



Saskatchewan Research Council

Gunnar Mine Site Closure Options
November 16, 2010

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Basics of Gunnar site history



- ↳ Uranium mines operated in 1953-1964
- ↳ Average grade of deposit was 0.18% U_3O_8A
- ↳ Total ~8.5 million tons of rock mined and processed
- ↳ Open pit over 100m deep, up to 3 million m^3 volume
- ↳ Vertical shaft 600 m deep
- ↳ Uranium mill, acid plant, other utility, structures, and buildings
- ↳ Over 5 million tons of unconfined tailings
- ↳ Mining ceased in 1964
- ↳ The pit and subsurface workings were flooded, shaft plugged with concrete, and mine site abandoned
- ↳ All buildings, tailings, and waste rock piles were left on site "as is"

Summarizing existing site conditions



Sources of Contaminants and Physical Hazards

1. Town site, mill site, head frame
2. Waste rock
3. Tailings
4. Flooded pit

Important Exposure Routes

1. Physical hazards
2. Human exposure to gamma radiation while near waste rock or tailings
3. Runoff of contaminants into Lake Athabasca.
4. Contaminants in food chains

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Gunnar site components



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Project Objectives



1. Eliminate or reduce public safety hazards at the site and minimize the risks to the public in the future.
2. Eliminate or reduce environmental hazards at the site and minimize the risks to the environment in the future.
3. Develop options that are technically and economically practical.
4. Ensure long-term environmental monitoring at the cleaned up sites

Issues to address



- **Public hazards**
 - Mine pit, buildings, and structures
- **Gamma radiation**
 - Tailings, waste rocks, mill, and mine head frame
- **Contaminant effluents**
 - Mine pit, waste rock seep, Langley Bay tailings
- **Contamination of valued ecosystem components**
 - Tailings, Zeemel Bay, Back Bay, Langley Bay

Common features (regardless of option)



- Demolish all the buildings and structures
- Clean up the demolition waste
- Barge hazardous substances off site
- Build a waste facility for ACM/RCM
- Redirect surface water flows
- Use airstrip as borrow material
- Submerged tailings are left in place
- Long-term monitoring program

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Basic alternatives



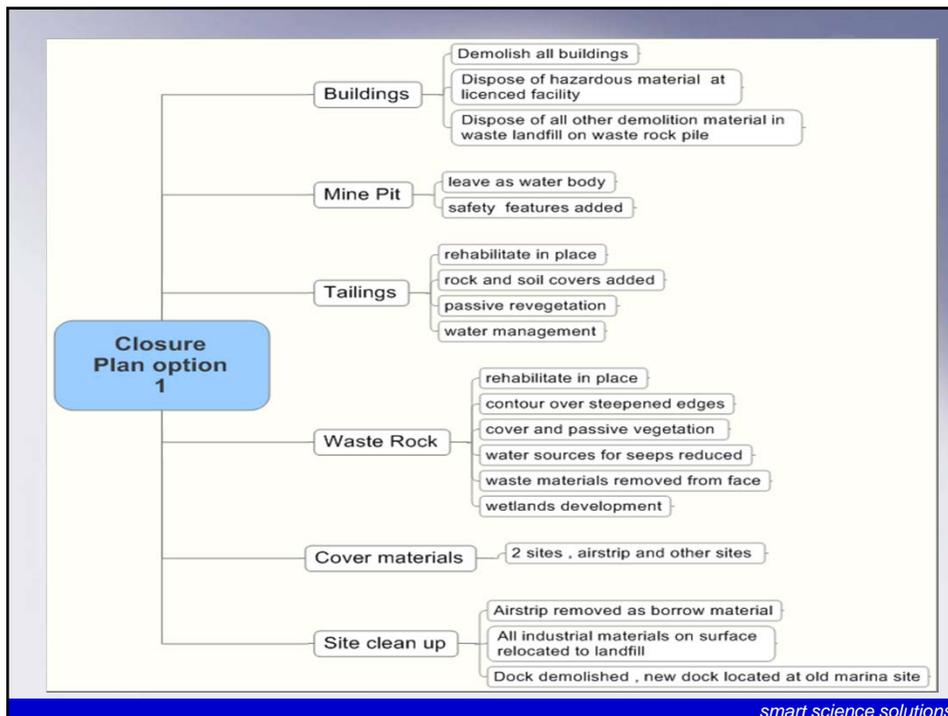
- **Mine pit**
 - Leave as a water body or dewater?
- **Tailings and waste rock**
 - Cover or relocate to mine pit?
- **Waste disposal**
 - Dispose of in the mine pit or an approved landfill?

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Closure option #1



- **Mine pit:**
 - Leave as is (the watershed is to be reduced)
 - Add safety features (fence and/or dike)
- **Waste rock piles**
 - Clean-up, contour, cover, and re-vegetate
 - Divert water flows feeding the seep
- **Dry tailings**
 - Cover and re-vegetate
 - Divert/channelize surface water flows



Closure option #1: pro & con



- **Pro:**
 - Minimum disturbance of the existing ecosystems
 - Minimum occupational hazards
 - No need for active water treatment
 - Lower occupational hazards
 - Reasonable capital cost
- **Con:**
 - Remaining public hazards from the pit
 - Residual discharge from the mine pit
 - Residual seepage from the waste rock
 - Will need permanent water treatment
 - High operation and maintenance cost for uncertain period of time

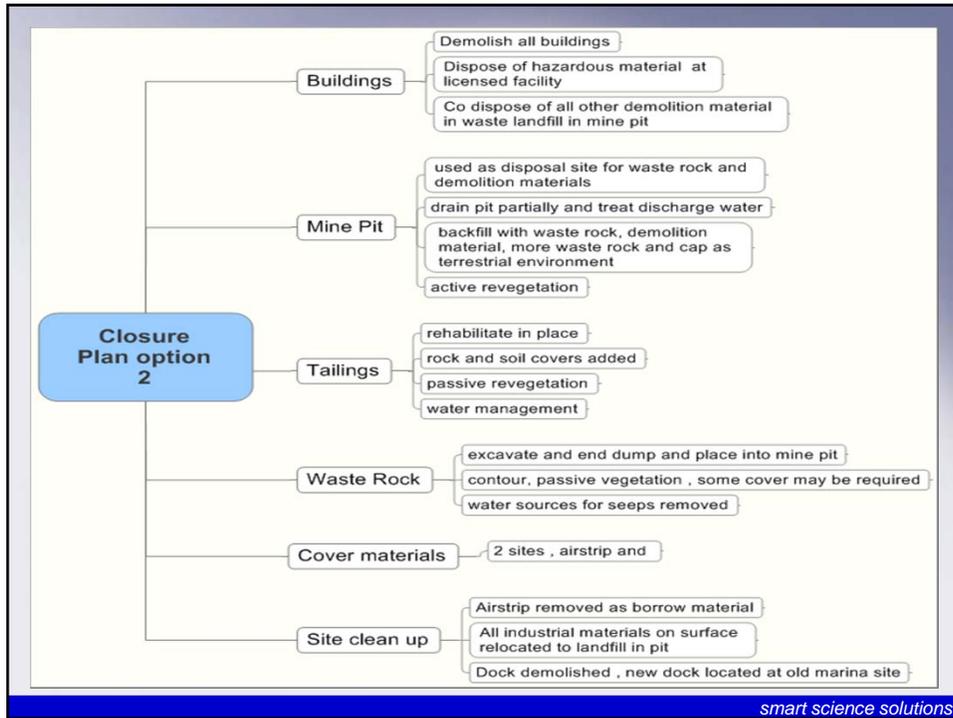
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Closure option #2



- **Mine pit:**
 - Drain to Athabasca Lake following water treatment
 - Use for waste rock & demolition waste disposal
 - Cover by clean material and re-vegetate
- **Waste rock piles**
 - Relocate to the mine pit
 - Clean the footprint
- **Dry tailings**
 - Cover and re-vegetate
 - Divert/channelize surface water flows

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Closure option #2: pro & con

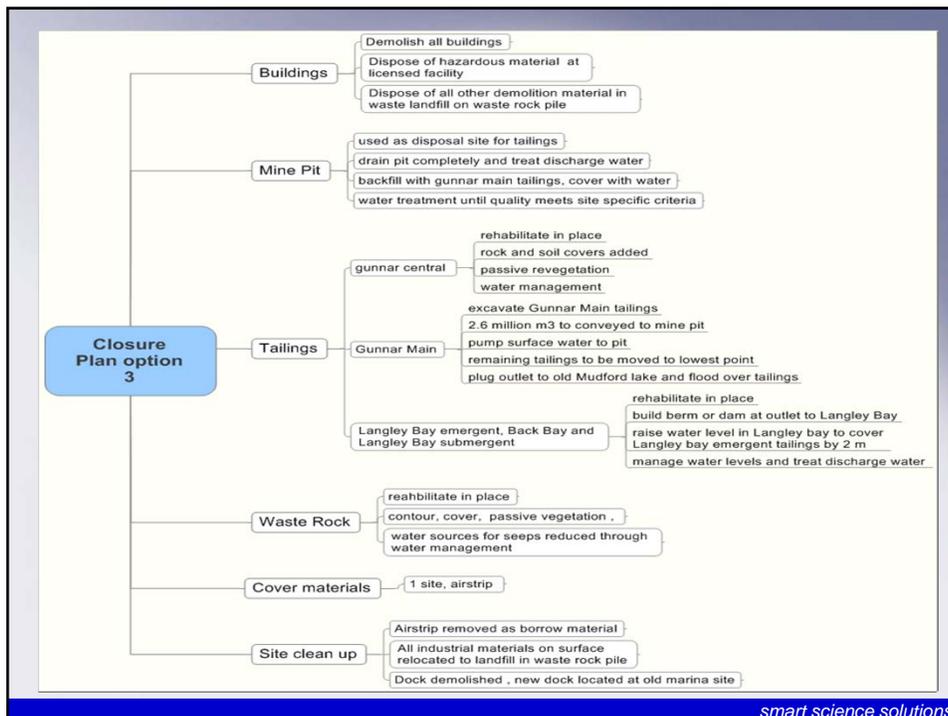


- **Pro:**
 - Eliminates public hazards due to mine pit
 - Eliminates discharge from mine pit
 - Eliminates hazards due to waste rock
 - Eliminates seepage
 - Low or no maintenance cost
 - No need for a landfill to dispose hazardous materials
 - No need for permanent water treatment
- **Con**
 - Water treatment may take 3-4 years and is expensive
 - Potential “surprises” within the waste rock piles
 - Higher occupational hazards during remediation work (due to pit dewatering and waste rock relocation)
 - Higher capital cost vs. Option #1

Closure option #3



- **Mine pit:**
 - Drain to Athabasca Lake following water treatment
 - Use it for disposal of the tailings & demolition waste
 - Cover and re-vegetate
- **Waste rock**
 - Clean-up, contour, cover, and re-vegetate
 - Divert water flows feeding the seep
- **Dry tailings**
 - Gunnar main: dispose in the mine pit
 - Central and Langley Bay:
 - Cover and re-vegetate
 - Divert/channelize surface water flows



Closure option #3: pro & con



- **Pro:**
 - Eliminates public hazards due to the mine pit,
 - Eliminates discharge from the mine pit
 - Eliminates environmental hazards from Gunnar main tailings
- **Con**
 - Footprint of Gunnar Main is to be covered and revegetated
 - Remaining tailings are to be covered and revegetated
 - Will need perpetual water treatment for residual seep from the waste rock
 - Will need a landfill to dispose demolition hazardous wastes
 - Higher occupational hazards during remediation work (due to pit dewatering, and tailing excavation and relocation)
 - Pit water treatment is expensive and may take 3-4 years
 - The highest capital and operational (maintenance) cost

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Your feedback



- Do you have the “cleanup options” flyer in your hands?
- It briefs you on the options and includes a *Feedback Form*.
- Please, choose and tick one option and add your comments.
- Feel free to suggest your own solutions for any option
- You may return the *Form to us* at the end of this meeting, or
- You may take time to think about the options, and then:
 - ↳ Fax the *Feedback Form* to SRC, or
 - ↳ Mail it to SRC in the supplied envelope.

THANK YOU SO MUCH FOR YOUR CONTRIBUTION!

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Thank you for your attention!

QUESTIONS?