



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

# CNSC 101: An Information Session



An Introduction to the Canadian Nuclear Safety Commission (CNSC)

Canada

December 2013

Check presentation against delivery

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# Information Session Expectations



This session **is** an introduction to the CNSC

- ✓ Who are we
- ✓ What we do
- ✓ How we do it

This session **is not**...

- x A public hearing or a Commission meeting
- x An in-depth review of the *Nuclear Safety and Control Act* (NSCA) and associated regulations
- x A detailed examination of any one area of the CNSC's mandate
- x Intended to make you a technical or legal expert

This session **does not**...

- x Provide legal advice
- x Discuss nuclear policy or politics
- x Discuss specific licensing matters
- x Discuss technical and environmental specifics of proposed projects





# Housekeeping

## Housekeeping

- Materials
- Breaks
- Refreshments
- Questions
- Feedback

## Presenters and staff

- Lynn Forrest
- Dov ben-Reuven
- Karen Mayer
- Ethan Townsend
- Tanya Johnston
- Reuben Marini

## Agenda

- What is the Canadian Nuclear Safety Commission (CNSC)?
- Organizational structure
- Regulated activities
- The way we regulate
- Licensing and compliance
- Get involved
- Web site overview
- In the news







# What is the Canadian Nuclear Safety Commission (CNSC)?

# The Canadian Nuclear Safety Commission



- Established May 2000, under the *Nuclear Safety and Control Act (NSCA)*
- Replaced the Atomic Energy Control Board (AECB), established in 1946, under the *Atomic Energy Control Act*
- Exclusive jurisdiction over all nuclear-related matters in Canada



**Canada's Independent Nuclear Regulator  
Over 65 Years Of Experience**

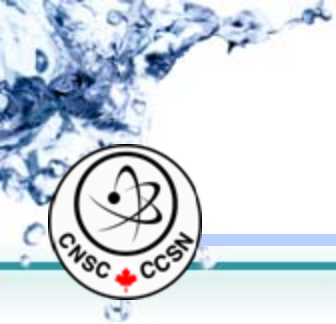
# How the CNSC Reports to the Government



Constitution Act 1982  
Parliament  
Governor in Council

Minister of  
Natural  
Resources

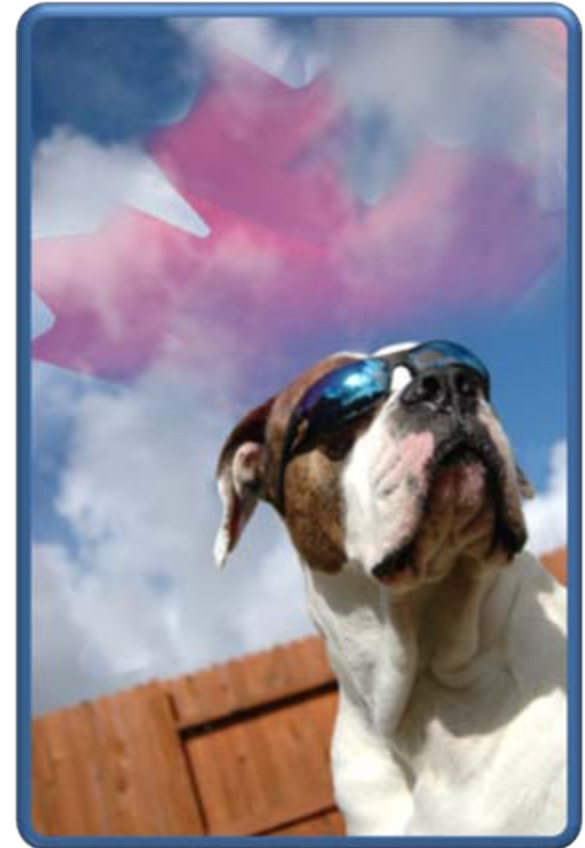




# Our Mission

The CNSC's mission is to **regulate** the use of nuclear energy and materials so that the **health, safety and security** of Canadians and the **environment** are protected, and to implement Canada's **international commitments** on the peaceful use of nuclear energy.

**We are Canada's nuclear watchdog and we will not compromise safety.**



# Regulatory Fundamentals



- The Canadian Nuclear Safety Commission is **Canada's nuclear regulator**. How does the CNSC regulate?
  - Nuclear-related activities can only be conducted by persons or organizations that are licensed by the CNSC
  - A person or organization must apply to the CNSC to obtain a licence
  - Applicants must demonstrate that they meet the requirements set out in the CNSC's regulatory framework
  - Once a licence is obtained, the CNSC assures that activities are conducted safely and licensing conditions are upheld, through processes of verifying, enforcing and reporting



Gouvernement  
du Canada

Government  
of Canada



# Regulatory Fundamentals (Cont.)



- What are the **licensees' responsibilities**?
  - Persons and organizations that are licensed by the CNSC are responsible for managing regulated activities in a manner that protects health, safety, security and the environment, while respecting Canada's international obligations
  
- What are the **CNSC's responsibilities**?
  - The CNSC is responsible to Canadians, through Parliament, to fulfill its mandate. The CNSC:
    - sets requirements and verifies compliance
    - bases regulatory action on the level of risk
    - makes independent, objective and risk-informed decisions



# Fact or Fiction



- The Canadian Nuclear Safety Commission (CNSC) is a Government of Canada agency
  - Fact
  - Fiction
- The CNSC reports directly to Parliament
  - Fact
  - Fiction
- The CNSC is involved in the political decision-making process on whether to use nuclear energy and materials
  - Fact
  - Fiction



# Organizational Structure

# Commission and Staff



## Permanent Commission Members



**Dr. Sandy  
McEwan**



**Dr. J. Moyra  
J. McDill**



**Dr. Ronald  
J. Barriault**



**Dr. Michael  
Binder**



**Ms. Rumina  
Velshi**



**Mr. Dan D.  
Tolgyesi**



**Mr. André  
Harvey**

**Commission  
Secretariat**

**Legal  
Services**

## CNSC STAFF



**Regulatory  
Operations Branch**

**Technical Support  
Branch**

**Corporate  
Services Branch**

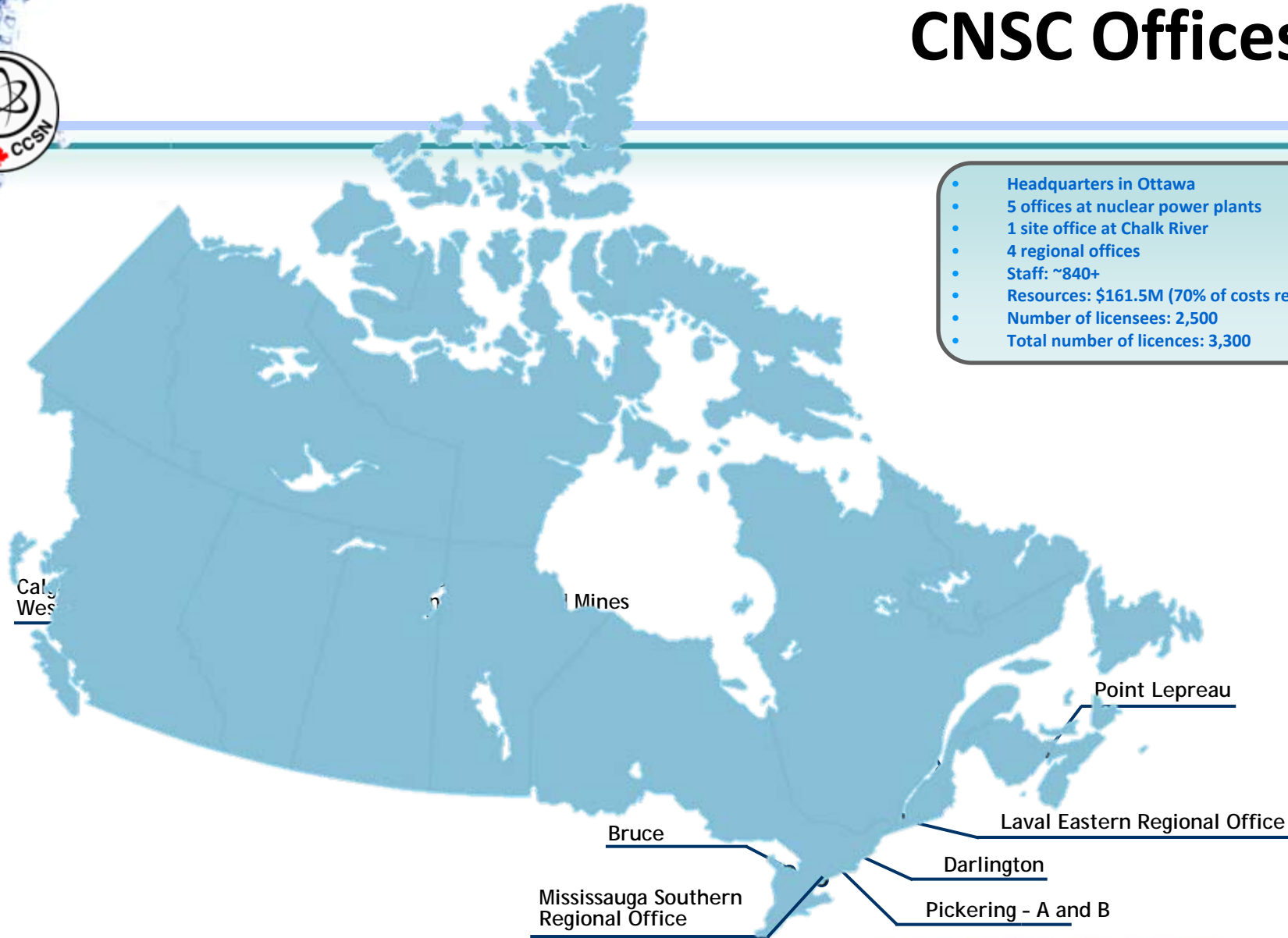
**Regulatory Affairs  
Branch**



# CNSC Offices



- Headquarters in Ottawa
- 5 offices at nuclear power plants
- 1 site office at Chalk River
- 4 regional offices
- Staff: ~840+
- Resources: \$161.5M (70% of costs recovered)
- Number of licensees: 2,500
- Total number of licences: 3,300



# Fact or Fiction



- CNSC inspectors are located across Canada
  - Fact
  - Fiction
- All Commission members work at CNSC headquarters on a full-time basis
  - Fact
  - Fiction
- The role of CNSC staff at Commission hearings and meetings is to persuade the Commission to take a positive licensing decision
  - Fact
  - Fiction



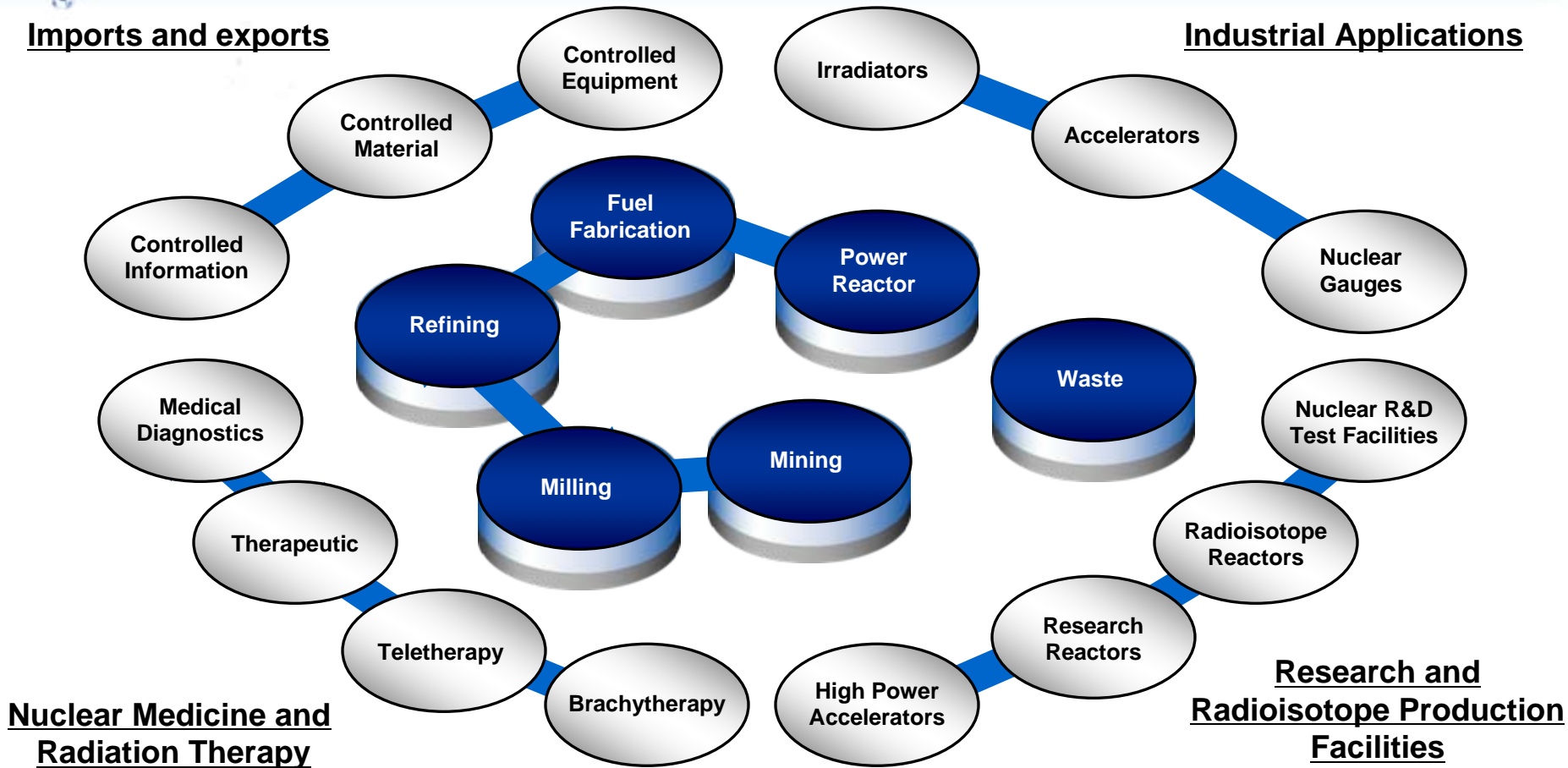
# Regulated Activities

# CNSC Regulates all Nuclear-Related Facilities and Activities



## Imports and exports

## Industrial Applications



**...From cradle to grave**



# CNSC Regulates all Nuclear-Related Facilities and Activities

Imports, exports, and safeguards

Controlled information, controlled material, controlled equipment

**Mining**

**Milling**

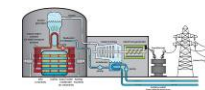
**Refining**

**Conversion**

**Fuel fabrication**

**Fuel assembly**

**CANDU reactor**



Rock containing on average 1 - 19 % uranium (uranium ore) is extracted from the ground. The ore is transported to a regional mill

Uranium ore is ground and the uranium ( $U_3O_8$ ) is chemically separated from most other constituents. The uranium concentrate, containing approximately 98% uranium (yellowcake) is shipped to a refinery

The remaining contaminants in the uranium concentrate are chemically separated from the uranium. The purified uranium ( $UO_3$ ) is shipped to a uranium conversion facility

The chemical form of uranium is converted to  $UO_2$  (for CANDU reactor fuel) or to  $UF_6$  (for export).  $UO_2$  powder is shipped to a fuel fabrication facility

The  $UO_2$  powder is pressed into pellets

The  $UO_2$  pellets are assembled in CANDU reactor fuel bundles. The fuel bundles are shipped to a nuclear generating station (NGS)

Fuel bundles are loaded into reactors, where they generate heat to produce electricity

Cigar Lake Mine (Cameco), SK

McClellan Lake Mill (AREVA Resources Inc.), SK

McArthur River Mine (Cameco), SK

Key Lake Mill (Cameco), SK

Rabbit Lake Mine (Cameco), SK

Rabbit Lake Mill (Cameco), SK



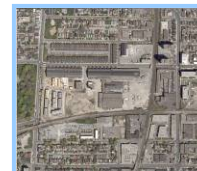
Blind River Refinery (Cameco), Blind River, ON



Uranium conversion facility (Cameco), Port Hope, ON



Nuclear Fuel Facility (Cameco Fuel Manufacturing Inc.), Port Hope, ON



Nuclear Fuel Processing Facility (GE Hitachi Nuclear Energy Canada Inc.), Toronto, ON



Nuclear Fuel Facility (GE Hitachi Nuclear Energy Canada Inc.), Peterborough, ON

Pickering NGS, Pickering, ON

Point Lepreau NGS, Point Lepreau, NB

Pickering, ON Bruce A and B NGS, Kincardine, ON

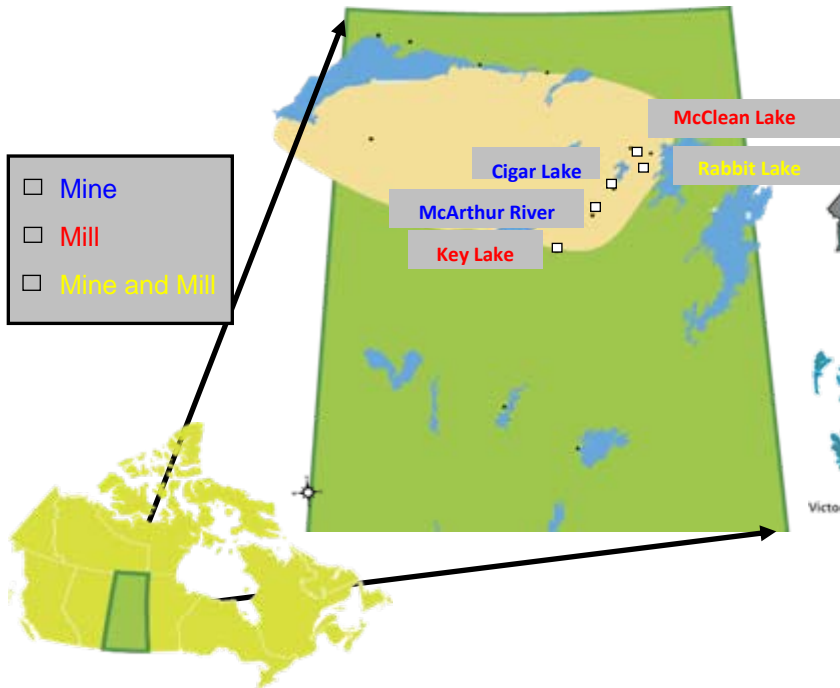
Darlington NGS, Clarington, ON

# Canadian Uranium Mining and Milling Projects



- Canada produces around 17% of the world's uranium
- The mine lifecycle includes site preparation, construction, operations, decommissioning, and release from licence
- The CNSC ensures the protection of the workers, public and environment

## Active projects



## Proposed projects





# Canada's Operating Power Reactors



Pickering Nuclear Generating Station  
(Ontario Power Generation),  
Pickering, ON



Point Lepreau Generating Station  
(New Brunswick Power Nuclear),  
Point Lepreau, NB



Bruce A and B Nuclear Generating Stations  
(Bruce Power),  
Kincardine, ON



Darlington Nuclear Generating Station  
(Ontario Power Generation),  
Clarington, ON



# Canada's Operating Research Reactors

- National Research Universal reactor  
(Chalk River Laboratories), Chalk River, ON
- ZED-2 research reactor  
(Chalk River Laboratories), Chalk River, ON
- McMaster Nuclear Reactor  
(McMaster University), Hamilton, ON
- Safe Low-Power Critical Experiment (SLOWPOKE)  
Reactors
  - École Polytechnique,  
Montréal, QC
  - Saskatchewan Research Council,  
Saskatoon, SK
  - University of Alberta,  
Edmonton, AB
  - Royal Military College of Canada,  
Kingston, ON



Chalk River Laboratories,  
Chalk River, ON



# Medical Uses of Radiation – Medical Isotopes Producers



## Nuclear power plants

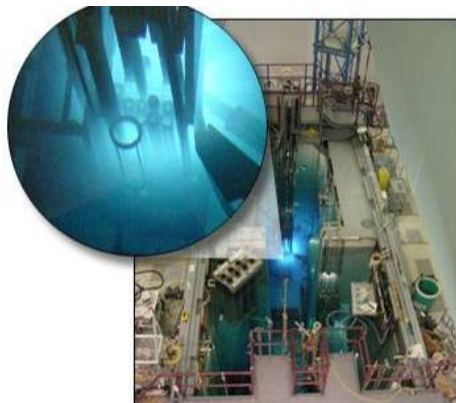


Bruce A and B Nuclear Generating Stations (Bruce Power),  
Kincardine, ON



Pickering Nuclear Generating Station (Ontario Power  
Generation),  
Pickering, ON

## Research reactors



McMaster  
nuclear reactor,  
Hamilton, ON



National Research Universal  
reactor (Chalk River Laboratories),  
Chalk River, ON

## Isotope production accelerators



Cyclotron at Advanced Cyclotron  
Systems Incorporated,  
Vancouver, BC

# Medical Uses of Radiation – Applications



## Nuclear medicine

### **Diagnostic**

uses short-lived radioactive isotopes as tracers that are injected into patients for diagnosis, management and treatment of disease

### **Therapeutic**

uses short-lived radioactive isotopes as tracers that are injected into patients for treatment of disease

## Radiation therapy

### **Teletherapy**

external source of radiation is pointed at a particular part of the body, to treat tumours

### **Brachytherapy**

also known as “internal radiotherapy” is a form of radiotherapy where radiation source is placed inside or next to the area requiring treatment



Positron Emission Tomography (PET) scanner



Example of an injection into a patient for treatment of disease



Stereotactic teletherapy



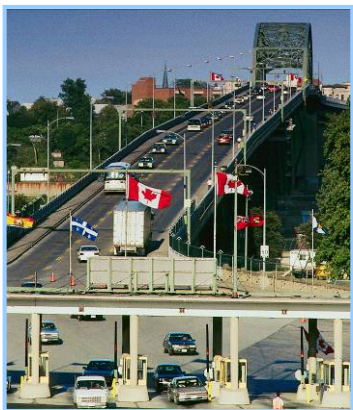
High Dose Rate Remote Brachytherapy Afterloader



# Imports, Exports, and Safeguards



## Import and Export Controls



The CNSC licenses the import and export of nuclear-related and nuclear dual-use substances, equipment, technology and risk-significant radioactive sources

## Safeguards



The CNSC liaises with the International Atomic Energy Agency and ensures Canada fulfils its international obligations to use nuclear energy solely for peaceful purposes.

## Certification of transport packages



All packaging types used to transport radioactive substances in Canada are licensed by the CNSC



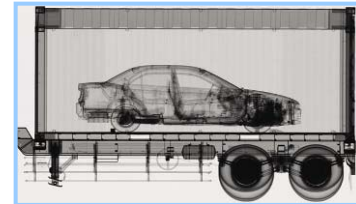
Example of uranium concentrate shipping containers licensed by the CNSC

## Transport licences

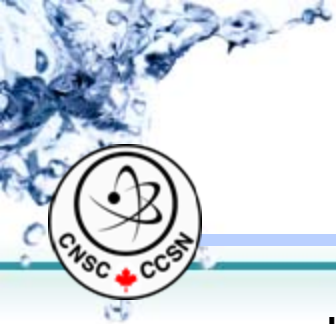


Transport licences are required for certain nuclear substances and activities

## Application of nuclear substances and accelerators for border security



A portable cargo screening accelerator licensed by the CNSC



# Industrial Applications

## Irradiators

Irradiators use large quantities of nuclear substances, which produce high radiation dose rates. They are used in the sterilization of medical equipment or blood products, irradiation of cells in research laboratories, food irradiation, and for calibration of radiation detectors.



Example of a pool type irradiator



Example of a blood irradiator



Example of a calibration irradiator (CNSC Laboratory), Ottawa, ON

## Accelerators

Accelerators "accelerate" a beam of charged particles, such as electrons or protons, to high energies. Electron accelerators can be used for a broad range of applications, including sterilization of medical equipment, radiography and industrial processing.



Example of an industrial electron accelerator facility (Acsion Industries) Pinawa, Manitoba

## Fixed Gauges

Fixed gauges are radiation devices commonly used to determine operational parameters of an industrial process, such as density, level and thickness.



Example of an industrial fixed gauge

## Portable Gauges

Portable gauges are radiation devices used to determine compaction, density or moisture content in soil.



Example of a portable moisture density gauge

## Industrial Radiography

In industrial radiography, nuclear substances are used for the non-destructive examination of materials.

To perform industrial radiography or operate an exposure device, you must hold a valid CNSC exposure device operator certification



Examples of exposure devices.



# Fact or Fiction

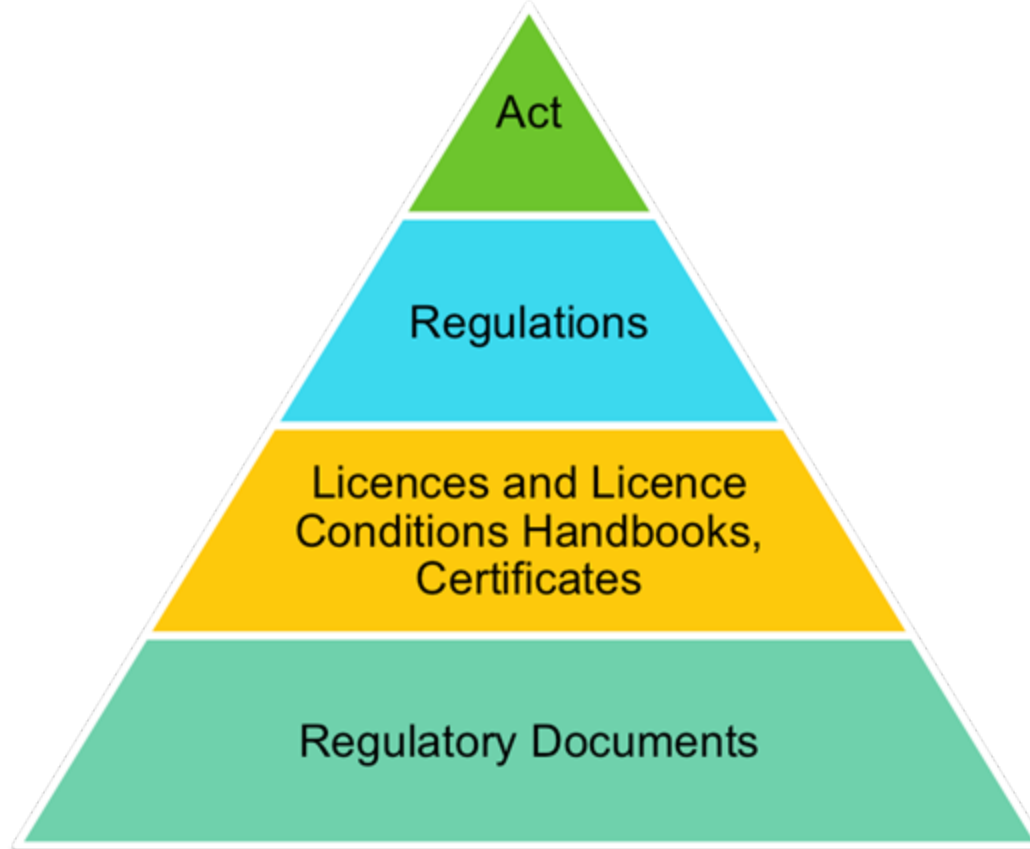


- Naturally occurring radioactive material is regulated by the Canadian Nuclear Safety Commission
  - Fact
  - Fiction
- CANDU reactors use enriched uranium as a fuel
  - Fact
  - Fiction
- Canadian nuclear power reactors and research reactors are sources of life-saving medical isotopes
  - Fact
  - Fiction



# The Way We Regulate

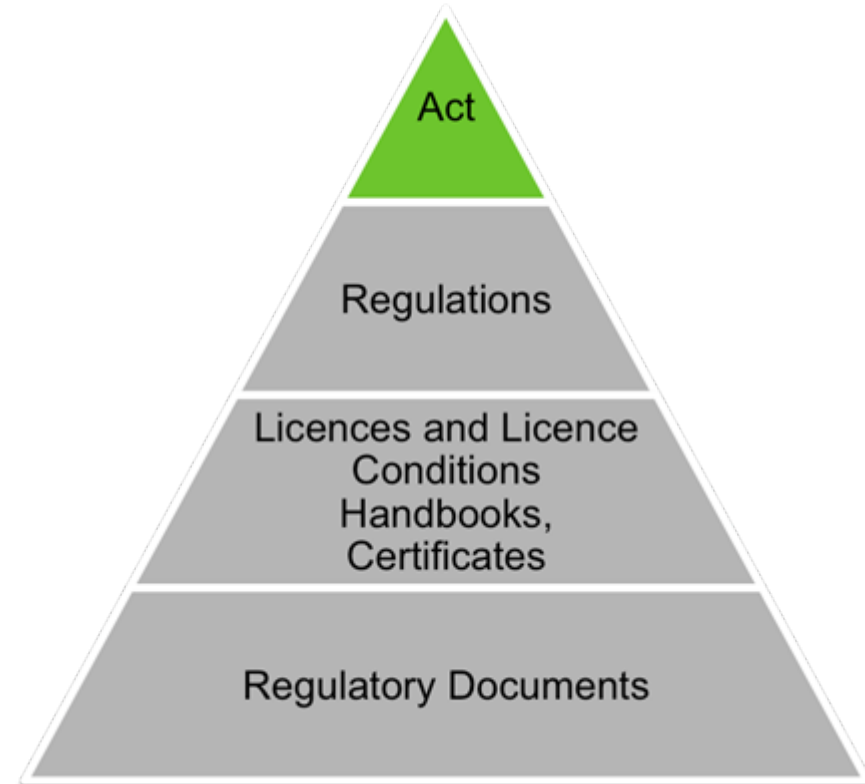
# Overview of the CNSC's Regulatory Framework



# Overview of the *Nuclear Safety and Control Act*



- *Nuclear Safety and Control Act* and associated regulations in force since 2000
- Established the legal framework that established the Commission, its authority and responsibilities, and allows the CNSC to make regulations
- Established power to licence, to inspect, and enforcement of regulations

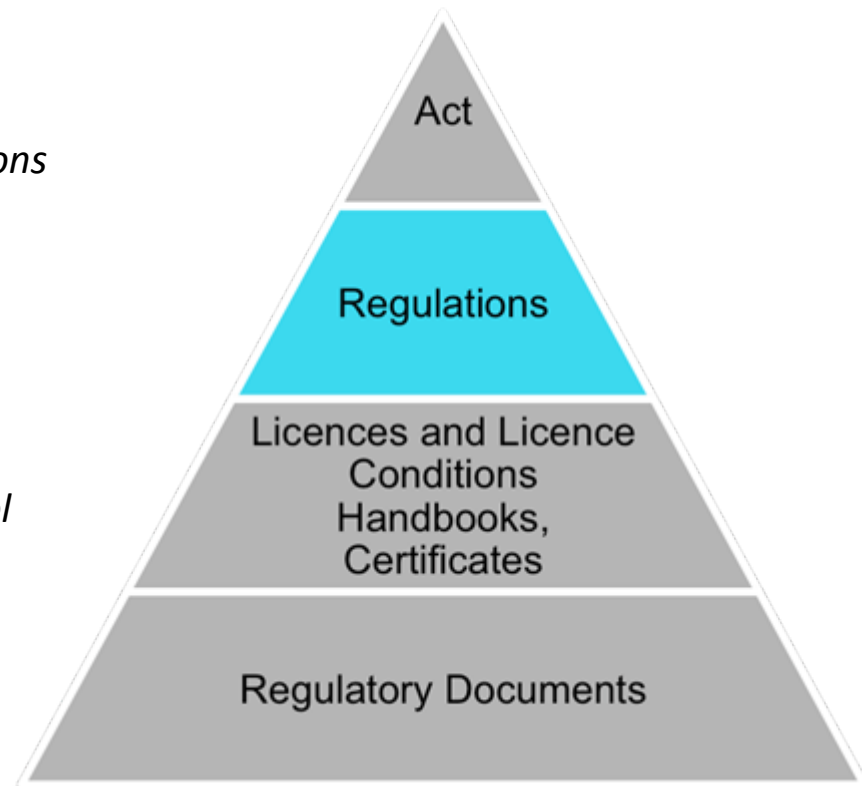




# Nuclear Safety and Control Act Regulations



- *Class I Nuclear Facilities Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
- *Uranium Mines and Mills Regulations*
- *Nuclear Substances and Radiation Devices Regulations*
  
- *General Nuclear Safety and Control Regulations*
- *Radiation Protection Regulations*
- *Nuclear Security Regulations*
- *Packaging and Transport of Nuclear Substances Regulations*
- *Nuclear Non-Proliferation Import and Export Control Regulations*
  
- *CNSC Cost-Recovery Fees Regulations*
- *Canadian Nuclear Safety Commission Rules of Procedure*
- *Canadian Nuclear Safety Commission By-laws*
- *Administrative Monetary Penalties*



# Class I Nuclear Facilities Regulations



- Applies to Class IA and 1B nuclear facilities
  - IA facilities (e.g., power reactors)
  - IB facilities (e.g., particle accelerators, uranium processing plants and waste disposal facilities)
- Types of licence applications include
  - Licence to prepare site
  - Licence to construct
  - Licence to operate
  - Licence to decommission
  - Licence to abandon
- Requires senior control room staff of nuclear power reactors to pass examinations that test their competence to operate nuclear reactors safely



Darlington Nuclear Generating Station (turbine hall),  
Clarington, ON

# Class II Nuclear Facilities and Prescribed Equipment Regulations



- Applies to nuclear facilities that pose a lower risk than Class I facilities (i.e., low-energy particle accelerators, irradiators and radiation therapy installations)
  - Types of licence applications include
    - Licence to construct
    - Licence to operate
    - Licence to decommission
- Applies to prescribed equipment
  - No person shall use Class II prescribed equipment unless
    - It is a certified model
    - It is used in accordance with a licence that authorizes its use for development purposes or for scientific research that is not conducted on humans
- Every licensee who operates a Class II nuclear facility shall appoint a radiation safety officer



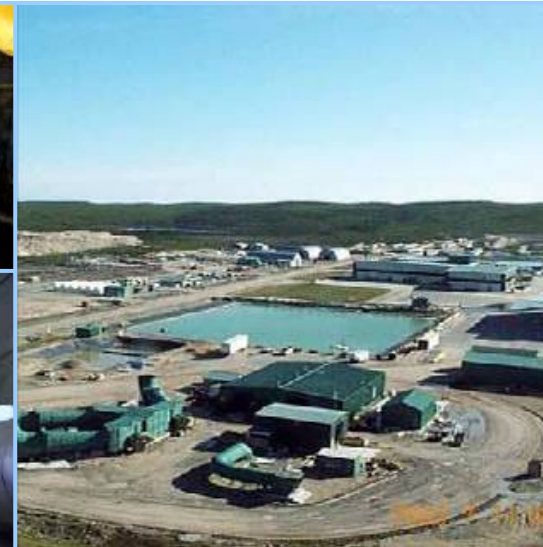
Example of a pool type irradiator



# Uranium Mines and Mills Regulations



- Types of licenses include
  - Licence to prepare site and construct
  - Licence to operate
  - Licence to decommission
  - Licence to abandon
- Obligations of licensees for operating procedures, codes of practice, ventilation systems, use of respirators, and protection from gamma radiation



McArthur River mine



# Nuclear Substances and Radiation Devices Regulations



- Apply to all nuclear substances, sealed sources and radiation devices not covered by other regulations
- Contains list of quantities of radioactive material below which no licence is required



Portable gauge used for paving and geotechnical studies

# General Nuclear Safety and Control Regulations



- Contain the general requirements that apply to all licensees
- Exempts naturally occurring radioactive materials that have not been associated with the development, production or use of nuclear energy
- Requires licence applicants to provide information on proposed financial guarantees and to describe their plans for decommissioning and waste management. The resulting requirements are imposed by licence condition



# Radiation Protection Regulations



- Set dose limits (Millisievert – mSv)
  - Nuclear energy workers: 50 mSv/year to 100 mSv for five years
  - Members of the public: 1 mSv/year
- Require the licensee to investigate, take appropriate actions and notify the Commission when an action level is exceeded
- Define requirements for labelling and signs



**Principle of “As low as reasonably achievable” (ALARA)**

# Nuclear Security Regulations



- Approach follows best practices and standards recommended by the International Atomic Energy Agency
- Amended in 2006 to enhanced security at nuclear facilities following September 11, 2001
  - Annual threat and risk assessment
  - Onsite armed response force at major nuclear facilities
  - Enhanced security screening of personnel
  - Enhanced access control to nuclear facilities
  - Threat analysis for nuclear facilities based on design
  - Uninterrupted power supplies for alarm monitoring and security systems
  - Contingency planning, drills, and exercises





# Packaging and Transport of Nuclear Substances Regulations



- Apply to the design, production, use, inspection, maintenance and repair of packaging and packages and the preparation, consigning, handling, loading, carriage, storage during transport, receipt at final destination and unloading of packages
- Requirements for carriers to have a radiation protection program



Packaging and transport of nuclear substances  
(portable gauge)

# ***Nuclear Non-Proliferation Import and Export Control Regulations***



- Require Canadian importers and exporters to obtain and comply with licences controlling the international transfer of nuclear and nuclear-related items
- Include a complete list of controlled imports and exports, including
  - Special fissionable material (e.g., certain isotopes of plutonium and uranium)
  - Deuterium and heavy water
  - Nuclear-grade graphite
  - Nuclear reactors and their parts
  - Controlled nuclear information
  - Nuclear-related dual-use items (e.g., controlled nuclear substances)



# ***CNSC Cost-Recovery Fees Regulations***



- Regulatory activities are cost-recovered from licensees through an equitable approach
- Provide a mechanism for the CNSC to annually revise the fees charged



# Canadian Nuclear Safety Commission Rules of Procedure



## One-day public hearing process

- All of the evidence from the applicant, CNSC staff, and interveners is heard by the Commission in a single hearing session. Intervenors are invited to register their submissions at least 30 days prior to the hearing
- Some hearings may be held “in-camera”

## Two-day public hearing process

- **Day 1:** the applicant and CNSC staff present submissions to the Commission and respond to questions from the Commission
- **Day 2:** normally takes place 60 days after Day 1. Registered intervenors have an opportunity to present and respond to any questions from the Commission. Intervenors are invited to register their submissions 30 days before Hearing Day 2

## Abridged hearings

- Decision that are more administrative in nature and with less public interest in the matter being considered





# Canadian Nuclear Safety Commission By-laws



- Govern management and conduct of Commission affairs (meetings)
- Commission meetings may include CNSC staff presentations followed by discussion by the Commission Members
- May discuss:
  - significant development reports, facility or industry sector developments or status reports, and mid-term licensee performance reports
  - CNSC staff may present technical briefings on subjects related to the regulation of the nuclear industry
- Meetings are usually open to public attendance for observation
- Meetings may be held “in-camera”



# Administrative Monetary Penalties (AMPs)



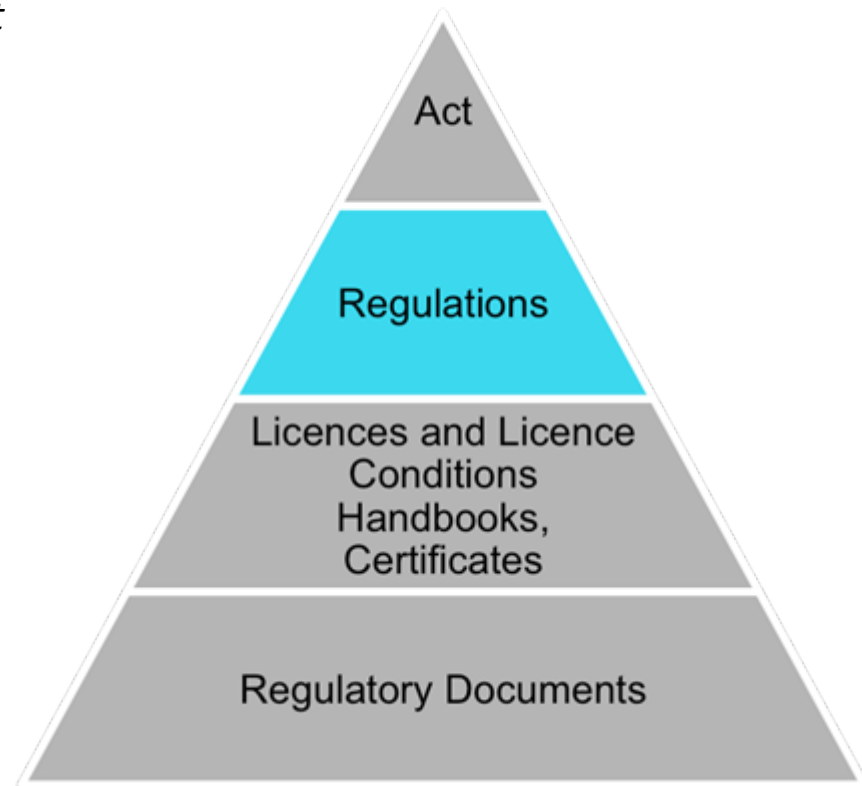
- Designed to promote compliance
- Can be applied for non-compliance with *Nuclear Safety and Control Act*, regulations, or licence conditions
- Up to \$25,000 for an individual and \$100,000 for a corporation per day
- Came into effect on July 3, 2013



# Nuclear Safety and Control Act Regulations Recap



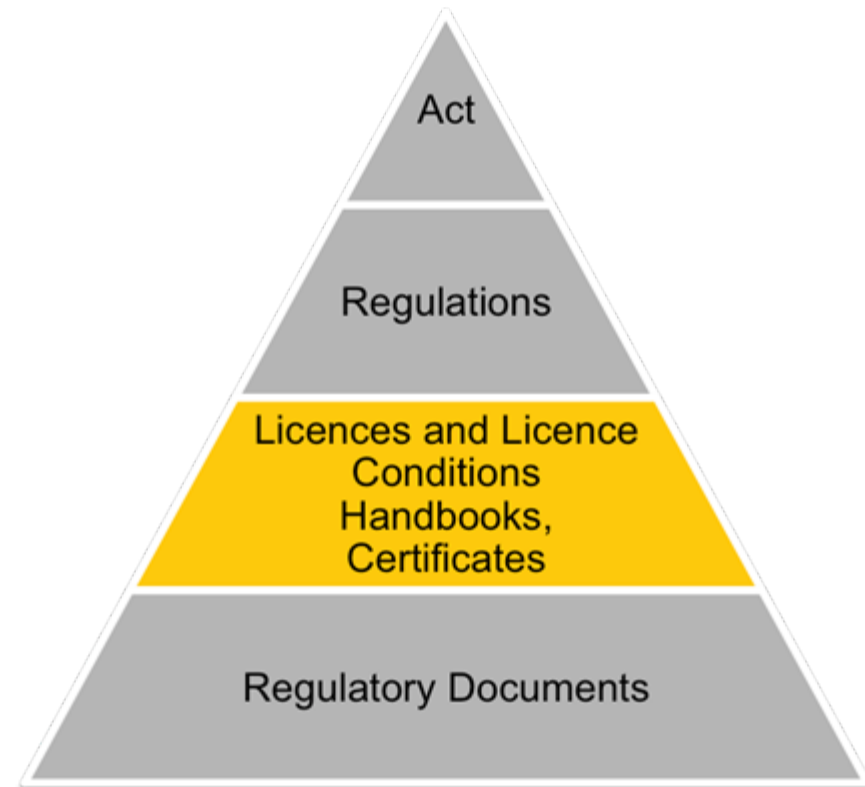
- *Class I Nuclear Facilities Regulations*
- *Class II Nuclear Facilities and Prescribed Equipment Regulations*
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- *CNSC Cost-Recovery Fees Regulations*
- *Canadian Nuclear Safety Commission Rules of Procedure*
- *Canadian Nuclear Safety Commission By-laws*
- *Administrative Monetary Penalties*



# Licences and Certificates



- Licences
  - CNSC assesses applications for licences, and issues a licence if the applicant is deemed to be capable to operate safely
  - Once issued, the company or corporation (could also be a person) becomes a CNSC licensee
- Licence conditions
  - Licensees are required to comply with all applicable regulatory requirements, including Licence Conditions
  - Licence condition handbooks
  - Provide further explanation of licence conditions
- Certificates
  - The CNSC issues certificates indicating that a nuclear device or person working in the nuclear sector or a transportation package meets specific requirements

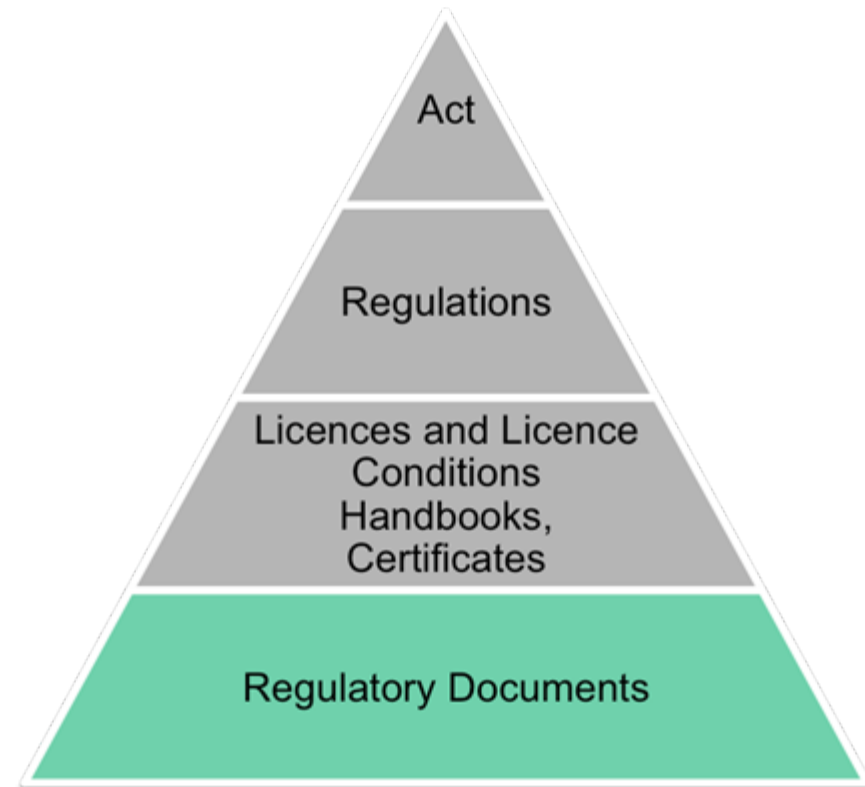




# Regulatory Documents



- Clarify requirements
- Provide guidance on how to comply with requirements
- Are developed through consultation



# Regulatory Document Series



## 1.0 Regulated facilities and activities

- 1.1 Reactor facilities
- 1.2 Class IB facilities
- 1.3 Uranium mines and mills
- 1.4 Class II facilities
- 1.5 Certification of prescribed equipment
- 1.6 Nuclear substances and radiation devices

## 2.0 Safety and control areas

- 2.1 Management system
- 2.2 Human performance management
- 2.3 Operating performance
- 2.4 Safety analysis
- 2.5 Physical design
- 2.6 Fitness for service
- 2.7 Radiation protection
- 2.8 Conventional health and safety
- 2.9 Environmental protection
- 2.10 Emergency management and fire protection
- 2.11 Waste management
- 2.12 Security
- 2.13 Safeguards and non-proliferation
- 2.14 Packaging and transport

## 3.0 Other regulatory areas

- 3.1 Reporting requirements
- 3.2 Public and Aboriginal engagement
- 3.3 Financial guarantees
- 3.4 Commission proceedings
- 3.5 Information dissemination

# Fact or Fiction



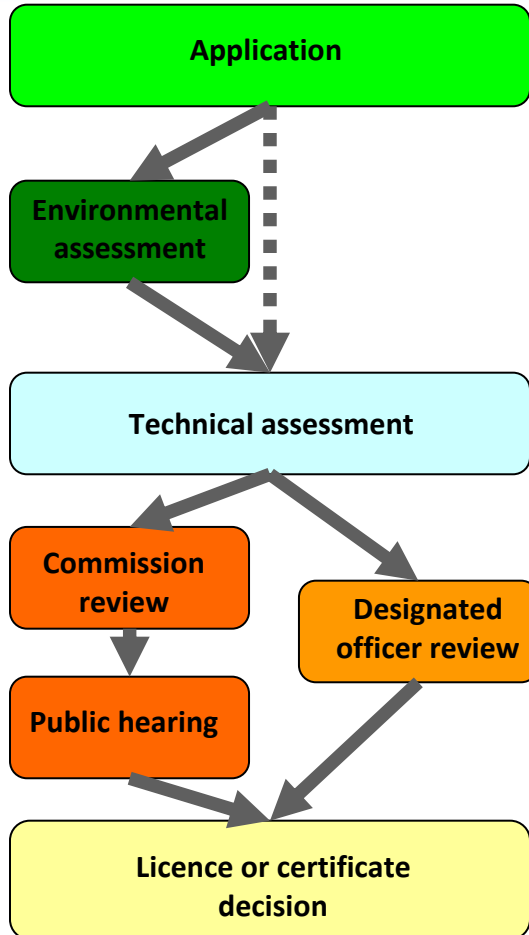
- The foundation for the CNSC's regulatory framework is the *Nuclear Safety and Control Act*
  - Fact
  - Fiction
- The *Nuclear Safety and Control Act*, regulatory documents, and REGDOCs set rules and guidance that ensure nuclear activities are conducted safely
  - Fact
  - Fiction
- The CNSC is secretive in its dealings with Canada's nuclear energy sector
  - Fact
  - Fiction



# Licensing and Compliance



# Licensing



## Safety and control areas

- Management system
- Human performance management
- Operating performance
- Safety analysis
- Physical design
- Fitness for service
- Radiation protection

## Other areas

- Conventional health and safety
- Environmental protection
- Emergency management and fire protection
- Waste management
- Security
- Safeguards
- Packaging and transport

- Financial guarantees
- Consultations and communications



# Compliance



## Report



## Verify



## Enforce



# Fact or Fiction



- Licensees file reports about their activities only when an incident occurs
  - Fact
  - Fiction
- The CNSC has the sole responsibility for environmental assessments related to the nuclear industry
  - Fact
  - Fiction
- The Commission makes all licensing or certificate decisions
  - Fact
  - Fiction



# Get Involved



# How to Get Involved



- Participate in a Commission public hearing
- Observe a Commission meeting
- Participate in an environmental assessment
- Comment on a draft regulatory document
- Comment on a proposed amendment to a regulation
- Watch a Webcast

# Participate in a Commission Public Hearing



- Notices and agendas for meetings and public hearings available on CNSC Web site
- Commission Member Documents (CMDs) available upon request from Secretariat
- Webcasts of public hearings and meetings
- Verbatim transcripts (on Web site)
- Publication of reasons for decision are published on Web site
- Subscription service to receive updates on matters of interest, including Commission business

[nuclearsafety.gc.ca/eng/commission/webcasts/index.cfm](http://nuclearsafety.gc.ca/eng/commission/webcasts/index.cfm)

[youtube.com/watch?v=niVq9tX\\_NrE](http://youtube.com/watch?v=niVq9tX_NrE)



# Aboriginal Consultation



- Duty to consult
- Consideration of potential or established Aboriginal or treaty rights
- Whole-of-government approach
- Commitment to Aboriginal consultation



# CNSC Participant Funding Program (PFP)



- Established to give the public, Aboriginal groups and other stakeholders the opportunity to request funding from the CNSC to participate in its regulatory processes
- Objectives
  - Enhance Aboriginal, public and stakeholder participation in the CNSC's environmental assessment (EA) and licensing process
  - Help stakeholders bring valuable information to the Commission, through informed and topic-specific interventions related to aspects of EA and licensing processes
- Open on a case-by-case basis, through a funding application process
- Find out more online at [nuclearsafety.gc.ca](http://nuclearsafety.gc.ca)





# Mythbusters



- Members of the public have an opportunity to submit written and/or oral presentations at Commission hearings
  - Fact
  - Fiction
- All public Commission hearings are broadcast and archived online, and can be observed in-person
  - Fact
  - Fiction
- The CNSC provides funding to the public to provide new, distinctive, and relevant information that contributes to a better understanding of the anticipated effects of a project
  - Fact
  - Fiction



# Web Site Overview

# CNSC Web Portal



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire



## Canadian Nuclear Safety Commission

nuclearsafety.gc.ca



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- [The Commission](#)
- [Acts and Regulations](#)
- [Licensees and Applicants](#)
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**Deep Geologic Repository Webcast**

Webcasts and Transcripts

**Interactive Tool**

Learn More About Nuclear

**CNSC 101**  
Information Sessions

Learn How the CNSC Regulates

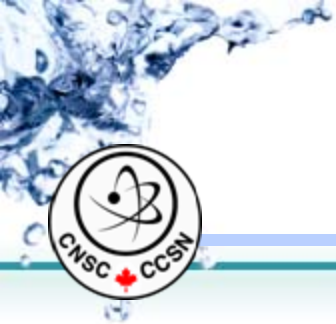


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# In the News





- Strong regulatory oversight in Canada
- Lessons learned applied to Canadian nuclear power plants
- CNSC continues to assure the safety of Canadians

# Fukushima

NATIONAL POST

VOL. 18 NO. 118 THURSDAY, MARCH 17, 2011

## 'SLOW-MOVING NIGHTMARE'

No end in sight to Japan's nuclear crisis while snow hampers relief efforts on coast



SHIRO FUJIKAWA/THE NEW YORK TIMES  
Firefighters walk through the devastation in Kesennuma. Snow and falling temperatures added to the misery for Japan's 500,000 evacuees on Wednesday.

### 'Fukushima 50' risk lives to prevent meltdown

**BY JOE O'CONNOR**  
We do not know their names, their faces, their families or their personal stories. Nobody really does. They are strangers, in a faraway land, doing the unthinkable.  
In Japan they have a name: The Fukushima 50. A coterie of nuclear plant employees — some reports indicate 50, others suggest four working rotations of 60 — who stayed behind while 700 of their co-workers were evacuated from the stricken Fukushima-Daiichi facility on the Japanese coast.  
Five have been killed. Two are missing. Twenty-one have been injured in a struggle where, in the words of Japan's Prime Minister Naoto Kan, "retreat is unthinkable."  
The men understand the stakes. They know there is no turning back. One worker told a departing colleague he was prepared to die — that it was his job. Another informed his wife he wouldn't be coming home anytime soon.  
See O'CONNOR on Page A5

### DISASTER IN JAPAN

**AKIHITO'S ADDRESS**  
Emperor makes unprecedented TV appearance. *A8*  
**THE BLACK SWANS**  
Series of extreme events threatens global recovery. *FP1*  
**REBUILDING JAPAN**  
Reconstruction could take five years, experts say. *FP2*

### 'NEXT 48 HOURS WILL BE DECISIVE'

**BY GORDON RAYNER AND MARTIN EVANS**  
France warning if Japan did not solve the nuclear crisis within 48 hours the catastrophe could be "worse than Chernobyl."  
With temperatures plummeting and snow beginning to fall, the misery continued to mount for the more than 500,000 evacuees who have been forced from the rain and devastation of their cities, towns and villages.  
The official death toll from last Friday's earthquake and tsunami now stands at 4,314, with another 8,606 listed as missing.  
See CRISIS on Page A7  
**Anne Applebaum, A15**  
**Terence Corcoran, FP11**

# Radioactive Waste Management



Canada's radioactive waste classification:



Uranium mine and mill tailings



Low-level radioactive waste  
• low-level short-lived radioactive waste  
• very-low-level radioactive waste



Intermediate-level radioactive waste



High-level radioactive waste

# Ontario Power Generation's Deep Geologic Repository



## Deep Geologic Repository Joint Review Panel



Dr. Stella Swanson

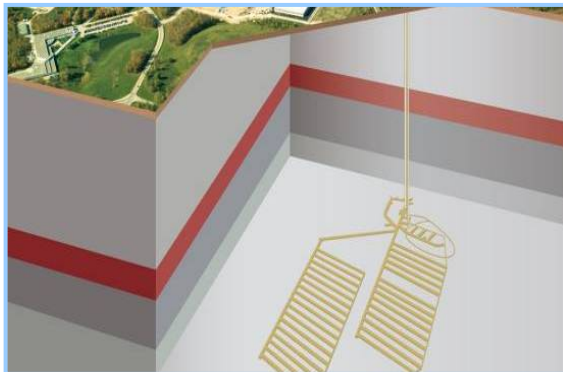


Dr. Gunter Muecke



Dr. James F. Archibald

- CNSC is responsible for licensing geological repositories intended to provide for long-term management of radioactive wastes:
  - The Deep Geologic Repository (DGR) is a proposed project by Ontario Power Generation (OPG)
  - Long-term management of OPG's low- and intermediate-level radioactive waste produced from the Bruce, Pickering and Darlington nuclear power plants
  - Not for used nuclear fuel
  - Proposed project location: Municipality of Kincardine, Ontario



The Deep Geologic Repository design concept



# Interim Management of Used Nuclear Fuel in Canada



- All used nuclear fuel in Canada is currently held onsite in interim storage facilities, which are safe, secure and environmentally sound



Used nuclear fuel stored in water-filled pools



Preparation of used nuclear fuel storage containers



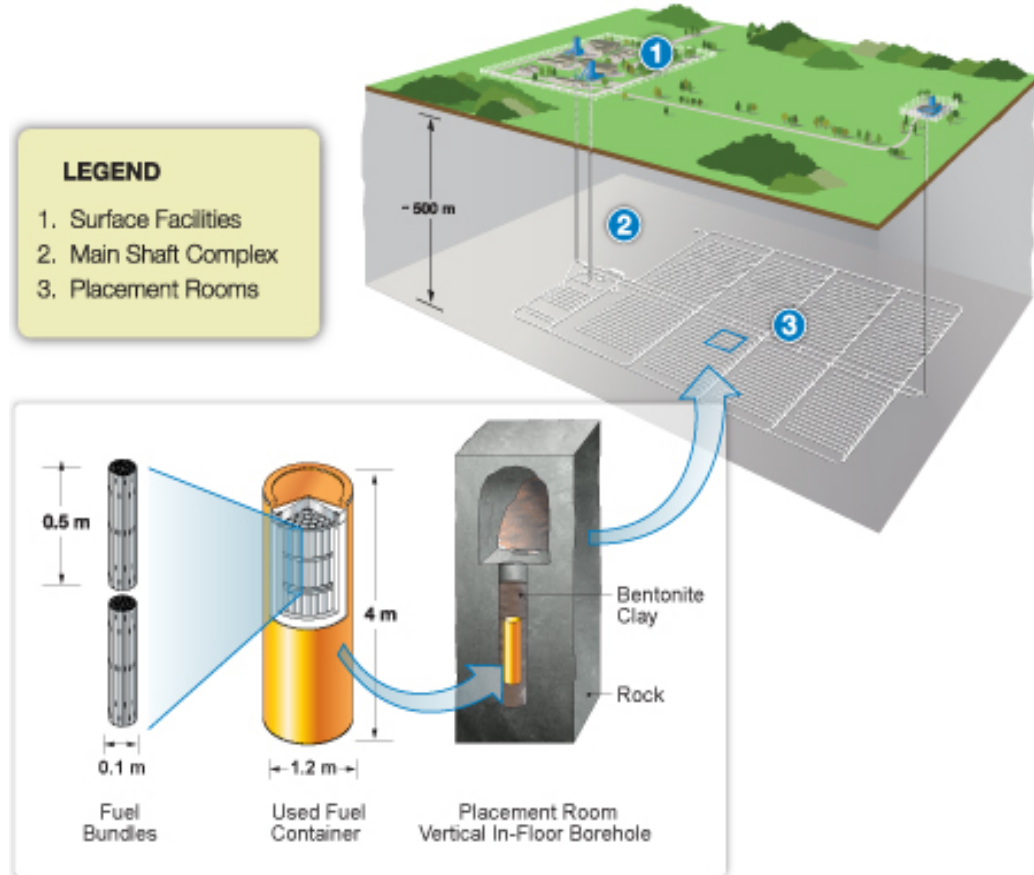
Example of used nuclear fuel stored in dry storage containers



# Long-term Management of Canada's Used Nuclear Fuel



- Nuclear Waste Management Organization's (NWMO) Adaptive Phased Management Project
- Site selection process launched May 2010 by the NWMO
- No licence application
- CNSC involved early:
  - Provides regulatory guidance
  - Conducts pre-project design reviews
  - Provide public information on our regulatory role and responsibilities



# Highly Enriched Uranium (HEU) Repatriation



- HEU is produced in the United States
- Used in Canada as a source fuel at AECL's Chalk River Laboratories and research reactors
- Used to produce life-saving medical isotopes
- In 2010, the Government of Canada committed to send back used HEU to the United States, to consolidate HEU

# Mythbusters



- The CNSC does not regulate radioactive waste
  - Fact
  - Fiction
- Spent fuel repatriation involves the certification of transport containers, transport licence, export licence, a transport security plan, and Transport Canada's emergency response assistance plan
  - Fact
  - Fiction
- Ontario Power Generation's Deep Geologic Repository is a proposal for low- and intermediate-level waste. The Nuclear Waste Management Organization's Adaptive Phased Management Project is a proposal for high-level radioactive waste
  - Fact
  - Fiction



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

# Questions?



[nuclearsafety.gc.ca](http://nuclearsafety.gc.ca)

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