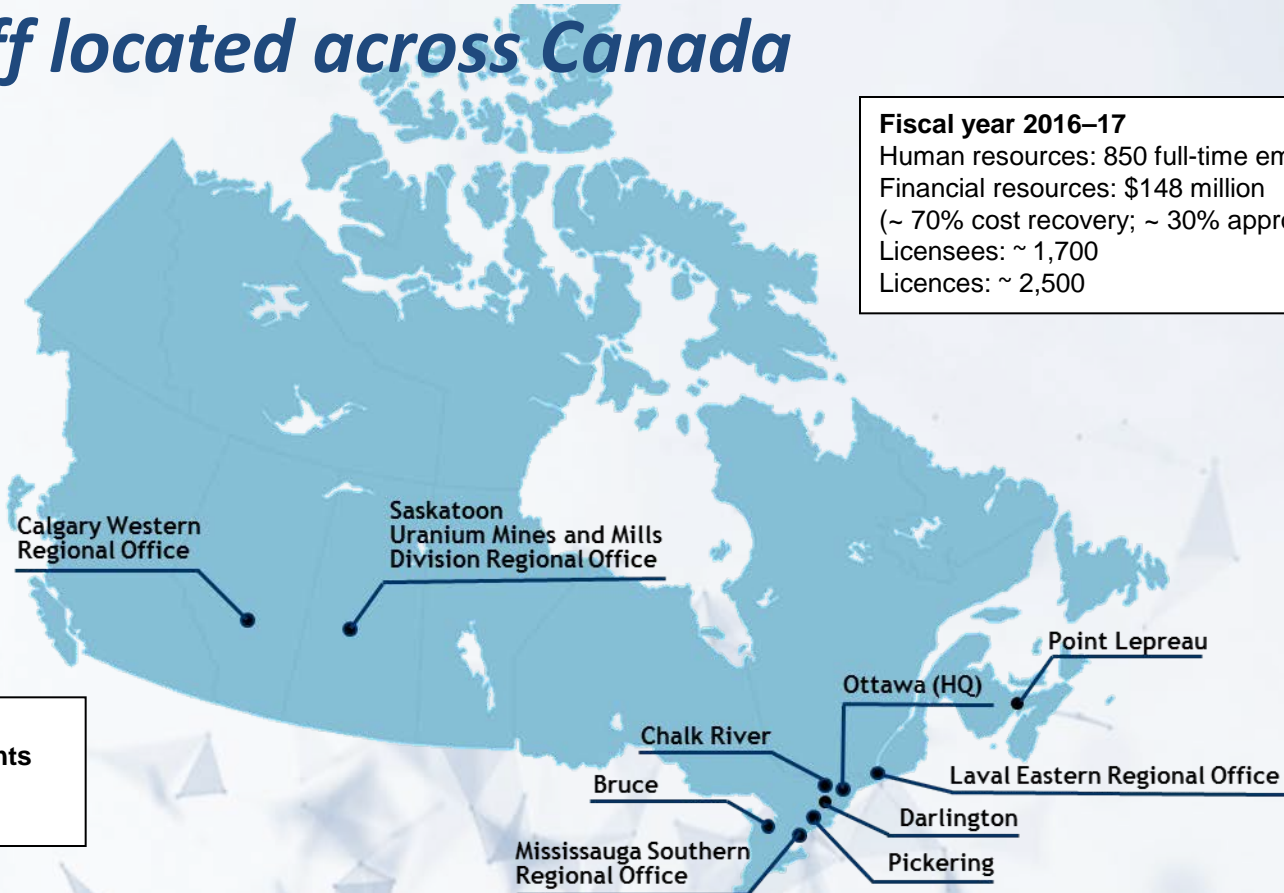
- ▶ Uranium mines and mills
- ▶ Uranium fuel fabrication and processing
- ▶ Nuclear power plants
- ▶ Nuclear substance processing
- ▶ Industrial and medical applications
- ▶ Nuclear research and educational activities
- ▶ Transportation of nuclear substances
- ▶ Nuclear security and safeguards
- ▶ Import and export controls
- ▶ Waste management facilities



*...from cradle to grave*



# CNSC staff located across Canada



**Fiscal year 2016–17**  
 Human resources: 850 full-time employees  
 Financial resources: \$148 million  
 (~ 70% cost recovery; ~ 30% appropriation)  
 Licensees: ~ 1,700  
 Licences: ~ 2,500

**HQ in Ottawa**  
**4 site offices at power plants**  
**1 site office at Chalk River**  
**4 regional offices**



## *Independent Commission*

- ▶ Quasi-judicial administrative tribunal
- ▶ Agent of the Government of Canada (the Crown)
- ▶ Reports to Parliament through Minister of Natural Resources
- ▶ Commission members are independent and part-time
- ▶ Commission hearings are public and webcast
- ▶ Staff presentations in public
- ▶ Decisions are reviewable only by Federal Court



*Transparent, science-based decision making*





# Commission Members



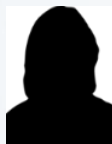
**Dr. Michael Binder**  
President and Chief Executive  
Officer, CNSC  
(Term expires May 8, 2018)



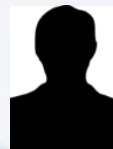
**Dr. Alexander (Sandy) McEwan**  
Chair, Department of Oncology,  
University of Alberta  
Edmonton, Alberta  
(Term expires Mar. 6, 2018)

## New interim Commission members

- **Dr. Sandor Jean Demeter** (one-year term)
- **Mr. Rob Seeley** (one-year term)
- **Dr. Soliman A. Soliman** (one-year term)



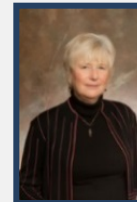
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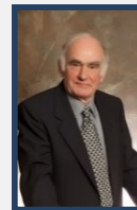
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Commission members Tolgyesi and Velshi are authorized to complete files they were working on at the time their terms expired.

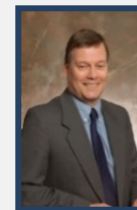
## Deep Geologic Repository (DGR) Joint Review Panel (JRP)



**Dr. Stella Swanson**  
Biologist and Environmental  
Consultant  
Rocky, Saskatchewan



**Dr. Gunter Muecke**  
Professor  
Department of Geology,  
Dalhousie University  
Halifax, Nova Scotia



**Dr. James F. Archibald**  
Professor  
Department of Mining, Queen's  
University  
Kingston, Ontario



# *Safety – The Cornerstone of the CNSC Mandate*

## *Section 24(4) of the Nuclear Safety and Control Act (NSCA)*

No licence shall be issued, renewed, amended or replaced... unless, in the opinion of the Commission, the applicant...

- (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and
- (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed

### Regulatory philosophy

**Licensees responsible for** the protection of health, safety, security and the environment, and respecting Canada's international commitments

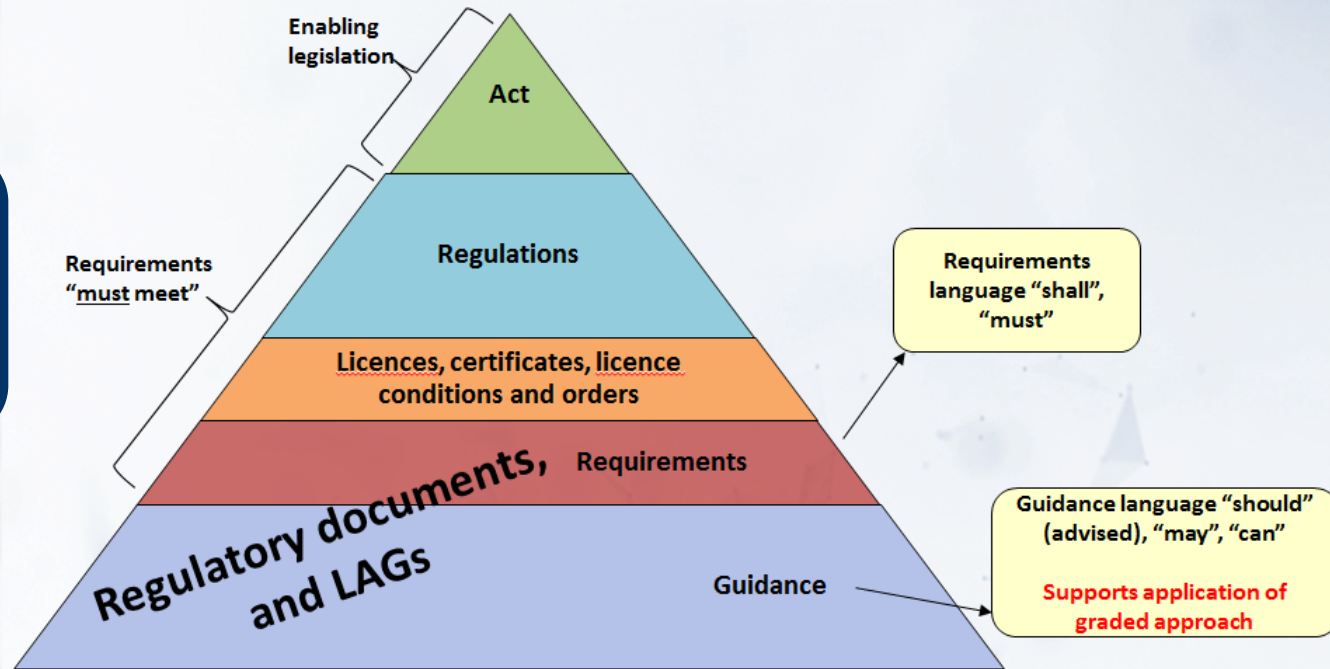
**CNSC responsible for** regulating licensees, and assessing whether licensees are compliant with the NSCA, regulations, and international obligations

*The Licensees are held accountable by their licence*



# Regulatory Framework

Adaptable to an evolving industry and advancements in policy, science and engineering



*Risk-informed and independent of reactor size or technology*



# Regulatory Approach

- ▶ **The CNSC establishes safety requirements**
  - Applicant proposes how to meet the requirements
  - CNSC regulations were designed to allow for flexibility
- ▶ **Graded approach**
  - Safety commensurate with risk
- ▶ **Technology neutral**
- ▶ **Mix of performance-based and prescriptive approaches used**
  - Radiation protection, for example, is more prescriptive



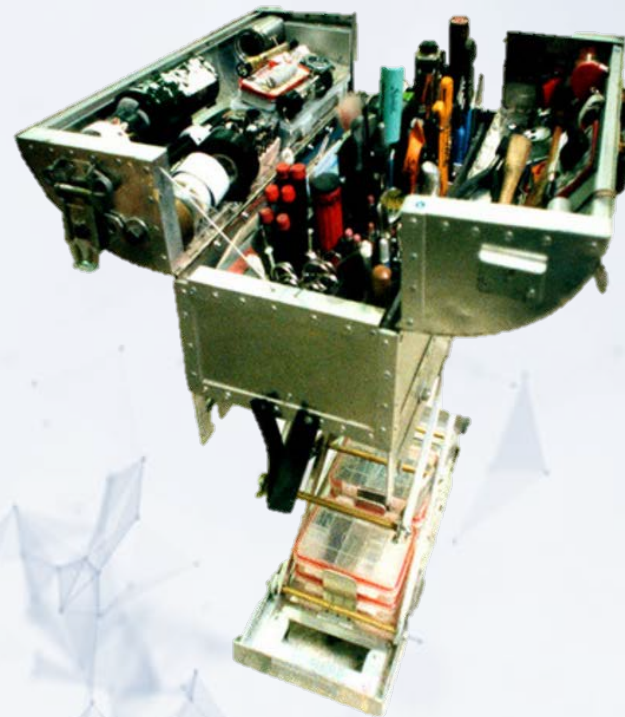
***Many regulatory requirements allow for alternative approaches***



# *Enforcing Compliance*

The CNSC has several regulatory options to enforce compliance

- ▶ Licence conditions
- ▶ Licence amendments
- ▶ Requests
- ▶ Recommendations
- ▶ Warnings
- ▶ Orders
- ▶ Administrative Monetary Penalties
- ▶ Prosecution



## CNSC Licensing Process Overview (1)

### Five stages in the lifecycle of a nuclear facility



Site preparation  
under

Construction  
under

Operation  
under

Decommissioning  
under

Release from  
licensing  
under

***Licence to prepare  
site***

***Licence to construct***

***Licence to  
operate***

***Licence to  
decommission***

***Licence to  
abandon***

## CNSC Licensing Process Overview (2)

One process, regardless of facility size



***Ongoing public involvement, Aboriginal consultation and environmental monitoring***



# Public Engagement

- ▶ Ensuring the confidence of Canadians
- ▶ Participant Funding Program
- ▶ Aboriginal and public consultations
- ▶ Extensive outreach and engagement program
- ▶ Requirement for licensees to communicate



***Building trust is a continuous process***

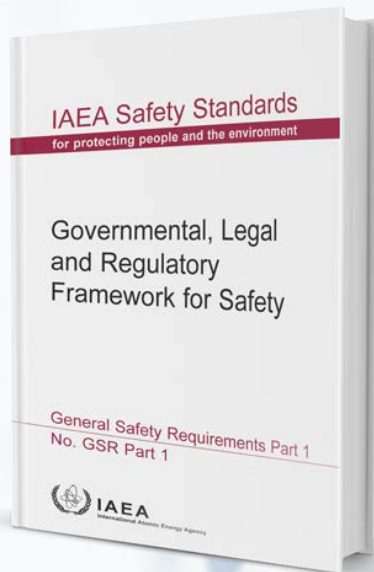




# International Cooperation and Security

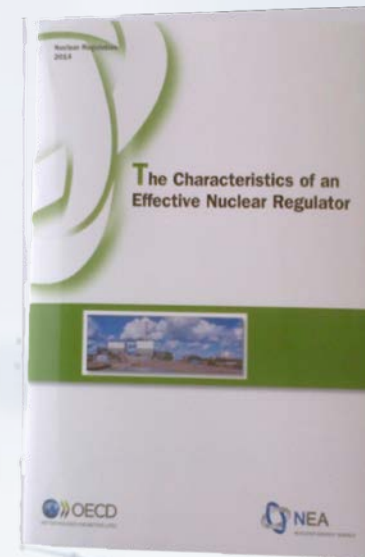


## *Consider International Best Practices*



The CNSC applies international best practices.

It has aligned with the International Atomic Energy Agency's recommendations, as well as those of the Nuclear Energy Agency, on further improving regulatory effectiveness and strengthening its safety culture.



*Always room for customization and improvement*



## *International Collaboration*

▶ **The CNSC participates in a range of international undertakings, including:**

- IAEA initiatives and conventions, for example the Code of Conduct on the Safety and Security of Radioactive Sources
- Integrated Regulatory Review Service (IRRS) missions
- International Commission on Radiological Protection (ICRP)
- Multinational Design Evaluation Programme (MDEP)
- International Physical Protection Advisory Service (IPPAS) missions





## ***Seventh Review Meeting for the Convention on Nuclear Safety (CNS)***

- ▶ **Held in Vienna, Austria (March 27 – April 7, 2017)**
- ▶ **Presided over by CNSC Executive Vice-President and Chief Regulatory Operations Officer, Ramzi Jammal**
- ▶ **Highest level of participation by Contracting Parties (CPs) to date; over 900 delegates attended**
- ▶ **Summary report available on the International Atomic Energy Agency website**
  - Details new measures to improve the effectiveness of the CNS and its reporting process, as well as measures to strengthen nuclear safety globally





## *Canada's Non-Proliferation Policy*

- ▶ To assure Canadians and the international community that Canada's nuclear exports do not contribute to the development of nuclear weapons or other nuclear explosive devices
- ▶ To promote a more effective and comprehensive international nuclear non-proliferation regime







# *Canadian Nuclear Security Governance*

- ▶ **The CNSC establishes nuclear security requirements commensurate with risk**
  - Verifies and enforces compliance
- ▶ **Licensees implement requirements**
  - Responsible for ensuring appropriate measures, training, equipment and processes in place
- ▶ **Federal and international partners have integral roles**
  - Import/export controls, border security, intelligence sharing , nuclear cooperation agreements



# Nuclear Security Regulations

- ▶ The overall objective of the *Nuclear Security Regulations (NSR)* is to prevent the theft or sabotage of nuclear material and associated facilities
  - The NSR set out the minimum expectations for the physical protection of nuclear material in use, storage and transport



***Nuclear security is a global concern***

## ***Nuclear Security in Canada***

- ▶ **Major consideration in all CNSC activities**
- ▶ **The CNSC works closely with operators, law enforcement and intelligence agencies**
- ▶ **The CNSC approach follows international physical protection best practices and IAEA recommended standards**
  - Canada hosted Integrated Physical Protection Advisory Service mission in 2015
  - Conclusion: Canada conducts strong and sustainable nuclear energy activities
- ▶ **Security measures and requirements based on risk assessment of facility/activity**





# Transportation and Waste



# Regulating All Four Classes of Radioactive Waste

Uranium mine and mill waste	Low-level radioactive waste	Intermediate-level radioactive waste	High-level radioactive waste
Includes tailings and waste rock generated by the mining and milling of uranium ore	More radioactive than clearance levels and exemption quantities Examples include: mop heads, rags and paper towels	Contains enough long-lived radionuclides to require isolation and containment Examples include: filters, resins and used reactor components	Primarily used nuclear fuel, along with small amounts of waste that generate significant heat
	Alpha: < 400 Bq/g Long-lived beta/gamma: ranges to tens of kBq/g Unshielded contact dose rate: < 2 mSv/h	Alpha: no limit Long-lived beta/gamma: no limit Unshielded contact dose rate: >2 mSv/h Thermal power: < 2 kW/m <sup>3</sup>	Alpha: no limit Long-lived beta/gamma: no limit Contact dose rate: no limit Thermal power: no limit



*Different approaches to managing each class*





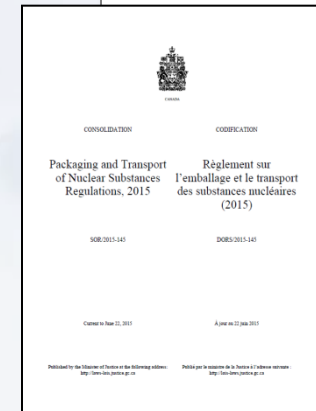
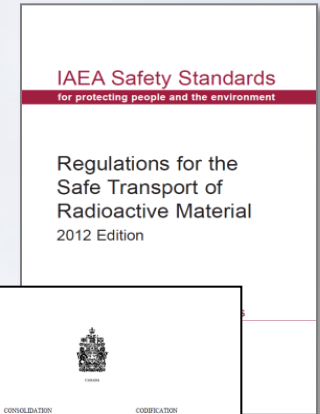
## *Transportation of Nuclear Substances*

- ▶ **Approximately 1 million packages are safely transported each year**
- ▶ **At the federal level, the responsibility is jointly shared by the CNSC and Transport Canada – MOU in place since 1981**
- ▶ **The CNSC uses a graded approach in limiting radioactive contents based on types of package – the greater the radioactivity, the more robust the packaging**



# Applicable Transport Regulations

- ▶ **Transport of Dangerous Goods (TDG) Regulations (Transport Canada)**
- ▶ **Packaging and Transport of Nuclear Substances Regulations, 2015 (CNSC)**
  - Ambulatory reference to latest edition of the International Atomic Energy Agency (IAEA) *Regulations for the Safe Transport of Radioactive Material* (currently 2012 Edition)
- ▶ **Nuclear Security Regulations (CNSC)**
  - Section 5 outlines the requirements for a transport security plan for the transport of Category I, II or III nuclear material





## ***Licence Requirements for Transporting Nuclear Material***

- ▶ **CNSC specialists assess a security plan that must be issued before any shipment of nuclear material can take place**
  - Proposed routing
  - Security systems and procedures
  - Communication arrangements
  - Contingency plan
  
- ▶ **The packaging to be used must be certified by the CNSC**
  
- ▶ **An Emergency Response Assistance Plan (ERAP) approved by Transport Canada must also be in place before the issuance of the licence for cases in which the nuclear material is classified as fissile material**

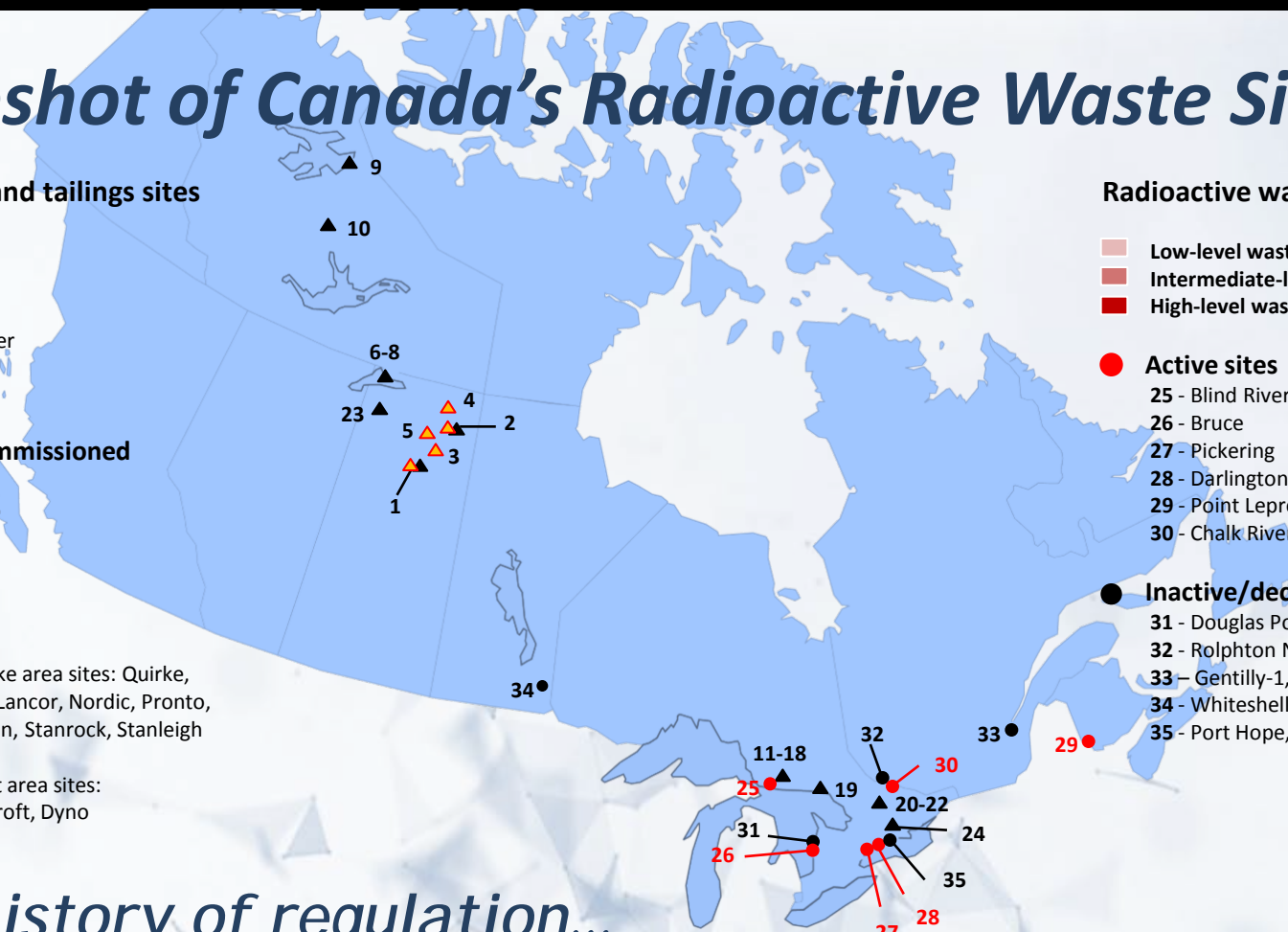
# Snapshot of Canada's Radioactive Waste Sites

## Uranium mines and tailings sites

- ▲ Active**
  - 1 - Key Lake
  - 2 - Rabbit Lake
  - 3 - McArthur River
  - 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

- Low-level waste**
- Intermediate-level waste**
- High-level waste**
- Active sites**
  - 25 - Blind River
  - 26 - Bruce
  - 27 - Pickering
  - 28 - Darlington
  - 29 - Point Lepreau
  - 30 - Chalk River Laboratories
- Inactive/decommissioned**
  - 31 - Douglas Point
  - 32 - Rolphton NPD
  - 33 - Gentilly-1, Gentilly-2
  - 34 - Whiteshell Laboratories
  - 35 - Port Hope, Port Granby, Welcome



*A long history of regulation...*



## *Regulating Low- and Intermediate-Level Radioactive Waste*

- ▶ **Ontario Power Generations (OPG) proposed Deep Geologic Repository (DGR)**
  - OPG submitted additional studies in 2016 to the Minister of Environment and Climate Change
  - Minister's decision pending the outcome of public comments
  
- ▶ **OPG's Western Waste Management Facility and Pickering Waste Management Facility**
  - Relicensing hearing held in April 2017
  
- ▶ **CNL's proposed Near Surface Disposal Facility (NSDF)**
  - Application received and EA commenced May 2016







## *Regulating High-Level Radioactive Waste*

- ▶ **Nuclear Waste Management Organization (NWMO) — Finding a high-level radioactive waste site**
  - Site selection studies continue in 9 of 22 communities
  - CNSC involved early to explain regulatory role and meet communities/Aboriginal groups





## *Remediation of Uranium Facilities and Legacy Sites*

- ▶ **Canada has considerable experience and expertise in the cleanup of legacy uranium mining facilities**
  - All uranium facilities and legacy sites are heavily regulated in Canada
- ▶ **The goal of remediation is to restore the sites to a safe and stable condition, thereby ensuring safety for current and future generations**
- ▶ **Internationally, Canada supports efforts to address and mitigate the effects of legacy uranium mining sites**
  - In 2014, the CNSC and IAEA hosted an international workshop on the Remediation of Uranium Legacy Sites in Elliot Lake, ON



The CNSC will never  
compromise safety...

...it's in our DNA!



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