Regulating Uranium Mines in Canada

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nuclearsafety.gc.ca
Outline

• Overview of CNSC
• Regulatory framework
• Uranium mines and mills - Examples
• Licensing process
• Radiation protection - workers, public
• Environmental protection
• Conclusion
Established in May 2000 under the Nuclear Safety and Control Act
Replaced the AECB, which had been established under the Atomic Energy Control Act of 1946

Canada’s Independent Nuclear Regulator - 64 Years of Experience
Our Mission Is Clear

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

Canada’s Nuclear Watchdog
CNSC regulates all nuclear facilities and activities in Canada, including:

- Nuclear power plants
- Uranium mines and mills
- Uranium fuel fabrication and processing
- Nuclear substance processing
- Industrial and medical applications of nuclear substances, such as nuclear medicine and cancer treatment centres
- Research and testing establishments
- Import and export of nuclear and dual-use substances, and of equipment and technology
- Waste management facilities

**A Federal Responsibility**
Joint Regulatory Approach to Uranium Mining

- CNSC is the principal federal regulator.
- Environment Canada, Fisheries and Oceans Canada, Indian and Northern Affairs, and Transport Canada also play a role.
- Local (provincial or territorial) jurisdiction for environmental protection, resource management and worker safety.
- A harmonized approach is encouraged.
Parliament has Provided the CNSC with Modern Legislation

- **Regulations**
  - *Uranium Mines and Mills Regulations*

- **Licensees** are responsible for ensuring security, protecting health and safety, protecting the environment, and respecting Canada’s international commitments.

- **CNSC** regulates licensees and assesses their compliance with the NSCA, the regulations and international obligations.
Other Federal Legislation that Must be Respected by Mining Licence Applicants

Examples

- 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
Executive Structure

President
Michael Binder
613-992-8828

Executive Advisor
Colin Moses
613-943-5039

Office of Audit, Evaluation and Ethics

Commission Secretariat
Marc Leblanc
613-995-6506

Commission Members
Dr. Michael Binder
Dr. Ronald Barriault
Mr. Alan R. Graham
Mr. André Harvey
Mr. Dan D. Tolgyesi
Dr. J. Moyra J. McDill

Legal Services
Senior General Counsel and Director
Jacques Lavoie
613-996-9694

Regulatory Operations Branch
Executive Vice-President and Chief Regulatory Officer
Ramzi Jammal
613-947-8899

Technical Support Branch
Vice-President
Terry Jamieson
613-947-8931

Regulatory Affairs Branch
Vice-President
Patricia McDowell
613-943-7662

Corporate Services Branch
Vice-President and Chief Financial Officer
Gordon White
613-995-0104
Commission Tribunal

- Quasi-judicial administrative tribunal
- Commissioners are independent
- Commission hearings are public and Webcast
- Science-based organization
- Supported by a secretariat and an independent legal services team

Transparent Decision Making
Scientific, technical and professional staff, who are responsible for:

- implementing the decisions of the Commission and verifying compliance with the regulations and licence conditions
- reviewing licence applications and environmental assessments
- engaging the public through outreach activities
Present Across Canada

Staff: ~ 850
Licensees: 2,050
Licences: 3,300

Headquarters (HQ) in Ottawa
5 offices at nuclear power plants
1 office at Chalk River
4 regional offices

Calgary - Western Regional Office
Saskatoon - Uranium Mines and Mills Division Regional Office
HQ
Gentilly-2
Chalk River
Bruce A et B
Laval - Eastern Regional Office
Darlington
Mississauga - Southern Regional Office
Pickering
Point Lepreau
Uranium Mining Projects

6 active projects
- Key Lake Mill (Cameco)
- McArthur River Mine (Cameco)
- Cigar Lake Mine (Cameco)
- Rabbit Lake Mine and Mill (Cameco)
- McClean Lake Mine and Mill (AREVA)
- Matoush Project (Strateco)

Down the road?
- Midwest Project (AREVA)
- Caribou Project (AREVA)
- Millennium Project (Cameco)
- Kiggavik Project (AREVA)
- Matoush Project (Strateco)

Source of Nuclear Sector Fuel
Decommissioning and Restoration

Saskatchewan
- Beaverlodge
- Lorado and Gunnar
- Cluff Lake

Ontario
- Deloro
- Elliot Lake
- Bancroft

Protecting the Environment
There are 6 uranium mining projects 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.
Stages of Mining
Exploration (not regulated by CNSC)
Key definition - exploring vs. evaluating

Examples of evaluation licensed by CNSC:

- shafts and declines
- test mining
- test milling
- more permanent site infrastructure
- waste management facilities
Stages of Mining
Construction - Cigar Lake, Saskatchewan
Stages of Mining
Operation - McArthur River, Saskatchewan
Stages of Mining
Operation of a mine and mill - McClean Lake, Saskatchewan
Key Lake - Mill
Packaging and Transport
Tailings Management - In-Pit
Stages of Mining
Decommissioning of Cluff Lake Mill in Saskatchewan

1999

2005
Licence Application - Stages

1. Site preparation

2. Site construction

3. Site operation

4. Decommissioning

5. Release from licensing

Each stage requires a licence and could also require an EA

Financial guarantees are required at stages 1 through 4
*Must demonstrate that management systems, plans and programs are in place to protect the workers, the public and the environment.*
Examples of Evaluated Programs

Operation
- Mining operations
- Milling operations
- Waste management
- Transportation and packaging
- Management system
- Radiation protection
- Environmental protection
- Non-radiological health and safety
- Emergency preparedness
- Staff training
- Public information
Public Hearings

Public hearings give the affected parties and members of the public an opportunity to be heard by the Commission.

**Application**
(NSCA + Regs)

**Environmental Assessment**
(CEAA)

**Public Hearing**

**Licence**
- Site/const.
- Operation
- Decommissioning
- Abandonment

**Licensee Obligations**
- Safety
- Quality assurance
- Monitoring
- Reporting

**CNSC: Compliance Verification**
- Inspections
- Program review
- Records review
Public Hearings and Public Meetings

Aboriginal consultation, meeting at a site

CNSC public hearing - community of La Ronge, Saskatchewan
Compliance Process

- Verification
  - Routine inspection and in-depth evaluation
- Enforcement
  - Request for action
  - Orders
  - Restrictions or revoking of licence
  - Prosecution under the NSCA
- Documenting and reporting on compliance
Protection of Workers, the Public and the Environment
An approved radiation protection program is required.

**Engineering controls**
- i.e. ventilation, mining method, shielding, dust control, design

**Administrative controls**
- i.e. staff training, work planning

**Monitoring**
- Individual dosimeters
- Continuous monitors with warning lights
- Area and time monitoring
- National Dose Registry
- Dose limits, action levels, codes of practice
## 2008 Total Effective Dose (mSv)

<table>
<thead>
<tr>
<th>Work Group</th>
<th>Average</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>Rabbit – Miner</td>
<td>4.0</td>
<td>10.9</td>
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<tr>
<td>McArthur – Miner</td>
<td>2.7</td>
<td>7.8</td>
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<tr>
<td>McClean – Surface miner</td>
<td>0.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Rabbit - Mill Worker</td>
<td>1.8</td>
<td>3.7</td>
</tr>
<tr>
<td>Key – Mill Worker</td>
<td>1.3</td>
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</tr>
<tr>
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</tr>
</tbody>
</table>

Compare to the annual worker dose limit of 50 mSv or 100 mSv/5 years.
Radiation Protection Program – Public

Public dose limits
Follows international science and protocol principles for radiation protection.

- Based on releases, modeling and monitoring.
- Evaluates the most-exposed group and its habits, etc. that lead to high rates.
- The average annual public dose is 0.001 to 0.1 mSv per year, near a nuclear facility.
- In comparison:
  - Natural background dose of 2.5 mSv per year.
  - Public dose limit of 1 mSv per year.
A monitoring program demonstrates that the facility is operating within the parameters described in the facility licence.

- The quality and quantity of effluent released do not exceed those predicted in the licence application and the environmental assessment.
- The environmental effects do not exceed those predicted in the licence application and the environmental assessment.
An approved environmental protection program is required.

**Engineering controls**
- i.e. waste minimization, effluent control and treatment, waste rock and tailings management, remediation

**Administrative controls**
- i.e. processes and procedures, staff training

**Monitoring**
- Effluent sampling and analysis
- Environmental sampling
- Ecological studies
Concluding Comments

- CNSC is Canada’s nuclear regulator.
- Canada’s nuclear sector is diversified.
- Transparency and public consultation are strongly valued.
- CNSC is responsible for licensing, compliance and enforcement in relation to the uranium mining industry in Canada.
- There is a co-operative approach to relations with other agencies.
- Protection of workers, the public and the environment is paramount.