



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire

# Canadian Licensing of New Uranium Mines

May 2007



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Canada



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## An Overview of Uranium Mines and Mills

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- CNSC Introduction
- Regulation of Nuclear Facilities
- Uranium Mines and Mills Regulations
- Licensing of Uranium Mine Facilities
- Compliance Inspection Programs
- Closing

Canada<sup>2</sup>



## CNSC Mission Statement

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The Canadian Nuclear Safety Commission regulates the use of nuclear energy and materials to protect health, safety, security and the environment and to respect Canada's international commitments on the peaceful use of nuclear energy.



## Mandate Under the NSCA

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The *Nuclear Safety and Control Act* (NSCA) obliges the CNSC to:

- Regulate the development, production and use of nuclear energy in Canada;
- Regulate the production, possession, use and transport of nuclear substances, prescribed equipment and prescribed information;
- Implement measures to respect Canada's international commitments on the peaceful use of nuclear energy; and
- Disseminate scientific, technical and regulatory information concerning the activities of the CNSC.

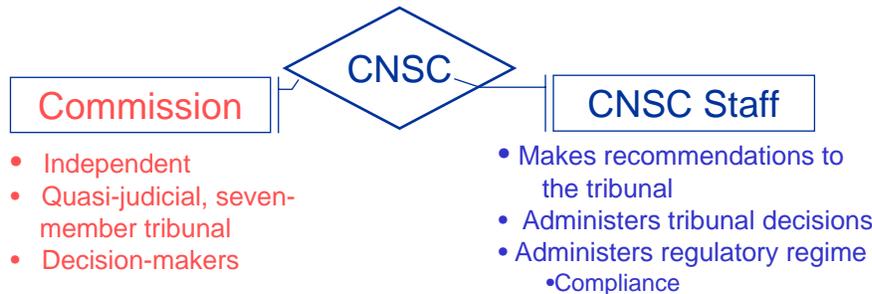
**To Protect  
Health, Safety,  
Security and the  
Environment**

## The CNSC: Two Components



CNSC is divided into two independent components:

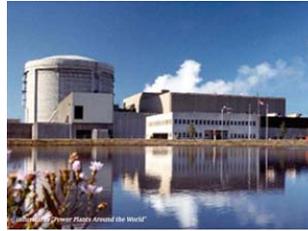
- Quasi-judicial administrative tribunal (Commission)
- Regulatory agency (staff)



## Regulatory Scope



- The CNSC licenses approximately 2,500 operations, comprising approximately 4,500 licences.
- Licensees include:
  - Nuclear power plants
  - Uranium fuel fabricators
  - **Uranium mines and mills**
  - Nuclear substance processing
  - Industrial nuclear substance users, such as hospitals
  - Research and test facilities
  - Importers/exporters of nuclear-related dual-use equipment
  - **Waste management facilities**
  - Radiographers

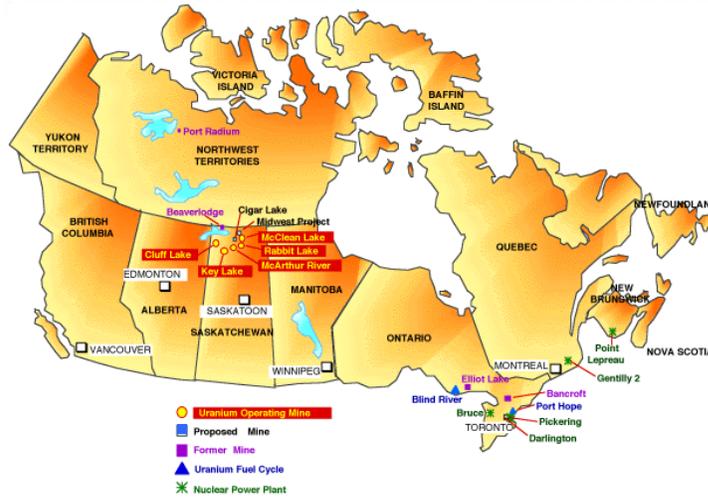


## Regulatory Philosophy

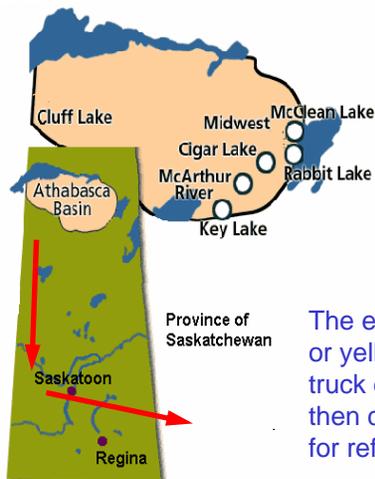


- **Licensees are responsible** for the protection of health, safety, security, and the environment and respecting Canada's international commitments.
- The **CNSC is responsible** for regulating licensees, assessing whether licensees are compliant with the NSCA, regulations, and international obligations.

# Nuclear Facilities in Canada



# Uranium Mining in Canada - Operational Mines



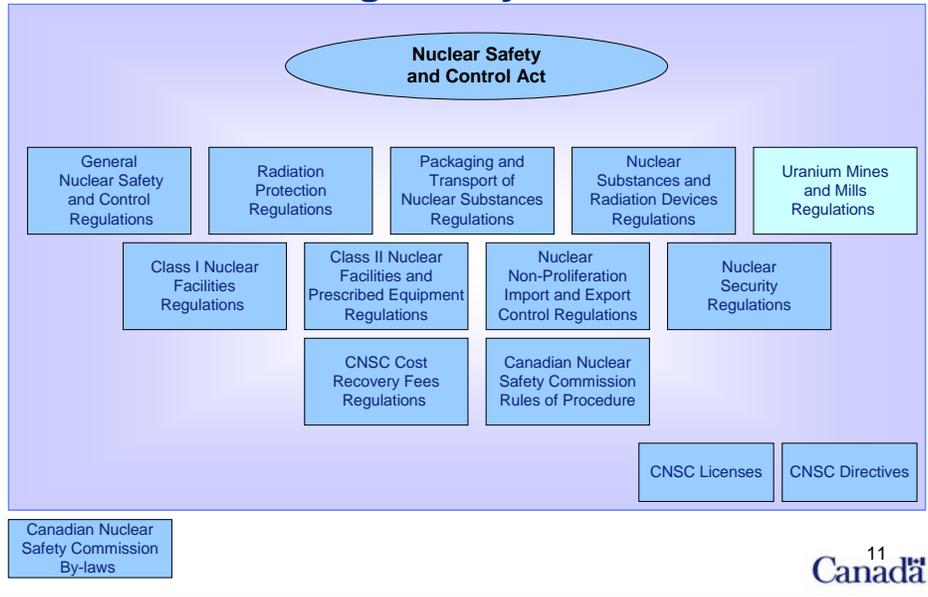
There are 5 operational uranium mining facilities in the Athabasca Basin of northern Saskatchewan.

Uranium ore from these mines are processed either at an onsite or local offsite mill. Average ore grade can range up to 24.7 %.

The end product (uranium oxide or yellowcake) is transported by truck down to Saskatoon, and then continues on to other sites for refining or processing.



## CNSC Regulatory Framework



## Uranium Mines and Mills Regulations Definitions



- “mine” includes an excavation site and a removal site.
  - “excavation site” means a place at which uranium is moved by means of **underground** activities for the purpose of evaluating a potential orebody.
  - “removal site” means a place at which uranium is removed from its place of natural deposit by means of **surface** activities for the purpose of evaluating a potential orebody.



## Uranium Mines and Mills Regulations Definitions (cont'd.)

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- Section 1 of the *Uranium Mines And Mills Regulations* contains definitions:
  - “*mill*” means a facility at which ore is processed and treated for the recovery of uranium concentrate, including any tailings-handling and water treatment system associated with the facility.



## Uranium Mines and Mills Regulations Definitions (cont'd.)

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- "waste management system"
  - means a system for collecting, transporting, receiving, treating, processing, storing or disposing of the wastes that are produced as a result of the licensed activity at a uranium mine or mill.



# Uranium Mines and Mills Regulations Important Distinctions



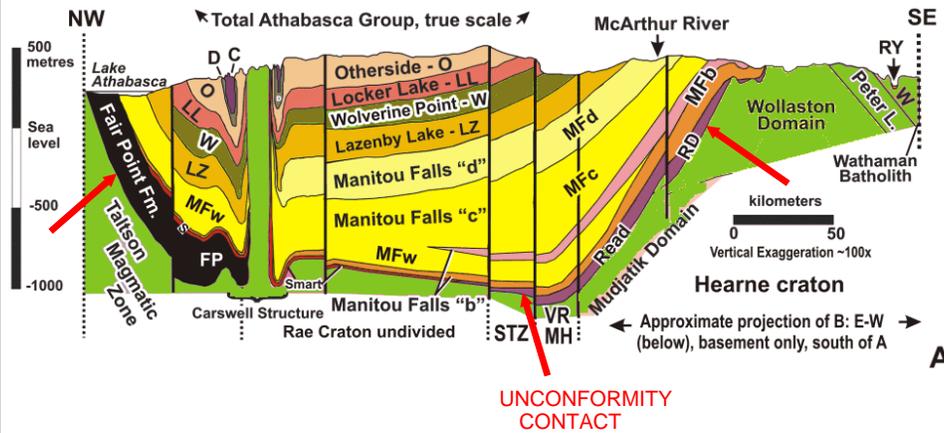
- Section 2(2) of the *Uranium Mines and Mills Regulations* distinguishes:
  - *these Regulations do not apply in respect of uranium prospecting or surface exploration activities.*



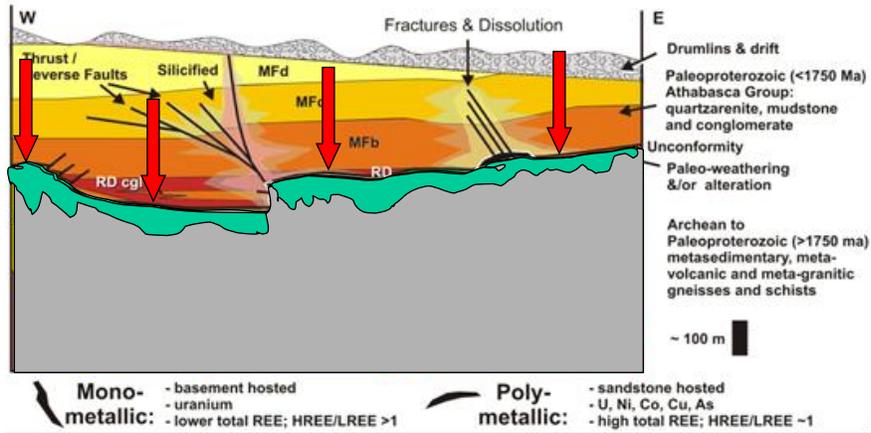
# General Geology of Saskatchewan



# Cross-Section of the Athabasca Basin



# Geology of Uranium Deposits





## Exploration - Diamond Drill Core at McArthur River



## Uranium Orebody - Evaluation Activities



- Key definition – assessing vs. evaluating
- Examples of evaluation:
  - shafts and declines
  - test mining
  - test milling
  - more permanent site infrastructure
  - waste management facilities



Info-0759 can be Downloaded at:

[www.nuclearsafety.gc.ca/eng/regulatory\\_information/other/licensing\\_process\\_uranium\\_mm.cfm](http://www.nuclearsafety.gc.ca/eng/regulatory_information/other/licensing_process_uranium_mm.cfm)



Licensing Process for  
New Uranium Mines and Mills  
in Canada

INFO-0759



March 2007



## Licence Applications General Requirements

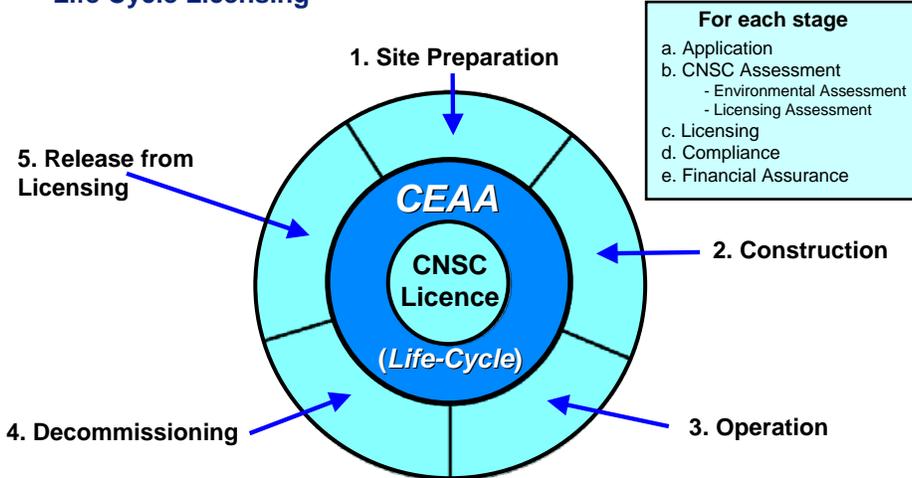
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- Life cycle licensing includes separate licences to:
  - *Prepare a site*
  - *Construct a site*
  - *Operate a nuclear facility (uranium processing)*
  - *Decommission a site*
  - *Release site from licensing (abandon).*

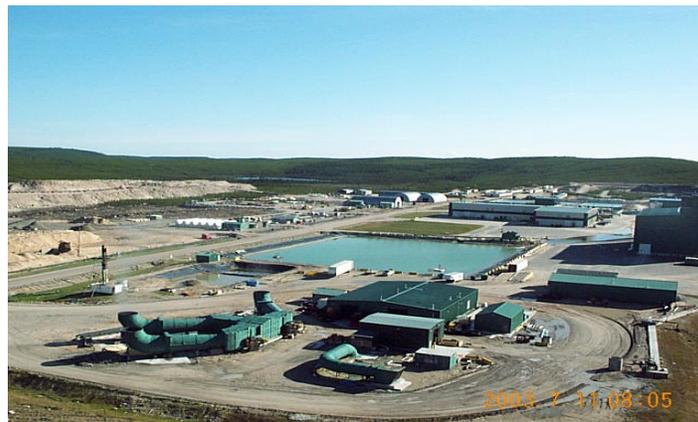
# Uranium Mines and Mills Regulations

## Life Cycle Licensing



The CNSC being a federal agency, is subject to the Canadian Environmental Assessment Act (CEAA) which requires that environmental assessments be performed if required, prior to making any licensing decisions.

# McArthur River - Mine Site



## McArthur River - Radiation Protection



2003. 7. 11 15:09

## McArthur River - Slurry Haul Truck



## Key Lake - Mill Site



## Uranium Mining in Canada



End Product (Yellowcake)

## Packaged Yellowcake



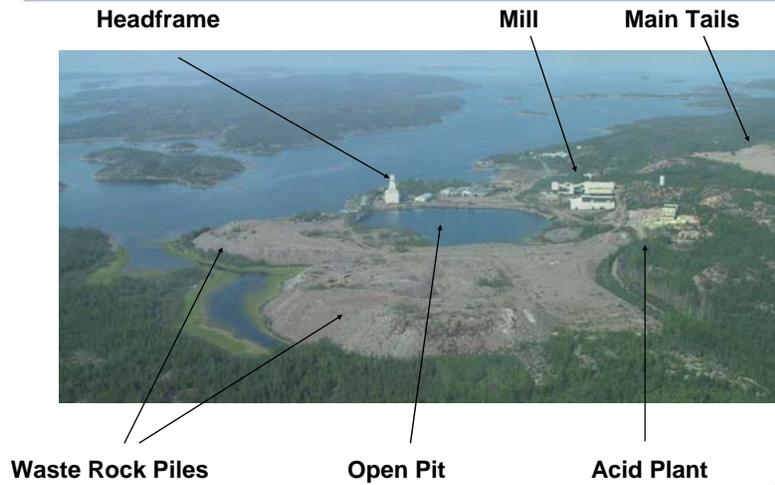
## McClean Lake - Sue Mining



## McClean Lake - JEB Site



## Gunnar Mine/Mill Site - Legacy





## Uranium Mines and Mills Regulations Licensing

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- Section 3 - An application for a licence (except to abandon) needs to include all the information defined in Section 3 of the *General Nuclear Safety and Control* (GNSC) Regulations
  - *Applicant's name and address*
  - *Activity to be licensed*
  - *Details of nuclear substances*
  - *Facility description*
  - *Radiation protection and security measures*
  - *Radiation action levels*
  - *Access control*



## Uranium Mines and Mills Regulations Licensing (cont'd.)

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- (Section 3 of the GNSC Regulations cont'd)
  - *Tests and analysis to support application*
  - *Radioactive and hazardous wastes management*
  - *Organizational management structure*
  - *Financial guarantees*
    - *Saskatchewan operating mines and mills guarantees are to the Province.*
  - *Applicant qualification*
  - *Provision for the protection of the environment, the health and safety of persons and maintenance of national security.*



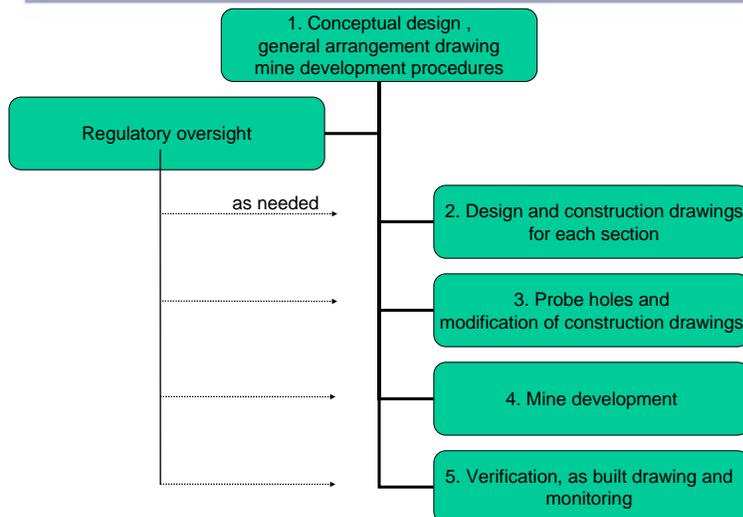
## Geotechnical and Hydrogeological Conditions Around Ore Deposits



- Fractures, faulting, alteration and weathering of the host rock pose some challenging conditions to mining in such an environment
- The mine operator must:
  - ensure stable ground conditions to protect workers safety
  - minimize groundwater inflow to reduce radon exposure and reduce loading to the environment
- The design of the mine in order to achieve the above requirements has to be based on geotechnical and hydrogeological data obtained during exploration and possibly test mining



## Adaptive Management Method - For Underground Mining (example)





## Regulatory Compliance

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- Promotion
  - guide documents, meetings
- Verification
  - compliance inspections
- Enforcement
  - escalating approach



## UMMD Compliance - Verification

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- Type II Inspections
  - Regular
  - Augmented
- Type I Inspections
  - Evaluations
  - Audits
- Risk Based
  - Typically 4 to 6 site inspections
- Harmonized Regulatory Approach



## Site Security – Resident Guard.... for Northern Saskatchewan

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## Safety Culture

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- Accidents and events have human factors.
- CNSC areas of focus include safety culture and operational performance including organizational management, human factors and quality assurance.
- Licensees must demonstrate their commitment and approach to safety culture – for their employees, and any contractors or visitors to their sites.

## Concluding Comments



- Nuclear industry in Canada is diverse, under federal jurisdiction and the CNSC is Canada's nuclear regulator.
- The CNSC strives to be one of the best nuclear regulators in the world and is committed to continual improvement.
- Transparency and consultation are strongly valued at the CNSC. Cooperative approach with other agencies is done.
- CNSC's emphasis is on a nuclear industry whose foremost concern is safety.
- Safety is the responsibility of licensees.

## Canadian Nuclear Safety Commission and Nuclear Regulation in Canada



More information at website:

<http://www.nuclearsafety.gc.ca>

Thank you,

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Uranium Mines and Mills Division