Legal and Safe Regulation of Uranium Mines and Mills in Canada
Copenhagen - 27-28 May, 2014

By:
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CANADA

Decommissioned Open Pit Mine,
Cluff Lake, Saskatchewan
Who Regulates Uranium Mines In Canada?

What is the Regulatory Framework?

What are the Financial Assurances and Liabilities?

Any Guidance Available?
Role of the Federal Regulator

Protect the health, safety and security of persons and the environment; and to implement Canada’s international commitments on the peaceful use of nuclear energy

Established May 2000, under the Nuclear Safety and Control Act

Replaced the AECB, established in 1946, Atomic Energy Control Act

Canada’s Independent Nuclear Regulator - 65 Years Of Experience
CNSC Regulates all Nuclear-Related Facilities and Activities

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

...From cradle to grave
CNSC: Independent Commission

- Quasi-judicial administrative tribunal
- Commission members are independent
- Commission Hearings are public and Webcast
- Supported by staff, technical experts and legal services
CNSC Executive Structure

President
Michael Binder

Commission Members

Executive Advisor

Commission Secretariat

Office of Audit, and Ethics

Legal Services

Regulatory Operations Branch

Technical Support Branch

Regulatory Affairs Branch

Corporate Services Branch
CNSC Regulatory Framework

- **Regulations**
- **Licence Conditions**
  - Supported by regulatory documents

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.

Further details and in depth information about the CNSC is available at:

[nuclearsafety.gc.ca/](nuclearsafety.gc.ca/)
CNSC Regulatory Framework

Elements of the Regulatory Framework

- Enabling Legislation
  - Act
- Regulations
  - Licences, Certificates, Licence Conditions and Orders
- Regulatory Documents
- Guidance
  - Guidance Documents
  - Staff Review Procedures
  - INFO-Documents
- Management System

Guidance for Staff
Specific CNSC Regulations:

When applying for a uranium mine or mill licence, the applicant must provide information specified in the following *Nuclear Safety and Control Act* Regulations:

- section 3 of the *General Nuclear Safety and Control Regulations*
- sections 3 to 7 of the *Uranium Mines and Mills Regulations*
- *Radiation Protection Regulations*
- sections 15 to 23 of the *Packaging and Transport of Nuclear Substances Regulations*
- section 3 of the *Nuclear Substances and Radiation Devices Regulations*
CNSC Links – A Summary

**Constitution Act 1982**
Parliament
Governor in Council

- Minister of Natural Resources
- Federal Court
- Provincial Memoranda of Understanding (MOU)
- Other experts

**Federal Acts**

- Federal Acts
- Other federal departments

**International agreements and activities**
Non-proliferation
Nuclear cooperation
Safeguards

**Intervenors:**
Non-governmental organizations
Aboriginal groups
Industry
Interested public
Municipalities

**CNSC staff**

- Canadian Nuclear Safety Commission (CNSC)
  Nuclear Safety and Control Act
  Regulations
  Regulatory Instruments

- Regulated parties

- Provincial Memoranda of Understanding (MOU)
- Other experts
- Intervenors:
  Non-governmental organizations
  Aboriginal groups
  Industry
  Interested public
  Municipalities

- International agreements and activities
  Non-proliferation
  Nuclear cooperation
  Safeguards

- Federal Acts
- Other federal departments
International Commitments

- Bilateral agreements
- Strict export controls
- Verification of inventories
- IAEA safeguard inspections
Other Local Regulations
- (equivalent to State)

• Saskatchewan Provincial Regulations on U Mines:
  
  – The Environmental Management and Protection Act, 2002
  – The Mineral Industry Environmental Protection Regulations, 1996
  – The Environmental Assessment Act, 2010
  – The Occupational Health and Safety Act, 1993
Other federal legislation that mining licence applicants must respect

- Canada Labour Code
- Canadian Environmental Protection Act
- Canadian Environmental Assessment Act
- Fisheries Act
- Species at Risk Act
- Transportation of Dangerous Goods Act
- Metal Mining Effluent Regulations
- Land Claim Agreements
Agencies working together

- **Regulatory Defence in Depth**

- There is a joint regulatory approach to uranium mining with the CNSC as the principal federal regulator

- Environment Canada, Fisheries and Oceans Canada, Indian and Northern Affairs, and Transport Canada also play a federal role

- Areas such as environmental protection and worker safety may also be the responsibility of local jurisdictions (e.g., territorial, provincial)
Legislation -

- It is common for a country regulating uranium mining to have:
  - National Nuclear Act
  - Supported by Regulations or Authorizations
  - Independent National Nuclear Regulator or Agency
  - Licences or Approvals, with conditions
  - Trained Uranium Mine Inspectors, Specialists
  - Licensees competent to mine the uranium safely.
Regulatory Compliance Program

Verification

Clarity

Enforcement
So why all the interest in uranium?
Why are Uranium Mines Special?

Key Uranium Mine Program Areas:

– Mining and Milling Operations
– Waste Management
– Radiation Protection
– Environmental Protection
– Quality Management System
– Worker Safety Programs
– Emergency Preparedness and Response
– Security
– Safeguards
– Public Information Programs
Canadian Uranium Projects
There is no in situ recovery in Canada. There is only open pit or underground uranium mining.
Stages of Licensing

1. Site preparation and construction
2. Site operation
3. Decommissioning
4. Release from licensing

Public Hearings

Financial guarantees are required
Before project is constructed, secured funds must be in place.

As each phase proceeds, all costs to decommission facility are put in place by operator, with no burden to public or government.

Guarantees include approved bank letters of credit or other security.

Operator can draw on these funds to decommission portions of the facility, as approved by regulator.

Long term surveillance funds are also required in Canada.

* Example: For AREVA’s Cluff Lake Project, the financial assurance, in the form of an irrevocable letter of credit for $33,800,000 was held by the Province in conjunction with the CNSC, and assures the availability of funds for decommissioning and long term surveillance.

Financial Guarantees
Modern Regulations: Uranium Mines; Environmental Protection, Worker Health and Safety (use of existing State Regulations) IAEA, NRC, ICRP, CNSC: radiation and nuclear safety protocols are understood, established, transferable
Trained inspectors, funded regulatory programs (cost recovered)
Harmonized regulatory approach among agencies, with defense-in-depth that is complimentary and coordinated (not contradictory)
CNSC Regulatory Fees are cost recovered from the licensees.
Regulatory Costs, Guarantees

- Under the *Cost Recovery Fees Regulations*, the CNSC charges all costs associated with the regulatory activities back to licensees. The annual fees can range over $1,000,000 per site licence, depending on complexity/status.
- A preliminary decommissioning plan and financial assurance are a condition of the operator for any license phase, at all Canadian uranium mines.
- The Financial Guarantees in place for the 5 active Uranium Mine Facilities are:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Canadian Dollar Amount</th>
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<tbody>
<tr>
<td>Cigar Lake Project</td>
<td>$27,700,000</td>
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<tr>
<td>McArthur River Project</td>
<td>$36,100,000</td>
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<tr>
<td>Rabbit Lake Project</td>
<td>$105,200,000</td>
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<tr>
<td>Key Lake Project</td>
<td>$120,700,000</td>
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<tr>
<td>McClean Lake, Midwest Operation</td>
<td>$43,070,000</td>
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</table>
Open Pit Mining
Mining in Ore
Regulatory Approach

Assessment

Monitoring

Controls
Radiation Exposure Control
Code of Practice Model

- Investigate
- Monitoring
- Corrective Action(s)
Radiation Protection

- Dose to workers below regulatory limits
  - (Example for McArthur High Grade U/ground Mine)
Protection of the Environment
Protect the Environment

- Control releases
  - to the air
  - to surface water
  - to ground water

- Measure
  - releases
  - Effects

- Take action, when required
Effluent Treatment

- Treatment for additional contaminants
- Multi-stage chemical precipitation
- Filtration
- Batch discharge
- Membrane technologies
Tailings Management Facilities

- Geochemical characterization
- Engineered tailings
- Thickened slurry and paste tailings
- Tailings consolidation
- Site-specific design
- Pore water monitoring

AREVA McClean Lake – In-pit TMF
Tailings Management – In-pit Technology Used at Key Lake, Rabbit Lake and McClean Lake
Waste Rock Management

- Segregation of waste rock
- Reduction and re-use
- Temporary storage of waste rock
- Leachate containment and control
Site Security – Resident Guards … for Northern Saskatchewan, Canada
Plus Site isolation, and - 50°C winter temperatures!

- In fact, Canadian Uranium Mines and Processing facilities have physical security measures in place at site, to control site access and exit from the facility. Site access and security is a common approach worldwide.
Protect the Public

- Measure key parameters in the environment
- Estimate potential dose to the public
- Start with the end in mind…
Uranium Mining and Health

- Human exposure to radon and radiation from modern uranium mining is low, and does not increase the risk of cancer.

- Studies have shown that workers and the general public living near mines are as healthy as the general Canadian population.

- Strong regulatory requirements ensure continued mitigation and effective management.

Economic Health 2010 (related):

- Northern Sask. mining operations averaged 3,401 employees - the highest ever.

- Northern Saskatchewan workers averaged 1,653, and made up 49% of the mine site workforce, compared to 35% in 1989.

- In terms of economics and jobs: Aboriginal workforce at all-time high of 1,434 people at N. Sask. Uranium mines.
Concluding Comments

• Canada’s nuclear regulator is the CNSC, and is responsible for licensing, compliance and enforcement of uranium mining industry in Canada, and joint regulatory cooperation:
  – increasing environmental standards
  – resulting changes to milling, effluent treatment and tailings management facilities
  – continuing innovation, and plan with decommissioning in mind
• Licensees must have high reliability performance, and continually improve through the ALARA process and self-report on events.
• Effective radiation protection: integrated and systematic regulatory framework of management, engineering and administrative controls, and is independent of ore grade or mining method.
January 12, 2011 – Staff Presentation in Sask. to Delegates from Quebec
Legal and Safe Regulation of Uranium Mines and Mills in Canada

Any Questions?

Thank you!

Kevin H. Scissons, Saskatoon