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Decommissioning of the Cluff Lake Project

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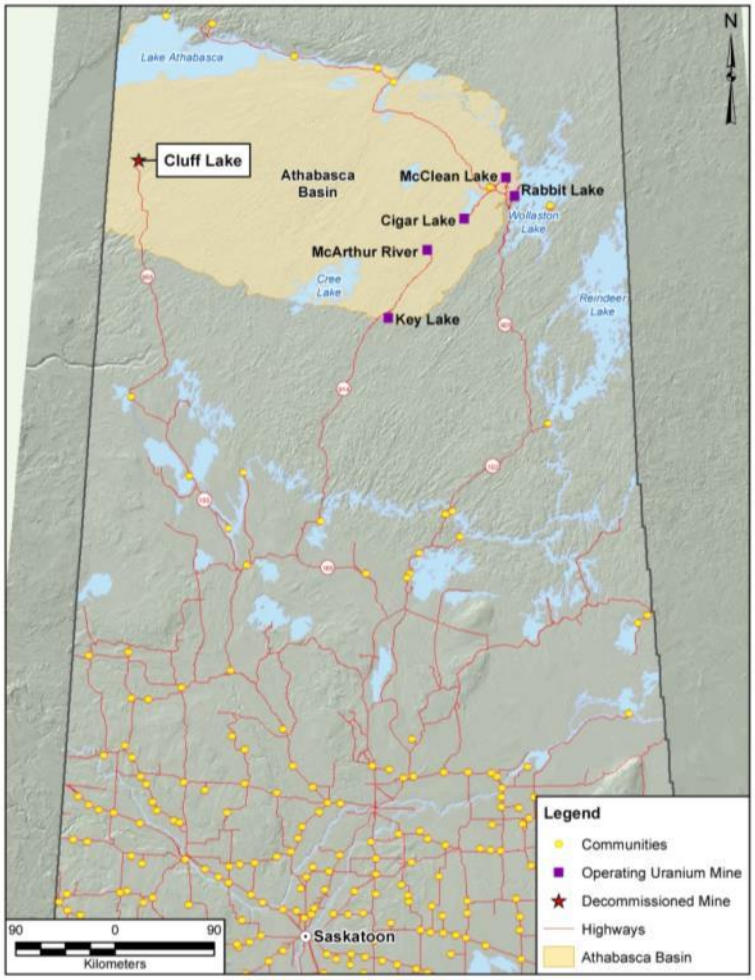
Overview

- Project Location and Background
- Decommissioning Objectives
- Decommissioning Milestones
- Key Guiding Documents
  - Decommissioning Plan
  - Follow-Up Program
  - Environmental Monitoring Program
- Looking Forward
- Lessons Learned

Project Location and Background



- First discovered in mid-1960s
- Operations commenced in 1980 and ceased in 2002
- Five ore bodies extracted using underground and open pit techniques
- Produced 62M lb (or 28M kg) uranium concentrate (U_3O_8)
- Cluff Lake is not a legacy site

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Cluff Lake History

- ~4,000 person years of company staff employment; 52% northern
- Nearby lands used for traditional purposes (incl. safe consumption of country food) throughout operations

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Cluff Lake Regulation

- Governed both federally and provincially
- 2000 - Comprehensive Study for Decommissioning (AREVA)
- 2003 - Comprehensive Study Report (CSR; CNSC)
- 2004 – CNSC Decommissioning Approval
- CSR outlined decommissioning objectives and evaluations of success:
  - safe environment,
  - stable & self-sustaining landscape
  - unrestricted traditional uses, and
  - minimal future land use constraints.

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How Will We Measure Decommissioning Success?

- Physical stability and erosion control including re-vegetation success
- Water and sediment quality in surface water bodies
- Contaminant transport modelling
- Ecological and Human Health Risk Assessment
- Radiological clearance

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Decommissioning Milestones

- 2004 to 2006 – Physical decommissioning (2013, 2015)
- 2004 - partial surrender of surface lease
- 2013 – physical decommissioning of remaining surface infrastructure, minor earthworks, continuous site presence discontinued
- 2014 – monitoring transitioned to campaigns 4X/year; Environmental Monitoring Locations & Schedule (EMLS) Optimization (2003, 2011)
- 2014 – revised Decommissioning Plan (2003, 2009)
- 2015 – reclassification of entire surface lease to ‘undeveloped’
- 2015 – (Proposed) completion of Follow-Up Program (FUP; 2004, 2009)

Cluff Lake
Key Documents

- Three key guiding documents, routinely updated and approved, that inform decommissioning plans, progress, and success
- As decommissioning progresses, the scope of each is increasingly narrowed or closed
  - Decommissioning Plan (2003/2004, 2008/2009, 2014; to close)
  - Follow-Up Program (2004, 2009, 2015; closed)
  - Environmental Monitoring Locations & Schedule (2003, 2011, 2014, [2016]; narrowed and transitioned to long-term monitoring under institutional control)

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Cluff Lake
D-Pit Mining Area

1999

2008

2014

- No further physical decommissioning action is planned
- Fast-flooded in 1980s, chemocline established, surface water quality objectives being met

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Cluff Lake
Claude Mining Area

1999

2008

2014

- No further decommissioning activities are planned; contingency included in financial assurance
- Backfilled, shaped, compacted, covered, and revegetated

Cluff Lake
DJ Mining Area

1999

2008

2014

- No further physical decommissioning action is planned
- Fast-flooded pit to establish chemocline
- Surface water quality objectives being met

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Cluff Lake Mill Area

1999

2008

2014

- No further physical decommissioning action is planned
- Mill demolished and buried at Claude Pit, area replanted with trees

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Cluff Lake
Tailings Management Area (TMA)

1999

2008

2014

- No further decommissioning activities are planned; contingency included in financial assurance
- Covered, graded, and revegetated, 2013 improvements:

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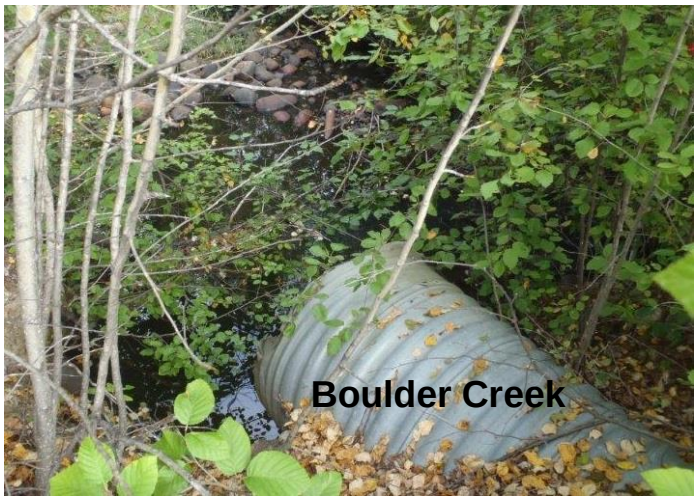
Cluff Lake
Ancillary Buildings and Services



- Final decommissioning includes removal of 4 remaining culverts, temporary camp, minor earthworks

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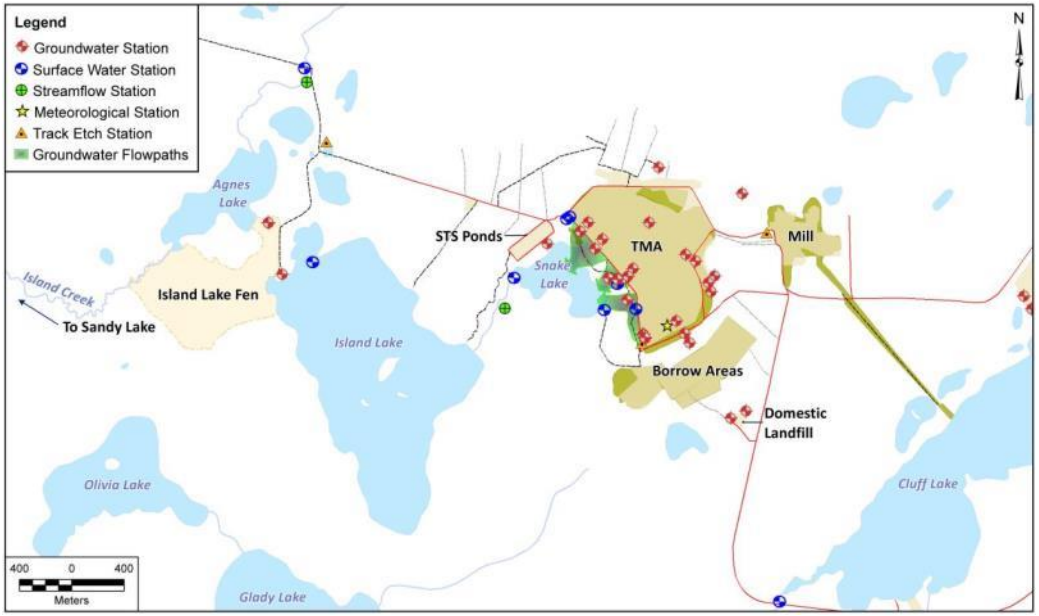
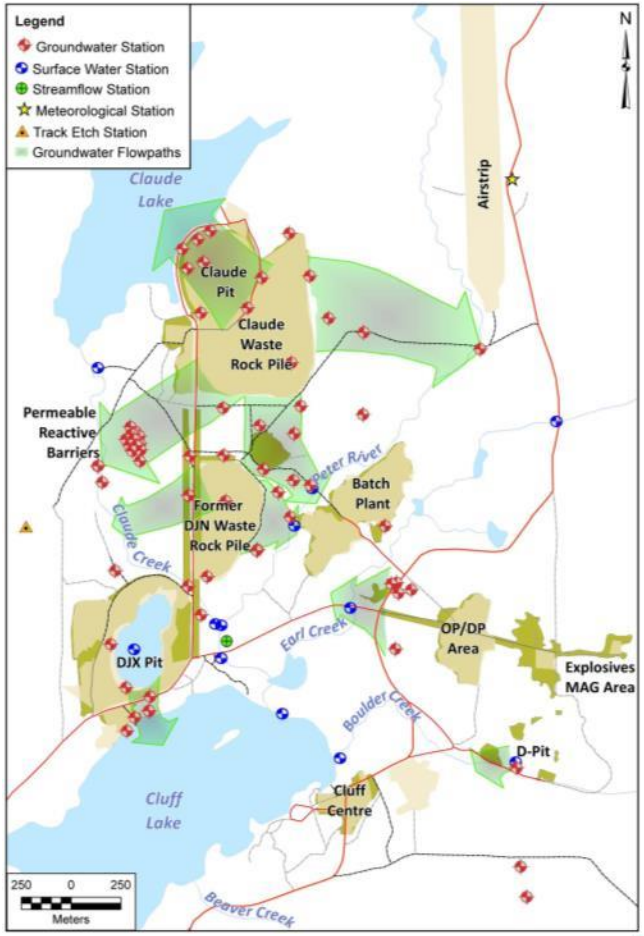
Post-Decommissioning and Follow-Up Monitoring





- Two distinct monitoring campaigns:
  - Environmental Monitoring Program (EMP)
  - Follow-Up Program (FUP)

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Cluff Lake
Follow-Up Program (2015)

- Section 10 of CSR, key uncertainties in decommissioning EA
- Progress report in 2009; final report in October 2015
- Research, post-decommissioning data collection, and refinement of modelling inputs have removed uncertainties identified in the CSR & improved confidence in long-term decommissioning performance
- Outcomes of the FUP incorporated into Ecological and Human Health Risk Assessments

Ecological and Human Health Risk Assessment Conclusions

- Risk assessments completed in 2015 with inputs from EMLS, FUP, & Hydrogeology and Groundwater Modelling Technical Information Document
- 2015 ERA confirms 2003 CSR conclusions i.e. potential adverse effects are not significant.
  - Potential adverse effects are moderate, local (Island Lake, Snake Lake), restricted to local populations, temporary, with recovery over several generations, and no downstream impacts
- 2015 HHRA confirms continued safe use of the area for traditional uses
  - Considered an adult visiting the Cluff Lake Project on a casual basis who hunts, fishes, gathers and traps over a lifetime as well as the adult's family (adult, child, toddler) who would consume the food over a six month period
  - Exposure to radionuclides is less than 1 mSv/year; No adverse effects from exposure to non-radionuclides

Cluff Lake
Environmental Monitoring Locations & Schedule

- Monitoring the recovery of impacted areas that result from cessation of operations and implementation of the decommissioning plan
  - Physical stability and erosion control including re-vegetation success
  - Water and sediment quality in surface water bodies
  - Contaminant transport modelling
  - Ecological and Human Health Risk Assessment
  - Radiological clearance

- Optimizations in 2003, 2011, 2014, and anticipated in 2016
- 2016 revision may transition EMLS to a Long-Term Monitoring Program (LTMP)

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Current Status

- Site buildings have been removed
- Barriers to site access have been removed
- The Cluff Lake site is not occupied
- Environmental monitoring and inspections conducted in quarterly campaigns, typically occurring in February, June, September, and December

Cluff Lake
Looking Forward

- 2016 – Confirmation of Follow-Up Program closure; EMLS optimization possibly transitioning to a Long-Term Monitoring Program (LTMP)
- 2017 – Final physical decommissioning campaign (e.g. remaining culverts, temp camp)
- 2019 – Entry into Province of SK Institutional Control Program (ICP)
  - Meet the environmental conditions and requirements to
    - Abandonment of CNSC licence
    - surrender the Surface Lease Agreement – Provincial, Final closure report – *Mineral Industry Environmental Protection Section 22*
  - Final revision of the EMLS/LTMP, if required
  - Closure of the Decommissioning Plan
  - Financial Assurance transition to ICP payments

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Lessons Learned

- Start with the end in mind; mining can be a temporary use of the land
- Environmental assessment is a planning tool
- Have an actionable decommissioning plan during operations
- Continuous on-site presence is costly
- Campaign monitoring is an effective method of collecting environmental samples in later stages of decommissioning
- Maintain corporate knowledge

Thank You!

- Any questions or comments?

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