

The Perpetual Care of Contaminated Sites: Case Studies



Joan Kuyek, DSW
Presentation to the MVEIRB
Giant Mine Remediation Project EA
September 10, 2012, Yellowknife

The case studies

- Love Canal and Superfund
- The Hanford Nuclear Reservation and the US Department of Energy
- Zortman-Landusky Mines and US abandoned mines
- Uranium Mine and Mill Tailings in Saskatchewan
- Faro Mine and Abandoned Mines in Canada's North
- Port Radium and the Sahtu Dene of Deline
- Managing Nuclear Wastes: Deep Geological Disposal
- System Accidents
- UNESCO World Heritage Sites

Questions for the case studies

- what is the site about and how it came to be,
- the role of the affected community in the history and cleanup of the site
- what organization(s) is charged with cleanup and long term care of the site and how does it work,
- what are some of the problems that have happened in long term care at the site,
- what can we learn from the case

Love Canal

journeyofthelizardking.blogspot.com



Love Canal



Superfund

- Superfund looks at hazardous sites and decides which ones are priorities
- It can force any current or past owners of the sites to pay for the clean-up.
- The U.S. Environmental Protection Agency requires controls to work for at least 200 years.
- Sites that are deemed to be cleaned-up are transferred to States, other departments or Tribes for long term care.

Superfund money

- In 1995, the US did not renew the authorizations that collected taxes from polluting corporations.
- These special taxes had been placed in a trust fund to pay for some of the activities of Superfund.
- The fund was worth \$6 billion when it was not renewed.
- By 2003 the fund was used up
- Clean-ups are now funded out of annual appropriations from general revenues.

Hanford site- Jan 1960





Three key challenges with transition from clean-up to long term stewardship

- Remedy design and regulation were usually inadequate for long term processes;
- When establishing goals for clean-up, the focus is on accelerating cleanup in the short-term and not on long term stewardship effectiveness (often increasing risk for future generations), and
- The remediator often operates in a social environment of public distrust, but community trust is needed to undertake long term stewardship effectively.



2011–2020 STRATEGIC PLAN

| | | | | |
|--------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------|--|---------------------------------------------------|
| <p>1 Protect human health and the environment</p> | | | | |
| | <p>2 Preserve, protect, and share records and information</p> | | | |
| | | <p>3 Meet commitments to the contractor work force</p> | | |
| | | <p>4 Optimize the use of land and assets</p> | | <p>5 Sustain management excellence</p> |
| | | | | |

Managing Today's Change, Protecting Tomorrow's Future

Possible failure as a basis for planning

- The long term stewardship planning by DOE is based on an understanding that – over time – institutional and engineering controls will fail.
- Engineering failures may be caused by seismic, climactic or hydrological changes in the environment, or they may be caused by inadequate design, process errors, or inability to deal with entropy.
- Institutional controls may fail because of lack of oversight, inadequate public disclosure, information management, site security, record- keeping, and a myriad of other factors.
- The ability to respond effectively when and if these failures happen is key to long term stewardship.

Zortman Landusky

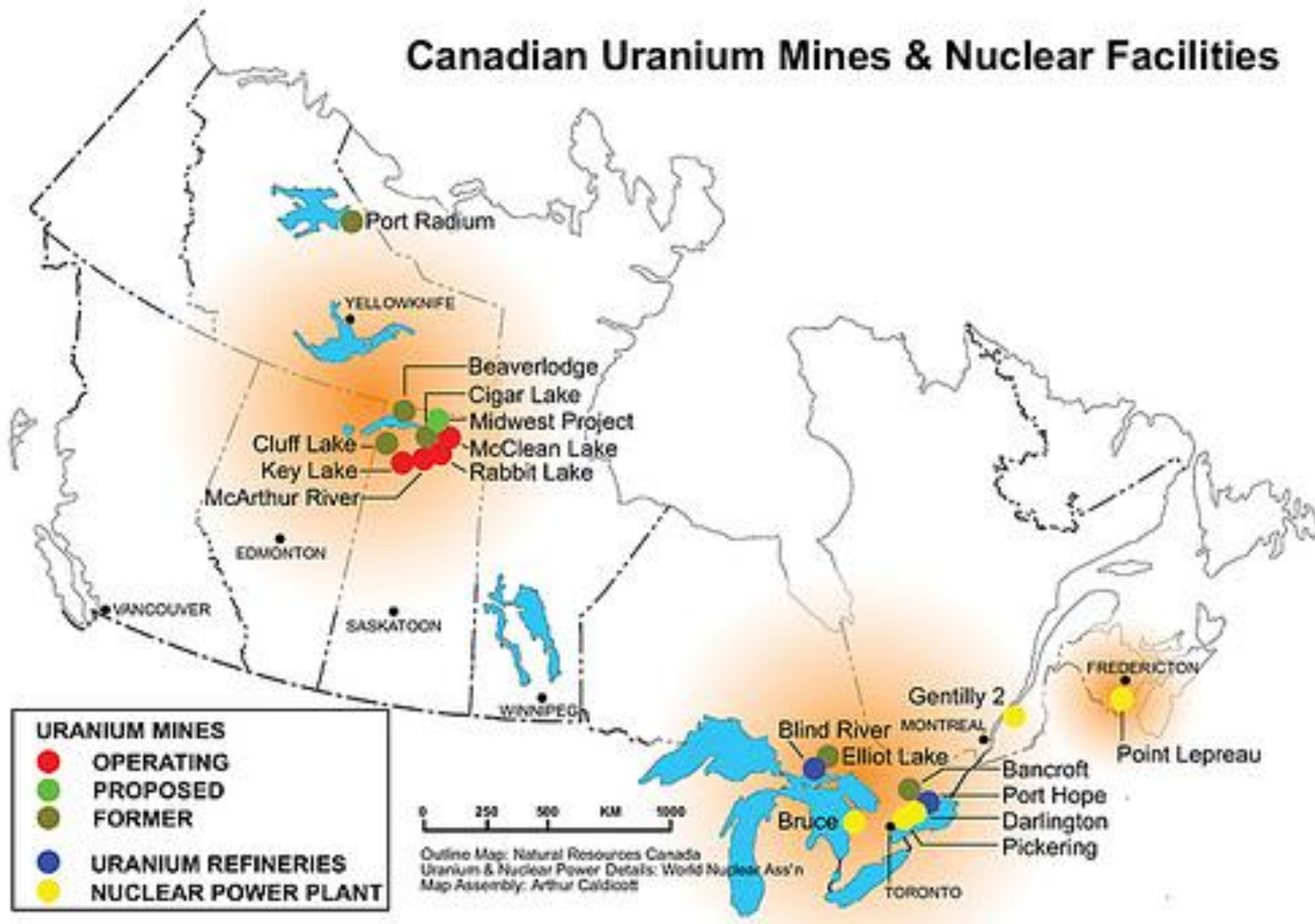
meic.org



Key Points from Zortman-Landusky

- The remediation at Zortman-Landusky Mines would be unlikely to have happened without the sustained advocacy and legal battles undertaken by the Fort Belknap indigenous peoples.
- The huge cost to taxpayers to remediate these mines and then to manage their wastes in perpetuity has focused attention on the adequacy of financial insurance.
- Annual appropriations from government are an inadequate means by which to ensure costs in perpetuity.
- There are serious problems with discounting and net present value as a basis for establishing long-term financial security, as they assume very long-term continuing economic growth, take no account of ecological destruction, and unfairly minimize the costs to future generations if/when something goes wrong.
- The accuracy of water quality predictions and the effectiveness of mitigation measures is always questionable. Real world emergencies will continue to occur during and after remediation

Canadian Uranium Mines & Nuclear Facilities



Uranium City

esask.uregina.ca



Saskatchewan's Institutional Control Plan

- Institutional Control Registry
- Two funds:
 - Monitoring and Maintenance Fund
 - Unforeseen Events Fund

Uranium Tailings lessons

- Government/ industry designed “consultation” process is exhausting for First Nations and citizen’s groups
- Engineering must be based on at least a 1000 year time frame
- Designs have to work with nature in the long term management of the site

Faro Mine

cbc.ca



Faro Mine tailings

mineclosure.com



Lessons from Faro

- The original lump sum for FCSAP funding has run out and it is now subject to annual appropriations
- There are serious concerns about long term funding for the work.
- The engineered covers planned for Faro will likely need to be replaced at some time in the future.
- Ensuring trained personnel, transportation systems, essential material supplies and power supply for the site over the long term will be difficult.
- Figuring out and establishing the roles of various interests in monitoring and emergency response is important.

The Sahtu Dene and Port Radium



Source: National Geographic News
<http://news.nationalgeographic.com/news/bigphotos/55114309.html>

The Risk Society

“It is as though our senses, our very own perception, had been expropriated, rendered useless and vestigial in the face of threats that cannot be seen, heard, smelled, tasted, or touched. The appeal to the eyewitness comes to have little value here. There is nothing there, nothing to be seen, leaving us dependent on others (often the same others, that is the institutions that produced the threats) to determine the appropriate means (instrumentation) with which to represent it back to us and for us...what is dangerous and what is safe, what dosage is hazardous and what is not, such thresholds and limits obscure the fact that they are foremost creatures of politics and not the test tube, objects of persuasion, not measurement.”

Peter Van Wyck, “Signs of Danger: Waste, Trauma and Nuclear Threat”, *Theory out of Bounds* (Volume 26, 2005), pages 82-3.

Lessons from Port Radium

- Because the toxins cannot be seen, smelled or tasted by our unassisted senses, communities become reliant on science to reveal contamination.
- The Sahtu Dene learned of their exposure 60 years after the fact. Their traditional means of protecting themselves had been unheeded.
- The Canada-Deline Uranium Table was formed to deal with the problems (1998 to 2003)
- Cultural memory is essential to remembering the places of danger. The healing workshops, work to protect the watershed , protected areas and so on, are essential to this process.

Waste Isolation Pilot Project



Nuclear Waste Management:

Key points

- It is impossible to predict the effectiveness of contaminated waste isolation facilities centuries and millennia into the future.
- No human made structure has shown itself to be effective forever. Everything chemically changes, leaks, or fractures. Attempts to contain transuranic wastes in salt mines to date have been fraught with problems and misjudgements.
- The money and resources to deal with contaminated sites are politically determined and flow only in response to sustained citizen advocacy. Funds for effective adaptive management are subject to political whim.
- For contaminated sites that are invisible to the senses, effective “go away” markers may be impossible to design. Signs and markers cannot be assured to operate apart from human practice and memory.



FORBIDDING BLOCKS

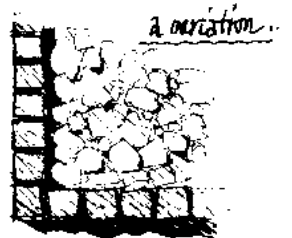
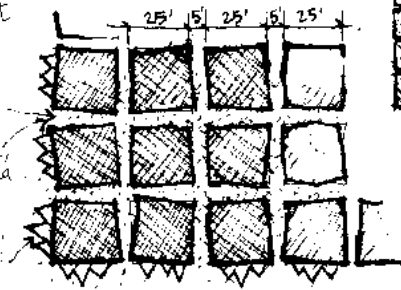
exploded landscape, but organized... an irregular regularity. contained but not restrained

massive effort to deny loss

form massive to use to form in

you're not inside, from block area concrete

spiky cubes



hollow square of blocks around a rubble core



Systems Management



The introduction, management and control of technology are overwhelmingly in the hands of organizations.

The importance of organizations – their structure, culture and operations - to the management of technological risks is clear.”

Humans intend to make rational decisions. However, we often do not. This can be a result of our ignorance or self-interest.

But it can also be a result of expectations imposed by organizations that conflict with safety, of division of labour, of routinization, of ideological indoctrination, or an unresponsive authority structure. (Rosa)

Lessons Learned from the Case Studies

- About the community near the site
- Keeping people away (Institutional Controls)
- Managing the site over the long haul: who is in charge?
- Keeping records and accessing them
- Inspections, data analysis
- Maintenance and making things better
- Responding to slow leaks, emergencies and failures
- Money to pay for it: trust funds, how much? Avoiding crime?
- Protecting future generations; creating guardians
- Using what we learn, making new plans