Cluff Lake Project Decommissioning Process and Lessons Learned

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Project Site and Decommissioning Overview



Orano Canada

- A **leader** in uranium exploration & processing
- Over **55** years in northern Saskatchewan; including exploration, mining & milling and successful decommissioning of a modern uranium mine, mill & tailings management facility
- 420 employees
- Corporate Office located in Saskatoon Saskatchewan





Decommissioned Cluff Lake Project

- located on Treaty 8 Territory and within the Homeland of the Métis
- site is remote, with unrestricted access
- primary, potential future users of the site are resource development and traditional land users
- discovered in mid '60's

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- operated from 1980 2002
- majority of decommissioning occurred 2004 2006
- 2019 acknowledgement that decommissioning objectives had been achieved



Temporary Use of the Land

Institutional Control (>2023) | Pre-Development (<1980) Long-Term Monitoring | Baseline Monitoring Unrestricted Access & Land Use

Post-Decommissioning Monitoring (2006-2022+) Achievement of Objectives and Criteria/ Risk Assessment

2013 – Unrestricted Access

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Construction and Operations (1980-2002) Progressive Decommissioning, Risk Assessment, and Monitoring Restricted Access (~4,200 hectares)

Physical Decommissioning (2004-2006) Objectives and Criteria for Success – Safe Land Use Reduced Restricted Access (~1600 hectares in 2004)

Detailed Decommissioning Planning (1998-2004) Environmental Assessment – Future Land Uses Restricted Access (~4,200 hectares)

Status

Decommissioning Objectives

- 1. Environment is safe for use
- 2. Landscape is chemically and physically stable
- 3. Landscape is stable and self sustaining, allowing for traditional land use
- 4. Constraints on future land use are minimized
- 5. No unreasonable risk to humans or the environment

Site is available and safe for traditional land use.

The surface lease area has been reduced by over 4000 ha.







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Decommissioning Details and Lessons Learned





Claude Mining Area



- Pit was backfilled with waste rock and demolition debris, covered, planted with trees
- Waste rock pile was shaped, compacted, covered with a 'moisture store-and-release' till layer, and seeded
- Vegetation is self-sustaining, pile is stable, and successfully minimizing net percolation rates
- Achieving surface water quality in Claude Lake now and in the long-term





- Contaminant transport was modelled every 5 years incorporating new data
- The results feed into environmental risk assessments
- Understanding change over time gave a good understanding of site stability and key areas of risk



10

Claude Area Re-Vegetation: Public Perception





D Mining Area









- First deposit mined
- Decommissioned as pit lake, flooded in 1983
- Stable chemocline, surface water quality objectives achieved in the long-term



Establishment of Stable Chemoclines



D-Pit limnological profiles demonstrate a stable chemocline over 14 years

Water with higher concentrations of contaminants is sequestered at the bottom of the pit, never interacting with the surface water

Tailings Management Area (TMA)



- Low permeability tailings consolidated to remove pore water
- Till 'moisture store-and-release' cover placed, graded, and seeded
- Vegetation is self-sustaining, storm water management achieved under passive care, design successfully minimizing net percolation rates
- Achieving surface water quality in Snake Lake now and in the long-term









The Future





How Do We Measure Decommissioning Success?

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







Ecological & Human Health Risk Safe now & for the future

Ecological Risk Assessment confirms Environmental Assessment conclusions:

- that the effects of decommissioning are largely positive and the potential adverse effects are not significant
- potential adverse effects are moderate, localized, temporary, with recovery occurring over several generations
- no downstream impacts

Human Health Risk Assessment confirms:

- radiation doses will remain well below the CNSC dose limit of 1 mSv/year for members of the public
- continued safe use of the area for traditional land use, e.g. safe for hunting/harvesting, fishing, gathering, etc.





Long-term Monitoring & Maintenance Plan

Monitoring measures COPCs in the environment to:

- Confirm level of risk and ERA predictions
- Demonstrate compliance with surface water objectives

Surface Water Monitoring

- Verifies the effectiveness of the decommissioning in controlling contaminant transfer to the receiving environment
- utilized to determine if risks to VECs remain within predictions

Geotechnical Inspections

- Ensure site is physically safe
- Monitor for low likelihood accidents and malfunctions
- Monitor for indications of site use





Institutional Control Program

Transfer to Provincial Institutional Control Program

- Established by legislation
- Allows for the transfer of a decommissioned site, or portions of, back to the Province (as land owner)
- Ensures that the government has adequate funds
 - Long-term monitoring and maintenance
 - Worse case failure event
 - Unforeseen event
- Sites are *not* abandoned



Thank you!

Cluff Lake Then & Now on YouTube

Cluff Lake Then and Now (2023) - YouTube



