



Regulating Uranium Mining and Production Part of a National Nuclear Regulatory Statute

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Outline

- Uranium market
- Regulating mines: old vs. new
- Environmental impact assessment
- Regulatory Framework for Uranium Mining
 - Licensing process
 - Oversight and compliance
 - Modern regulatory issues in uranium
- Indigenous Rights and Mining
- Responsible Business Conduct / Corporate Social Responsibility
- Some conclusions





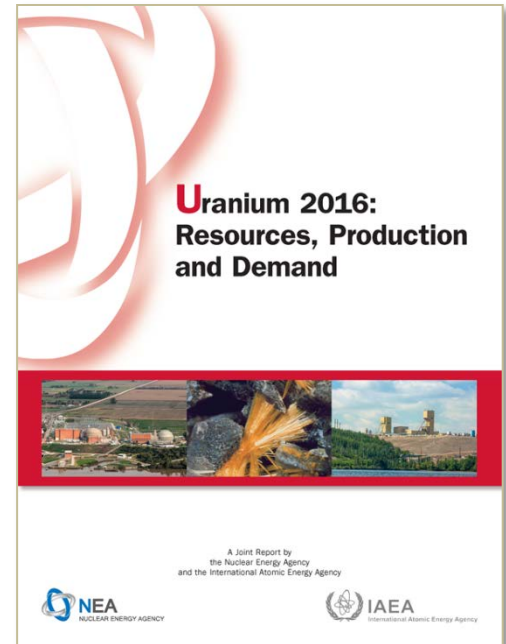
Uranium Market Information and Data

Resources, production, demand – the “Red Book”

- Uranium supply for energy security – statistical profile of the world uranium industry

Resources:

- Identified resources are sufficient for “over 135 years of supply” for global nuclear power fleet
- But this depends on timely investment, and challenges remain in a market with “high levels of oversupply and inventories, resulting in continuing pricing pressures”
- Identified resources have changed little over 2 years lower investment and exploration efforts
- Exploration and mine development expenditures up 10%, majority made by China





Current Red Book Information – Production

- Production has decreased 4.1% since 2013, but still above 2011 level
- Production in 21 countries – top 6 have 90%:
 - Kazakhstan – 40%
 - Canada – 23%
 - Australia – 10%
 - Niger – 6%
 - Namibia – 6%
 - Russia – 5%
- Mining methods:
 - In situ leach – 51%
 - Underground – 27%
 - Open-pit – 14%
 - By-product – 7%
- World production has varied between 70 and 80% of production capability
- Environmental and social aspects of uranium production are of ever-increasing importance, especially for newer mining countries



Current Red Book Information – Demand

Will uranium supplies be adequate for future needs of nuclear power?

- The currently defined resource base – existing, committed, planned and prospective mines – will meet high case uranium demand, to 2035.
- Demand projections have a lot of uncertainty:
 - Capacity growth in Asia, Middle East will increase uranium demand
 - North America – capacity estimate between same and 11% increase
 - EU – capacity estimate between 48% decrease and 2% increase

Market transition in future from supply-driven to demand-driven?

“Regardless of the role that nuclear energy ultimately plays in meeting future electricity demand, the uranium resource base...is more than adequate to meet projected requirements for the foreseeable future. The challenge in the coming years is likely to be less one of adequacy of resources than adequacy of production capacity development due to poor uranium market conditions.”



Some 2018 Developments

Resources

Cost-effective method of extracting uranium from seawater?

- US Dept of Energy (Pacific Northwest National Laboratory) and American company LCW Supercritical Technologies used acrylic yarn to absorb, then extract, uranium from ordinary seawater
- 4 billion tons of uranium in seawater – 500 times more uranium in the sea than could be mined on land

Demand

Some active uranium mine/mill operations in Canada have imposed temporary shutdown of operations

- Global price is not supportive of production – low demand and oversupply

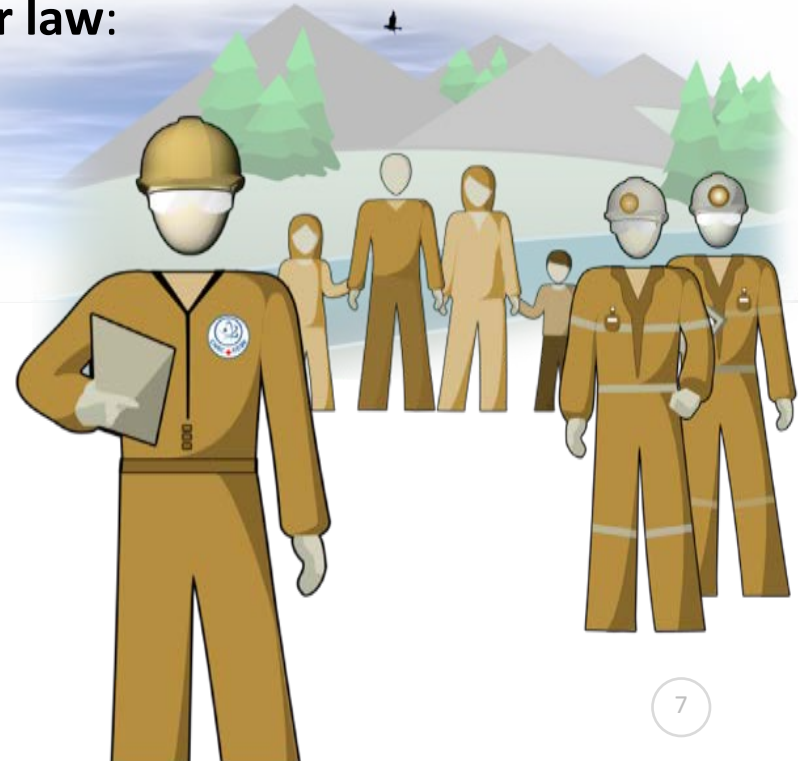
The next edition of the ‘Red Book’ to be expected by end-2018



Uranium Mining Regulation: Part of Nuclear Law

Commonalities with other aspects of nuclear law:

- Worker safety and radiation protection
- National interest in control over the resource
- Non-proliferation and export control
- Radioactive waste – low-activity, high-volume, long-lived
- Key part of nuclear fuel cycle
- Environmental protection
- Social acceptance





Old Uranium Mining vs. New Uranium Mines

- Legacy sites: old mining practices, Cold War secrecy, lack of remediation, no closure plans, worker exposures
- New sites: environmental stewardship, site rehabilitation, social responsibility, financial guarantees, internationalized standards, prevention and mitigation of risks to health, environment – highly regulated

Canadian example

Rio Algom v. Canada,

2012 ONSC 550

(Jan 4, 2012 decision
of Ontario Superior Court)



Rio Algom v. Canada, 2012 ONSC 550 not the Law that's interesting, but the facts

- **1954-1972:** Rio Algom sold >65M pounds of uranium oxide to a Canadian government-owned (Crown) corporation, which in turn (and for no profit), sold the uranium to the U.S. Atomic Energy Commission to build nuclear arsenal in the Cold War – the “Cold War contracts”
- Rio Algom made >\$72M on the contracts based on a formula that was meant to incentivize the industry and turn a profit for them – to create a uranium mining industry in Canada
- Price formula included cost of tailings management, but such management was rudimentary at the time
- **1990s:** new regulations – to remedy environmental harm caused by the radioactive waste, ineffectively treated mine tailings – Rio Algom complied
- **2000:** *Nuclear Safety and Control Act* – licence to decommission required, new standards for mine rehabilitation
- Rio Algom sues Canada – Canada indemnifying company as an implied term of Cold War contracts?
- Legal arguments fail – Rio Algom must hew to new environmental standards for mine rehabilitation, Canada is not required to indemnify it
- Rio Algom’s costs of managing tailings will continue **in perpetuity** – current estimate of future cost is approx. \$100M



Decommissioning and Restoration

- Legacy sites needing remediation are all over the world, a remnant of past inappropriate standards
- Governments may finance necessary cleanup – e.g., European Bank for Reconstruction and Development fund for Central Asia sites, set up in 2015
- Corporate responsibility to pay – e.g. US EPA claims to companies fund cleanup of >500 abandoned uranium mines in Navajo Nation region of US
- Remediating former sites can be more technically challenging than new sites
- New mine acceptance judged by treatment of old sites
- Photos – a modern mine decommissioning project





Regulating Uranium Mine Operations Today





Regulating Uranium Mining - Safety



Protecting workers

- Control of radioactive materials
- Control of workers' radiation doses
- Measurement of radiation
- Conventional health and safety

Protecting the public

- Measure key parameters in the environment
- Estimate potential dose to the public

Protecting the environment

- Control releases to the air, surface water, ground water
- Measure releases: effects
- Take action, when required
- Site decommissioning, remediation planned and costed



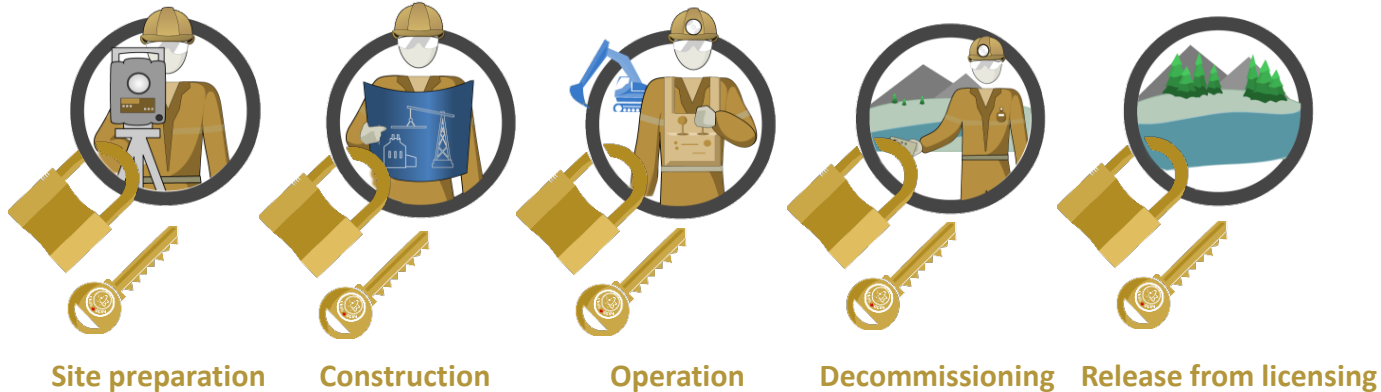
Regulating the Nuclear Industry in Canada

- **Licensees** are responsible for the protection of health, safety, security and the environment in the context of their licensed activities, and for respecting Canada's international commitments
- The **regulator – the CNSC** – is responsible for regulating licensees: assessing whether applicants should be authorized; then verifying whether licensees are compliant with the statute, the regulations and the licence; and taking measures to ensure compliance
- The Commission makes independent, objective and risk-informed decisions on licensing – this means that regulatory actions/decisions are based on the level of risk.
- Under the statute, licensees are responsible for managing their licensed activities in a manner that protects health, safety, security and the environment, while respecting Canada's international obligations
- The CNSC sets the requirements for licensees, and verifies compliance with those requirements.



Licensing Uranium Projects in Canada - Lifecycle Approach

Staged Approach / Early Planning

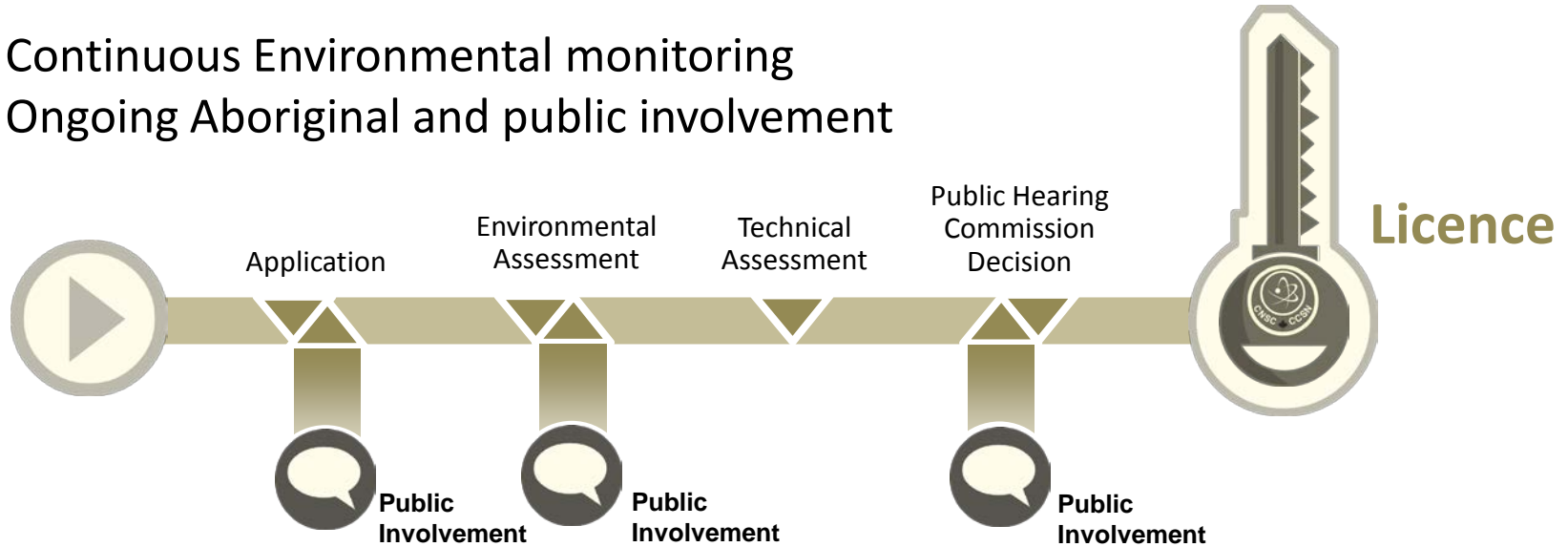


Each stage requires a CNSC licence
Financial Guarantee required for Stages 1-4



CNSC's Licensing Process

- Continuous Environmental monitoring
- Ongoing Aboriginal and public involvement



...ensures only qualified applicants are Licensed



Transparent, Science-based Decision Making



Quasi-judicial administrative tribunal – up to seven Commission Members
Reports to Parliament through Minister of Natural Resources – Independent
Commission conducts public hearings for licensing decisions – hearings are also webcast
Nuclear Safety and Control Act authorizes the Commission to decide whether applicant is qualified
Commission may impose any conditions in a licence that serve the purposes of the Act
Commission decisions are reviewable only by Federal Court of Canada



Licensing Uranium Projects in Canada

Regulatory oversight

- Licence conditions
- Inspections
- Compliance verification

Licensee obligations

- Health and safety
- Environmental protection
- Security
- Monitoring
- Reporting
- Financial guarantee





Licensing a New Mine or Mill

Licence application process (details of requirements are set in regulations):

- EIA process and results: environmental monitoring plan, water management
- Mining process and milling process
- Safety: radiation protection, conventional worker safety, transport, emergency preparedness/planning
- Public consultation/outreach
- Onsite security: physical protection for transport
- Waste generation and disposal, tailings management
- Disclosure/reporting requirements
- Financial assurance for site closure
- Long-term plan for institutional control and release

Social responsibility is important



Environmental Impact Assessment

- International conventions:
 - **Aarhus Convention** (access, public participation)
 - **Espoo Convention** (environmental assessment (EA) in transboundary context); **Kiev Protocol**
- Environmental protection: a tenet of nuclear law
- Environmental impact assessment (EIA) is a process to predict the environmental effects of proposals:
 - assessing whether proposal would cause adverse effects – physical, biological, human environment
 - ensuring public discourse on a project
 - crafting monitoring programs, mitigation measures, remediation plans – lifecycle approach
- International Environmental Standards – **ISO 14001**: environmental management system, to measure and improve environmental impact





EIA Components for Uranium Production

- Baseline data: topography, hydrogeology, flora, fauna, local air, water, soils, biota
- Detail of ore body and proposed mining method:
 - in situ recovery: inject leaching solution, recover uranium from solutions pumped to surface, *impact on groundwater is an issue
 - open-pit: near-surface orebodies, high ratio of waste rock to ore
 - underground: vein-type deposits, costliest, risk of collapse
- Milling process: how to extract uranium from ore – acid leaching, solvent extraction, calcinations – to obtain yellowcake (uranium oxide concentrate)
- Socio-economic issues: need to include potential impacts on culture, potential positive economic effects, long-term plan for land



EIA Components for Uranium Production

- EIA links social impact (political) to environmental protection (scientific)
- “Social acceptability” of uranium mining –
 - Ranger Inquiry (Australia):
1975–77 Fox Report – ethics of mining, social and Aboriginal opposition
 - Matoush Project (Canada):
2013 Quebec government decision:
inadequate social acceptability;
moratorium on uranium exploitation

Ressources Strateco Inc. v. Procureure Générale du Québec,
21 June 2017, Que.S.C., file 200-17-022389-159

- Strateco unsuccessfully sought \$200M in damages for failure to authorize advanced exploration on the basis that the project lacked social acceptance
- The governing statute (*Loi sur la qualité de l’environnement*) did not include or define the term “social acceptability”; the Court was nonetheless satisfied both that the concept came from the statutory principles, and that the environment must include the social environment.
- Just as important, the Court found that Strateco had, as evidenced from its own reports and statements, acknowledged the importance of social acceptability of the project throughout its work in the region



Regulatory Framework for Uranium Mining

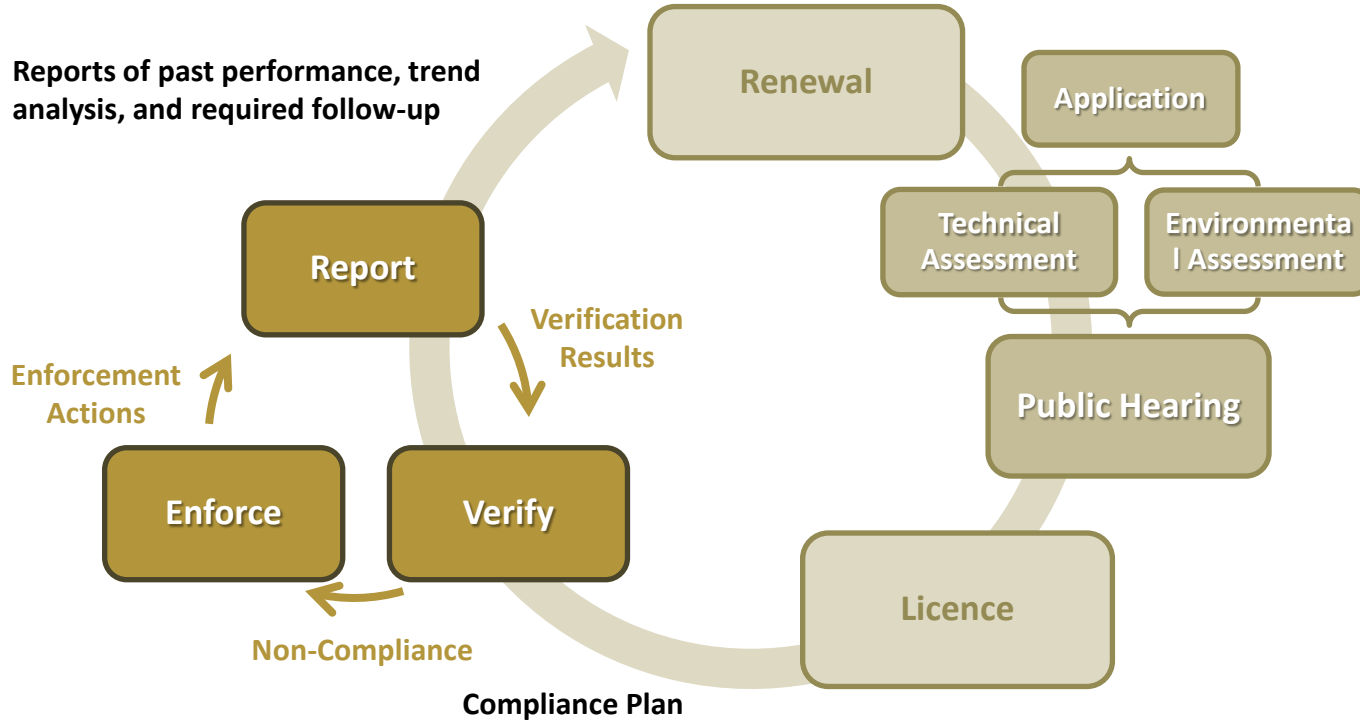
- Regulatory body: regulates to protect workers, the public and environment from risks of uranium production; licensing system; transparent decisions; lifecycle authority
- Applicant requirements: design information; closure plan before mine begins construction; practices proposed to minimize radiation exposure and protect workers, to protect water resources and to manage wastes
- Licensee obligations: safe operation; financial assurance for remediation; monitoring; records and reporting requirements; public consultation and information

The regulatory statute sets out the general regulatory authorities and licensee obligations.

Regulating may require different regulators to collaborate, to ensure adequate oversight without gaps or overlap



Licensing and Compliance





International Guidance and Tools

- Managing Environmental and Health Impacts of Uranium Mining (NEA, 2014)
<http://www.oecd.org/publications/managing-environmental-and-health-impacts-of-uranium-mining-9789264216044-en.htm>
- Lessons Learned from Environmental Remediation Programmes (IAEA Nuclear Energy Series No. NW-T-3.6, 2014)
<http://www-pub.iaea.org/books/IAEABooks/10509/Lessons-Learned-from-Environmental-Remediation-Programmes>
- Sustaining Global Best Practices in Uranium Mining and Processing: Principles for Managing Radiation, Health and Safety, Waste and the Environment (WNA policy document, 2010) <http://www.world-nuclear.org/our-association/publications/position-statements/best-practice-in-uranium-mining.aspx>
“This document holds the status of a policy and ethical declaration by the full WNA membership... In the category of uranium miners, the WNA membership includes all major uranium mining and processing companies as well as many mid-size and junior companies. The principles affirmed here are supported by key relevant international organizations, including the International Atomic Energy Agency. Indeed, these principles have been affirmed as an outgrowth of an IAEA cooperation project aimed at encouraging expanded exchanges between professionals from governments and industry. These principles are also supported by the global mining community through relevant international and national associations that cover uranium mining and processing.”



Construction – Cigar Lake Mine





Operation – McArthur River Mine





Mining – Drill and Blast



McArthur River a miner operates a scoop tram remotely to scoop up the muck.

Radiation Protection

- Distance – The person maintains a line of sight with the scoop tram but is far away from the muck pile.
- Shielding – The walls are covered with cement.
- Reduction – The muck pile is kept damp to reduce dust.
- Dilution – The tunnel where the worker is working is ventilated with fresh air.

Health and Safety

- The orange plates and screening provide ground support.
- Personal protective equipment



Operation – Key Lake Mill





Operation – McClean Lake Mine and Mill





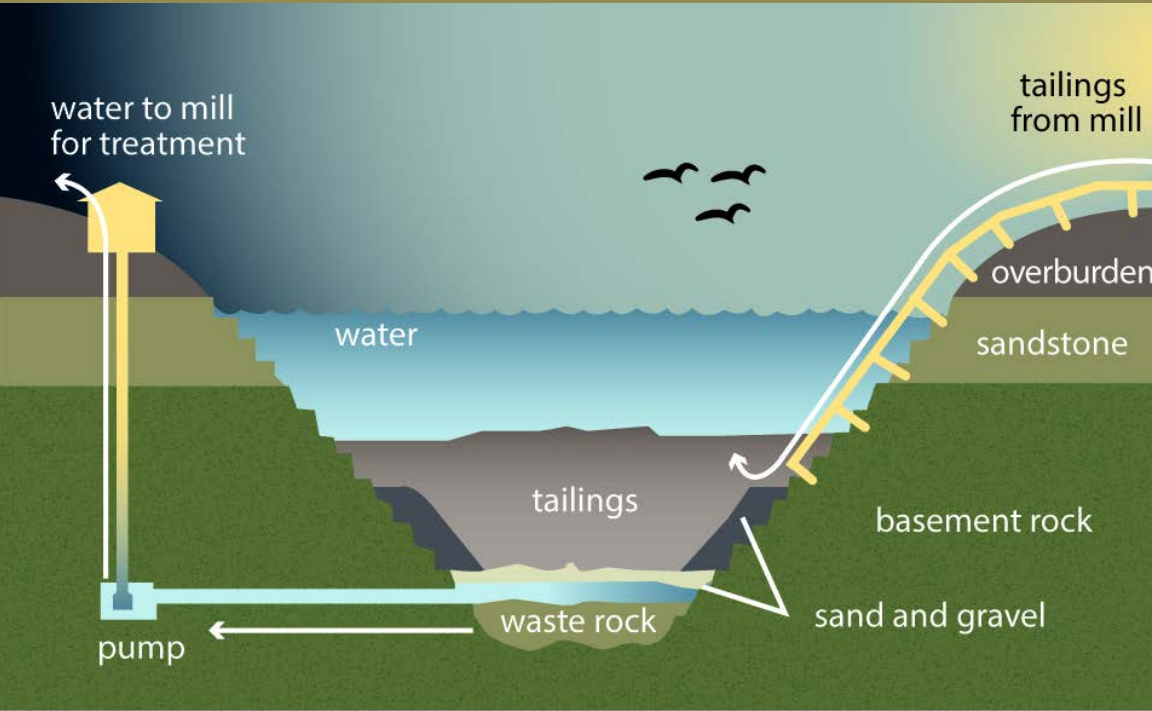
What Waste Do Uranium Mines and Mills Produce?

Remember: high volume, low activity

- **Clean waste rock and waste rock:** Mining produces both clean waste rock and waste rock that must be removed to retrieve the uranium ore. Clean waste rock is not harmful to the environment and is placed in surface rock piles for future use. Waste rock is usually found close to the ore body and contains low concentrations of radionuclides or heavy metals (mineralized waste). These must be managed during operations and properly disposed of so that contaminants are not released to the environment.
- **Tailings:** Milling uranium ore produces tailings. Tailings are what is left over once the uranium has been removed from the ground rock – they resemble fine sand. They contain long-lived radionuclides (such as thorium-230 and radium-226) produced from the decay of uranium, as well as trace metals like arsenic and nickel. They also contain chemical residues from the milling process.



Mine Waste Management





Waste Management for Mines/Mills

Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management

- Sets general safety requirements (article 11)
- Article 3(2) notes the Convention does not apply to “naturally occurring radioactive material ... that does not originate from the nuclear fuel cycle unless ... declared as radioactive waste ... by the Contracting Party.” Contracting Parties have agreed to include mine/mill waste in reporting





Transportation

Producing vs. using countries + complexity of fuel cycle = a lot of shipments, different stages

- IAEA regulations
- Packaging requirements
- Security requirements, physical
- Use of reliable carrier
- Secure storage in transit
- Driver communications
- Emergency planning
- Security response
- Shipment notification





Uranium Mining and Safeguards

Treaty on the Non-proliferation of Nuclear Weapons (NPT):

- Non-nuclear weapon states forego nuclear weapons, accept safeguards
- nuclear trade – for peaceful purposes – is done under safeguards

Starting point of safeguards (INFCIRC/153):

- “Nuclear material of a composition and purity suitable for fuel fabrication or for being isotopically enriched” (art. 34)
- Safeguards procedures for mining and milling: import and export reporting, keeping track of materials
- Accountancy and verification procedures apply to nuclear material at the next stage of the fuel cycle after mining – ore concentrate for nuclear purposes, conversion, enrichment, fuel fabrication
- Additional Protocol (INFCIRC/540) obligations include providing information on mining activities, stocks of source material, concentration plants, import/export, R&D



Indigenous Rights and Uranium Mining

- Indigenous peoples live in many places with valuable uranium ores – Canada's Athabasca Basin, Australia's Northern Territory, many parts of Africa
- Indigenous Peoples live in more than 60 States



United Nations
DECLARATION
on the **RIGHTS**
of **INDIGENOUS**
PEOPLES



Indigenous Rights and Uranium Mining

UN Declaration on the Rights of Indigenous Peoples:

- Adopted in 2007 by the UN General Assembly (143 in favour, 4 against, 11 abstentions)
- Altered the political and legal climate surrounding indigenous *rights* rather than *claims*
- a standard of achievement to be pursued – describes both individual and collective rights of Indigenous peoples around the world, recognizing past injustice and need to respect and protect
- addresses issues such as culture, identity, language, health and education and provides guidance to States, the UN and other international organizations on harmonious, cooperative relationships with Indigenous peoples
- Recognizes land rights, self-determination, autonomy as collective rights of Indigenous groups



Indigenous Rights and Uranium Mining

UN Declaration on the Rights of Indigenous Peoples:

- 29(2): *States shall take effective measures to ensure that **no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.***
- 32(2): *States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their **free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.***



Indigenous Rights and Uranium Mining in Canada

- Canada signed onto the UNDRIP in 2010
- Canadian constitutional law imposes on the Crown (government) the duty to consult and potentially accommodate Indigenous groups whose rights (established or asserted) may be affected by a Crown decision, such as a decision to authorize the construction and operation of a uranium mine (licensing/permitting)
- Project proponents are expected to engage with interested Indigenous groups and address all of their concerns
- The CNSC conducts consultation activities and considers potential accommodation as part of its regulatory role in considering a licence application



Fond du Lac Denesuline First Nation et al. v. Canada (Attorney General)

2012 FCA 73 March 2012 Federal Court of Appeal (see NLB 2012/1, No. 89)



OECD Guidelines for Multinational Enterprises

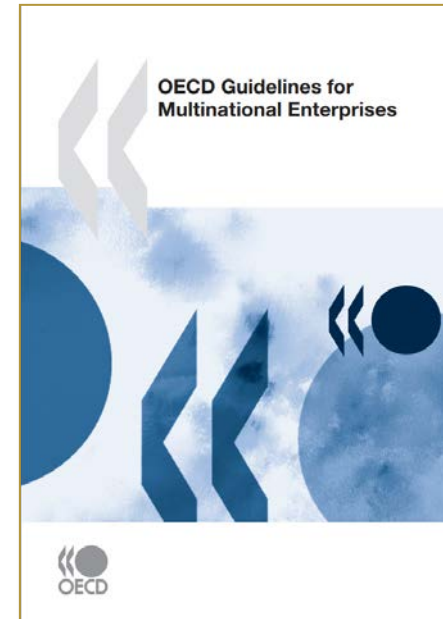
- Part of ***DECLARATION ON INTERNATIONAL INVESTMENT AND MULTINATIONAL ENTERPRISES***
- Declaration was first adopted in 1976 – a policy commitment by governments to open, transparent environment for international investment, and to encourage positive contribution multilateral enterprises can make to economic and social progress
- Latest periodic review of Declaration was May 2011, which included the updated Guidelines
- Adhering Governments: 35 OECD countries, plus 13 non-OECD countries



OECD Guidelines for Multinational Enterprises

“The OECD Guidelines ... are recommendations addressed by governments to multinational enterprises. The Guidelines aim to ensure that the operations of these enterprises are in harmony with government policies, to strengthen the basis of mutual confidence between enterprises and the societies in which they operate, to help improve the foreign investment climate and to enhance the contribution to sustainable development made by multinational enterprises...

The **Guidelines provide voluntary principles and standards for responsible business conduct consistent with applicable laws and internationally recognised standards. However, the countries adhering to the Guidelines make a binding commitment to implement them in accordance with the Decision of the OECD Council on the OECD Guidelines for Multinational Enterprises. Furthermore, matters covered by the Guidelines may also be the subject of national law and international commitments.**” (para 1 of Preface to Guidelines)





Responsible Business Conduct: the Extractive Sector

OECD Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector

“An OECD Recommendation on the Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractive Sector was adopted by Council on 13 July 2016.

While not legally binding, the Recommendation reflects the common position and political commitment of OECD members and non-member adherents.”

Recommendations for management on:

- Developing clear policy framework on engagement, integrating it into management system
- Considering stakeholder engagement issues when making investments/forming business relationships, integrating stakeholder views into project decision-making

Recommendations for on-the-ground personnel on:

- Identifying stakeholders, designing appropriate processes for engagement, ensuring follow-through – particular attention to Indigenous, women, workers/trade unions etc.



Business and International Human Rights



Implementing the **UN “Protect, Respect and Remedy” Framework** – the “Ruggie Framework”:

- State duty to protect and respect human rights;
- Corporate responsibility to comply with all applicable laws and respect human rights;
- The need for appropriate, effective remedies when human rights are breached

UN Guiding Principles on Business and Human Rights, 2011: to operationalize the Framework

- Authoritative global standard on risks of adverse human rights impacts linked to business activity
- Encourage States to have coherent laws, policies that are clear for businesses respecting “home” State requirements in terms of respect for human rights
- Operational Principles for businesses – policy commitment, human rights due diligence, legitimate and contextual remediation



Corporate Social Responsibility and Accountability

- Canada's ***Corruption of Foreign Public Officials Act***; U.S. ***Alien Tort Claims Act***; ***Foreign Corrupt Practices Act***
 - Global companies need to have robust anti-bribery, anti-corruption policies in place
 - Question of “facilitation payments” to get/expedite acts “of a routine nature”
 - Need to verify compliance tools, that employees disclose complete, accurate information
- OECD **National Contact Points (NCP)** – role comes from the ***Guidelines for Multinational Enterprises***
 - dialogue facilitation, mediation
- **Canadian Ombudsperson for Responsible Enterprise (CORE)** (coming soon to Canada)
 - Will have mandate to investigate alleged human rights abuses by Canadian companies abroad
 - Investigative powers and reports are meant to be transparent and publicly available
 - CORE will be “guided by” UN Guiding Principles and OECD Guidelines for Multinational Enterprises
 - Initial focus on extractive and garment sectors, will expand to others
 - Advisory Body on Responsible Business Conduct will be created at the same time



Operationalizing the Global Principles

- Domestic Laws – States regulate conduct; impose legal obligation to respect human rights, avoid corruption; include corporate laws with reporting obligations
 - Question of extraterritoriality – effect, investigation, reporting, follow-up
- Mandatory vs. voluntary corporate responsibilities – legal obligation or corporate commitment?
 - Potential litigation risks – conducting business in accordance with corporate policy
 - Potential costs of failing to address ‘social licensing’ notion
- Transparency can be a key factor
- Governance expectation for systematic approach on human rights (as with anti-corruption and other considerations) – (i) context-specific policies; (ii) due diligence processes that include stakeholder engagement and issues tracking; and (iii) grievance/remediation initiatives



Some General Takeaways

- As a “strategic resource” that is important for energy security, uranium is of both national and global importance.
- For health and safety, radiation protection, environmental stewardship and non-proliferation, control of uranium production and trade is an important part of national and international nuclear law.
- The regulation of uranium mining activities should be addressed in a national nuclear regulatory statute, with the same risk-informed regulatory oversight as for other nuclear fuel cycle activities.
- The evolution of environmental standards distinguishes current mining from “legacy” practices; lifecycle management is key to drafting current regulatory schemes.
- Industry needs to be aware of the evolution in social acceptability issues for projects – stakeholder engagement, sustainability, transparency and human rights protections are key.
- Global initiatives on human rights, governance and anti-corruption may not create hard law, but may inform the legal requirements that are imposed at State level.

We Will Never Compromise Safety

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