Gunnar Uranium Mine Remediation – Northern Saskatchewan

Nov 18, 2009

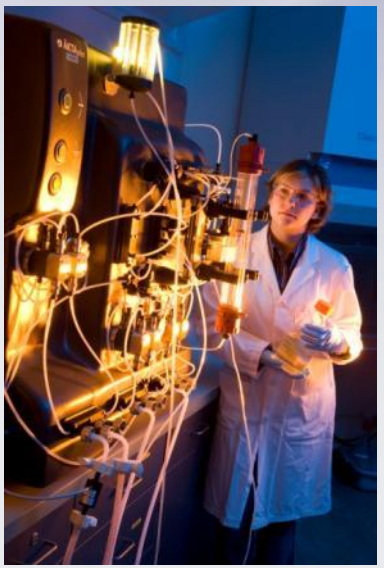
Environmental Quality Committee (EQC)

La Ronge, Saskatchewan

Mark Simpson

Saskatchewan Research Council

Agriculture, Biotechnology & Food



Environment & Forestry

SRC

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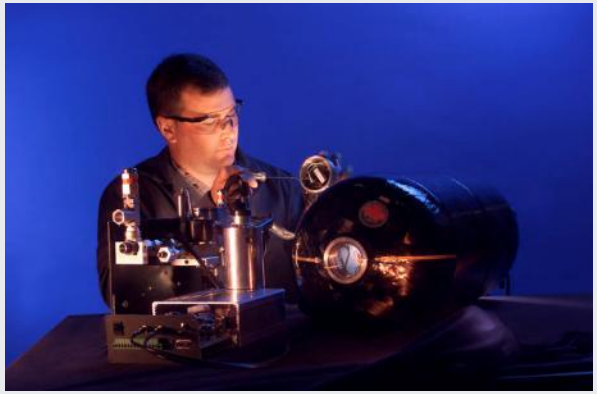
Alternative Energy & Manufacturing



Mining & Minerals

Energy

Project CLEANS

CLEan Abandoned Northern Sites consists of 3 components:

1) Gunnar Mine (requires CNSC license)
2) Lorado Mill & Mine (requires CNSC license)
3) 34 abandoned mines without tailings exempt from CNSC licensing, Saskatchewan Environment regulated

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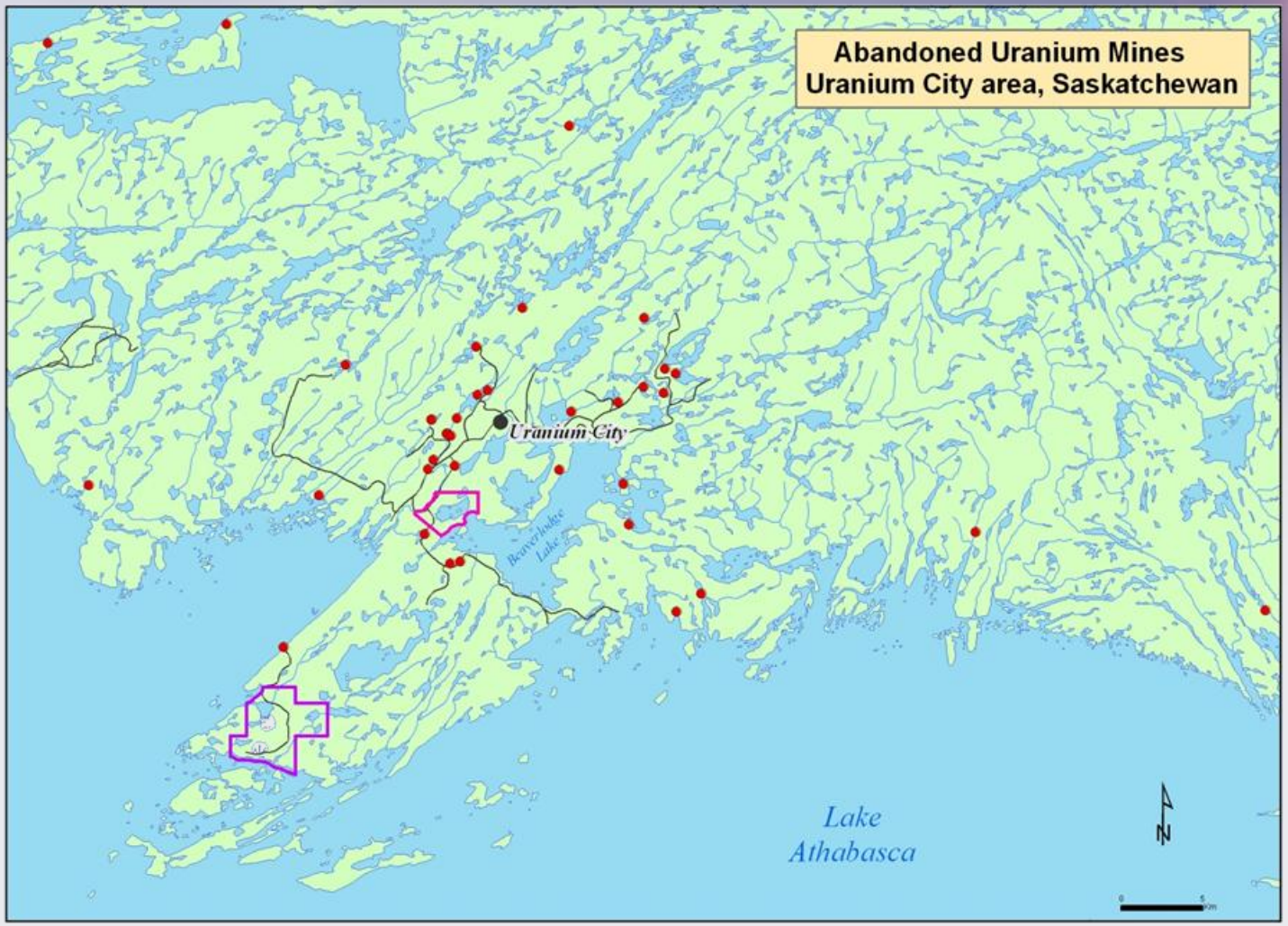
Gunnar Site

- Northwestern Saskatchewan on the Crackingstone Peninsula

Gunnar Site

- No permanent residents within 15 km
- Approx. 112 people live within 80 km


Abandoned Uranium Mines
Uranium City area, Saskatchewan
Uranium City
Beaverlodge Lake
Lake Athabasca

2006

November 2006

- SRC and SER finalize and sign the contract to deliver the Former Gunnar Mine Site Rehabilitation project

2007

April 2007

- SRC submitted the Former Gunnar Mine Site Rehabilitation project Proposal, to the Environmental Assessment Branch, Saskatchewan Environment

June 2007

- Saskatchewan Environment sent a letter informing SRC of the requirement to complete an environmental assessment under the Canadian Environmental Assessment Act

2008

April 2008

- the draft Guideline-Scoping Document for the Former Gunnar Mine Site Rehabilitation Project under went a 30 day public comment period

June 2008 - Lorado

- SRC and SER finalize and sign the contract to deliver the Former Lorado Mill SIte Rehabilitation project

July 2008

- CNSC staff recommend that the Commission accepts the Former Gunnar Mine Site Rehabilitation Project draft Track Report and adopt the scope as presented in the Guideline Scoping Document

2009

February 2009

- The Federal Minister of Environment announced the Former Gunnar Mine Site Rehabilitation Project will proceed as a Comprehensive Environmental Assessment

March 2009 – Lorado

- SRC submitted the Project Proposal for the Former Lorado Uranium Mill Site to the Environmental Assessment Branch of the Saskatchewan Ministry of Environment

April 2009

- SRC issued a RFP for the Former Gunnar Mine Site Environmental Assessment

June 2009

- Commenced work on the Gunnar EA

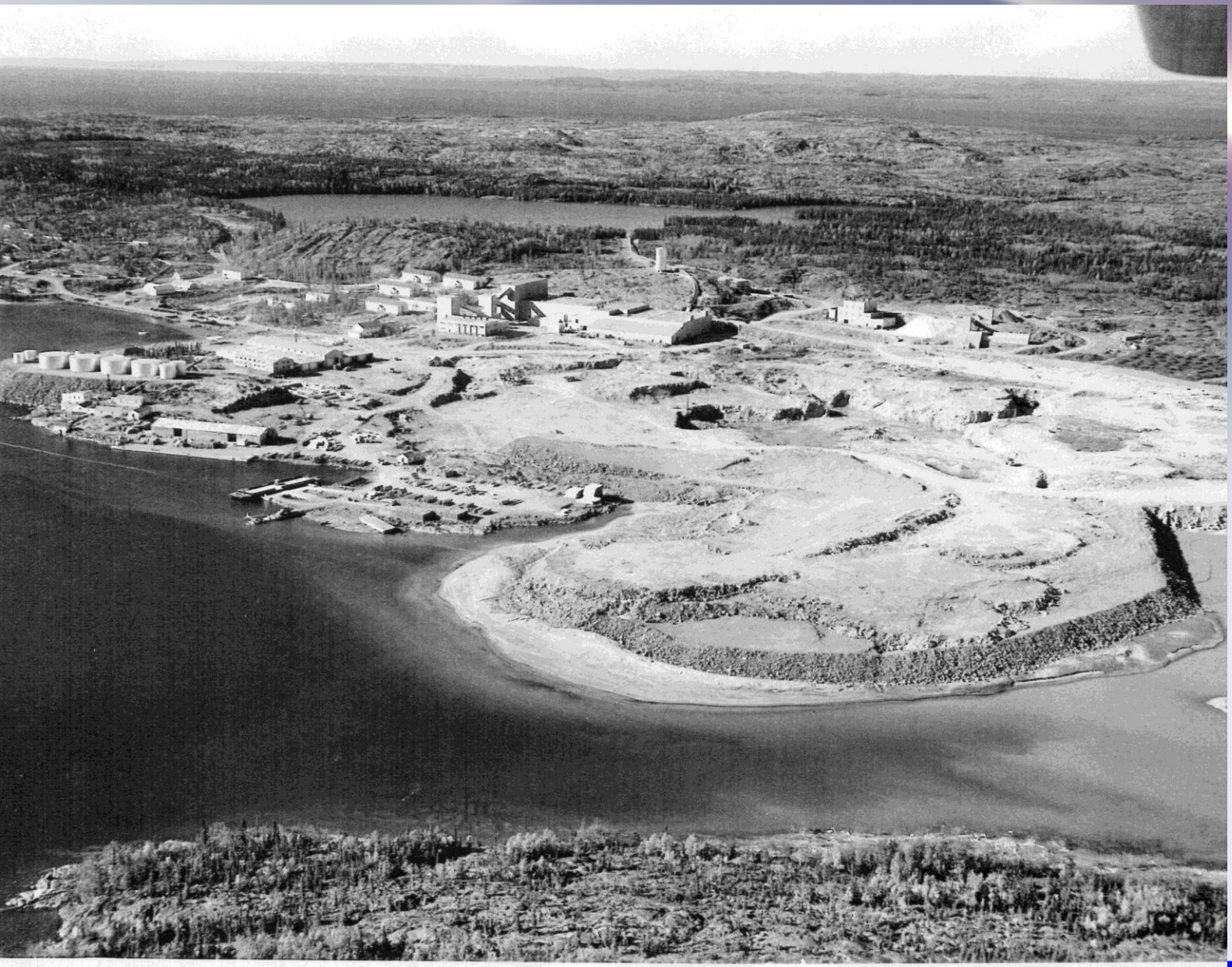
Presentation Outline

1. Gunnar Site – mine site and history
2. Hazards
3. Endpoints and Remediation Options
4. Community Involvement
5. Questions/Discussions

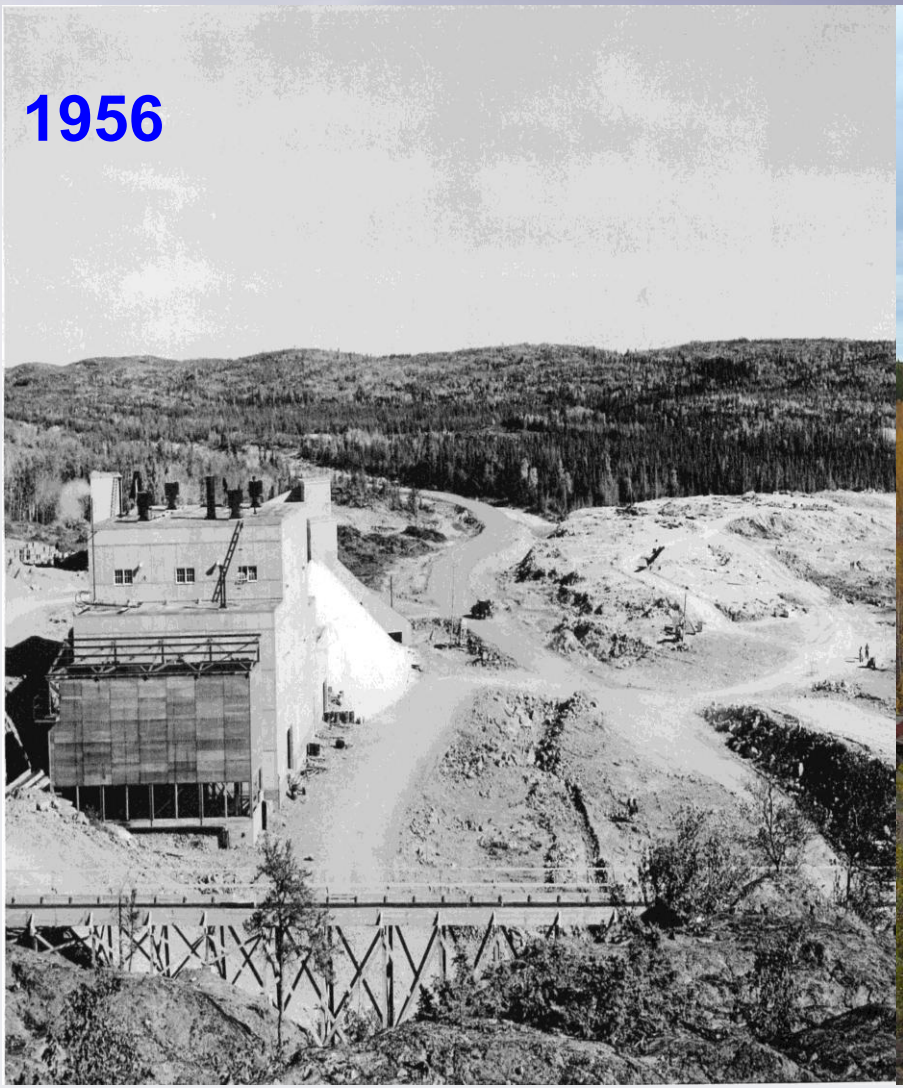
Gunnar History

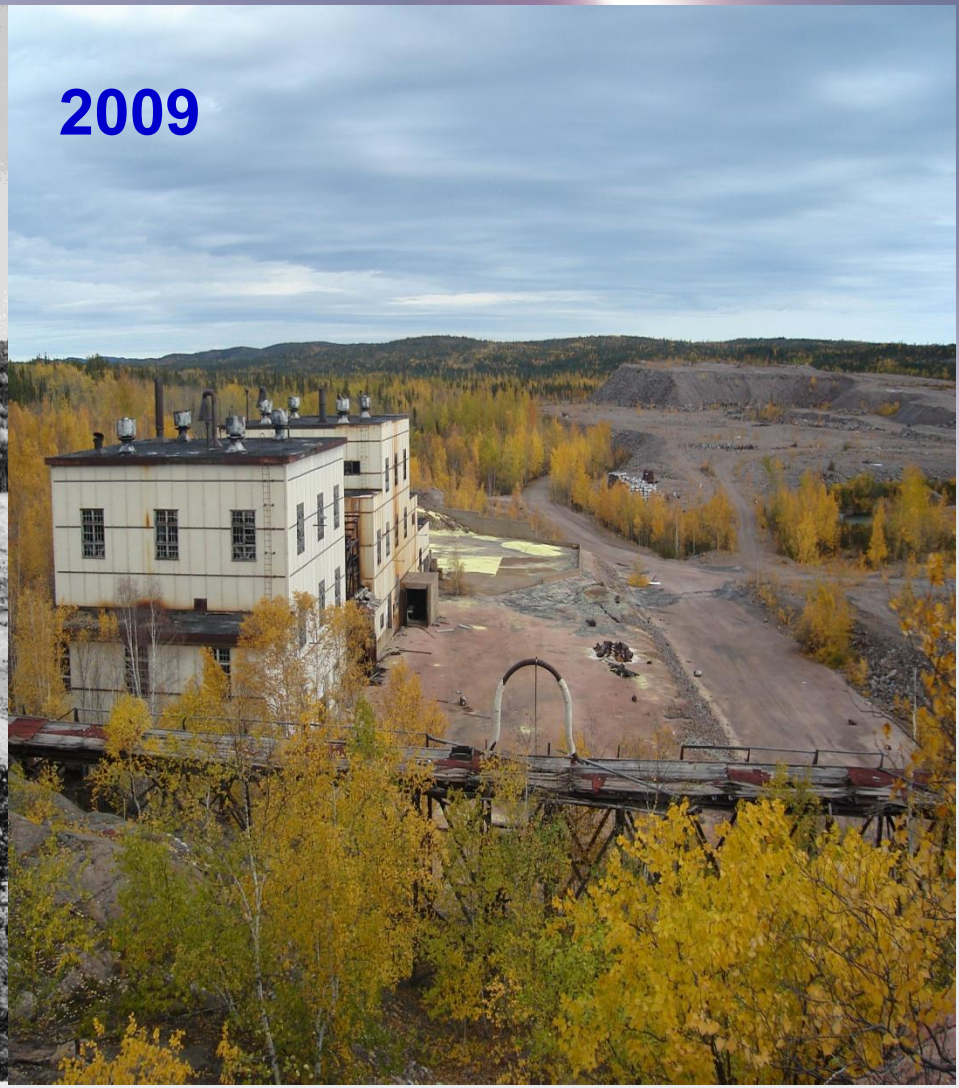
- mine operated from 1953-1964
- a total of 8.3 million tons of rock mined
- average grade of deposit was 0.18% U_3O_8
- initially started as open pit
- a 600 metre deep vertical shaft was sunk
- underground mining started in1957
- mining ceased in 1964
- pit was flooded, shaft covered with concrete cap, and mine site abandoned

Gunnar 1955 (open pit no headframe)



Gunnar 2009 (45 years after closure)


1956


2009

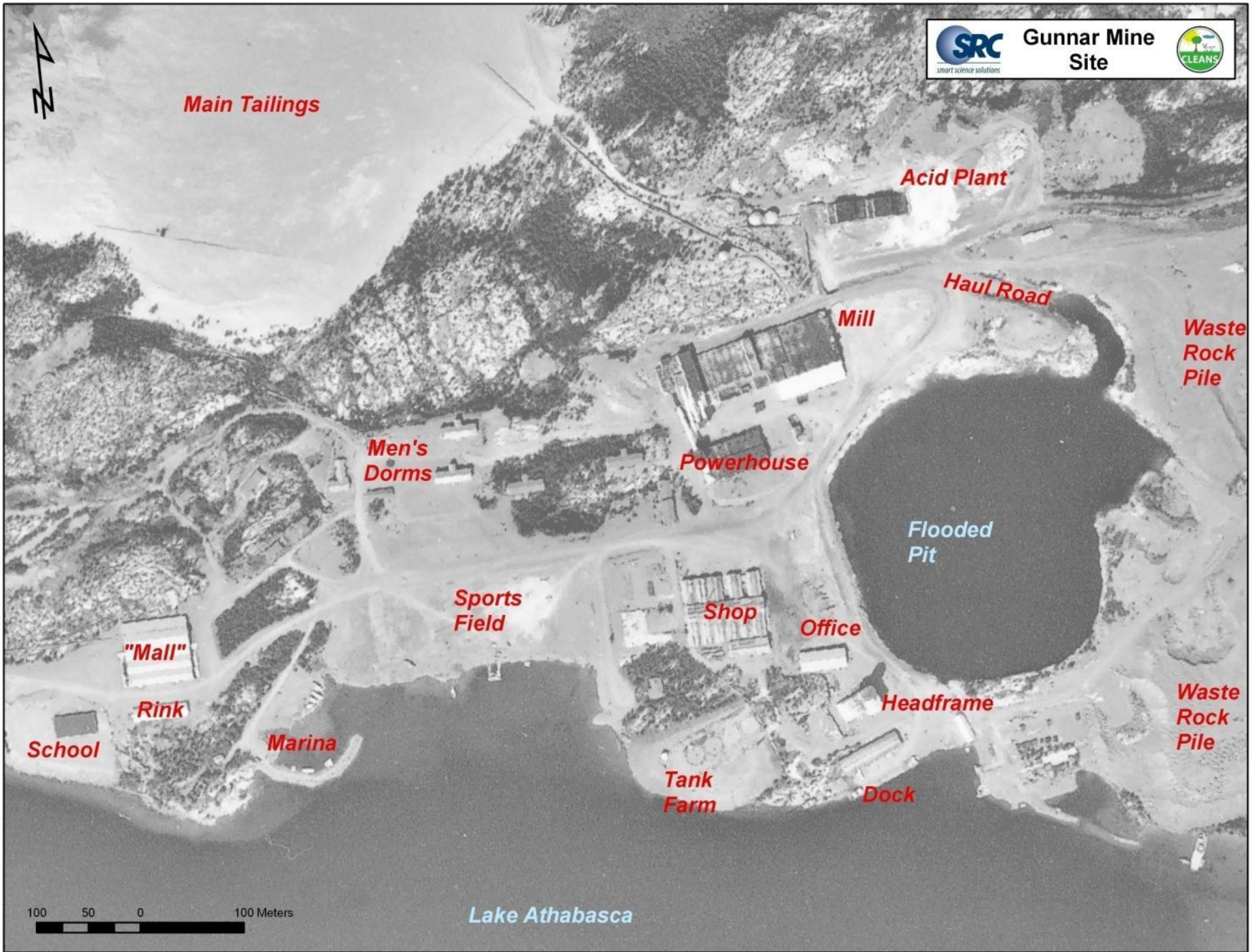
Mill Conveyors

Power Plant

Salvaged shortly after shutdown

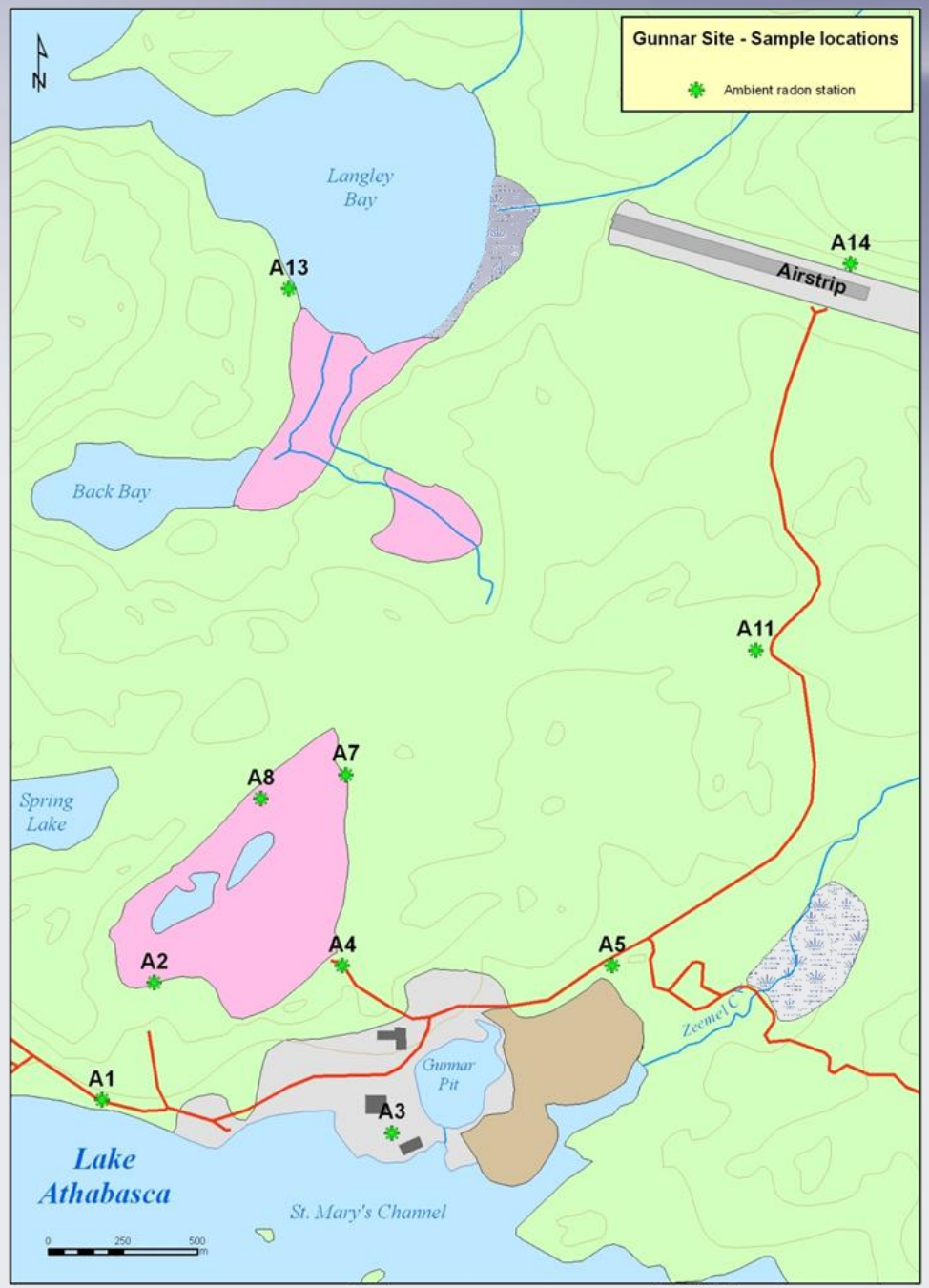
1956

2009


Gunnar Mine Site
Main Tailings
Acid Plant
Haul Road
Mill
Waste Rock Pile
Men's Dorms
Powerhouse
Flooded Pit
Sports Field
Shop
Office
"Mall"
Rink
School
Marina
Headframe
Waste Rock Pile
Tank Farm
Dock
100 50 0 100 Meters
Lake Athabasca

Hazards/Site Characterization

- Radon
- Gamma Radiation
- Buildings and Structures
- Tailings Areas (3)
- Waste Rock (2)
- Gunnar Pit
- Lake Athabasca impacts

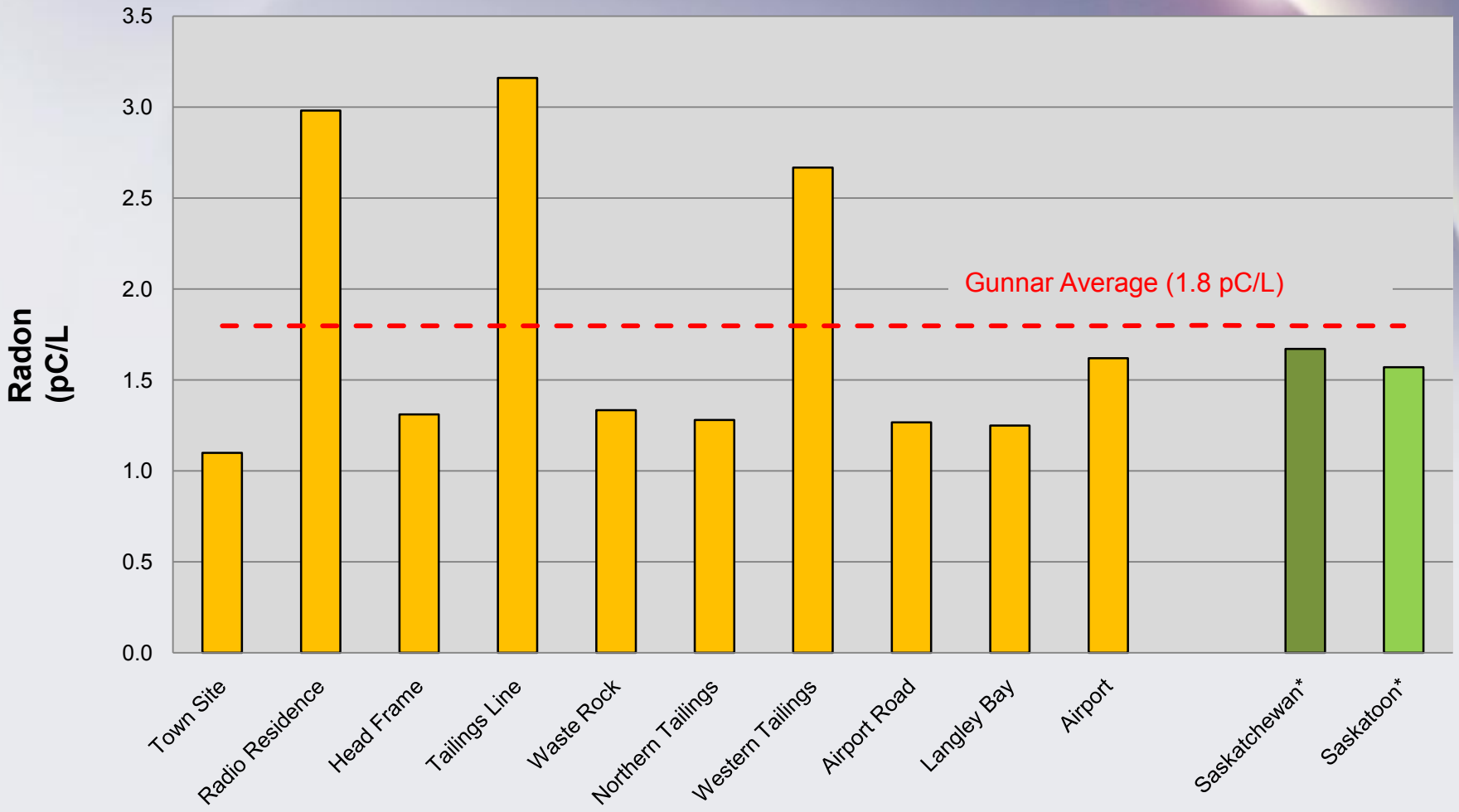


Radon monitoring stations at the Gunnar site

Radon gas monitoring

10 radon gas stations are located on the Gunnar site Detectors are collected and analyzed twice a year

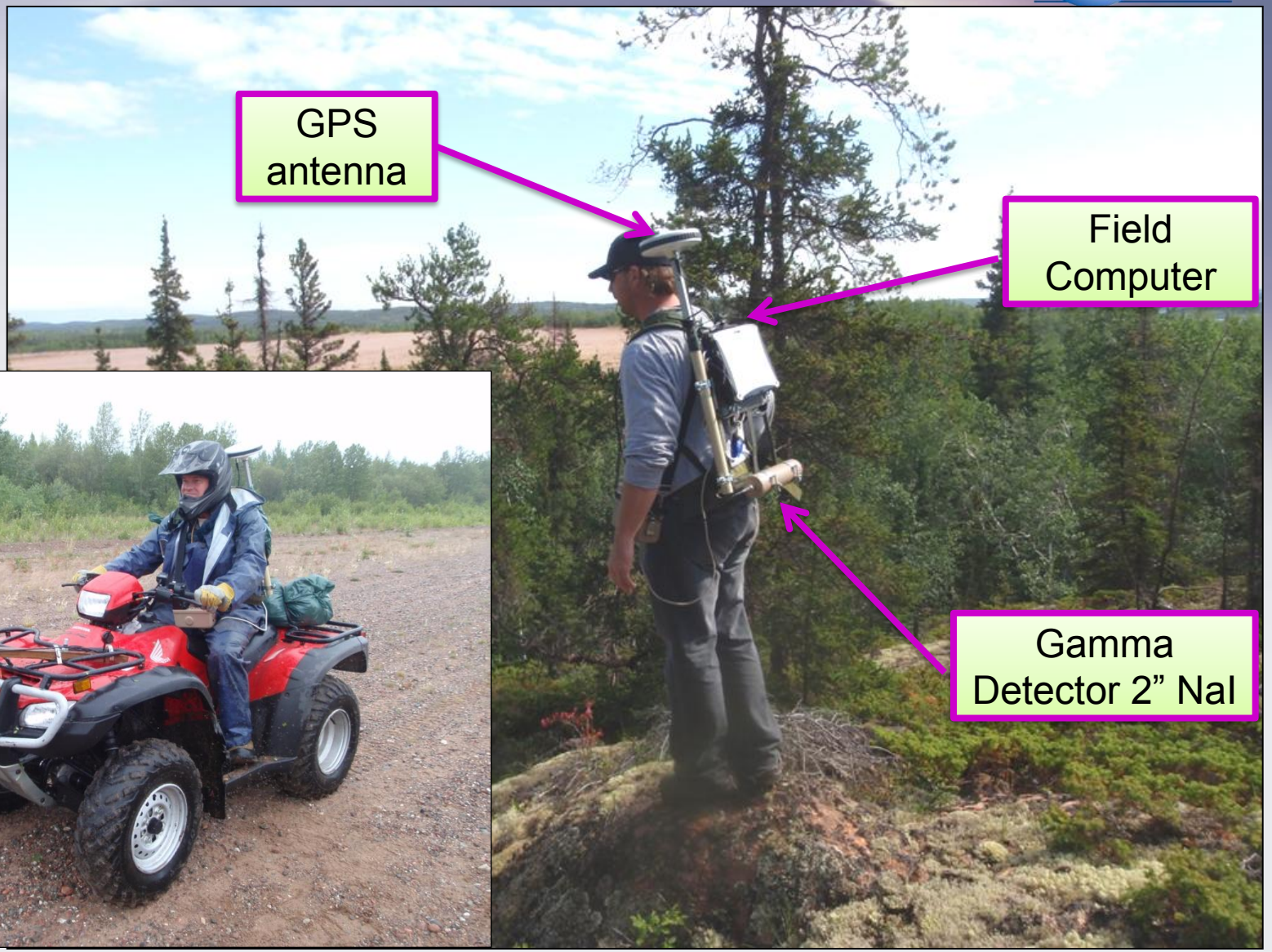
Average Radon levels Gunnar site 2004-2009

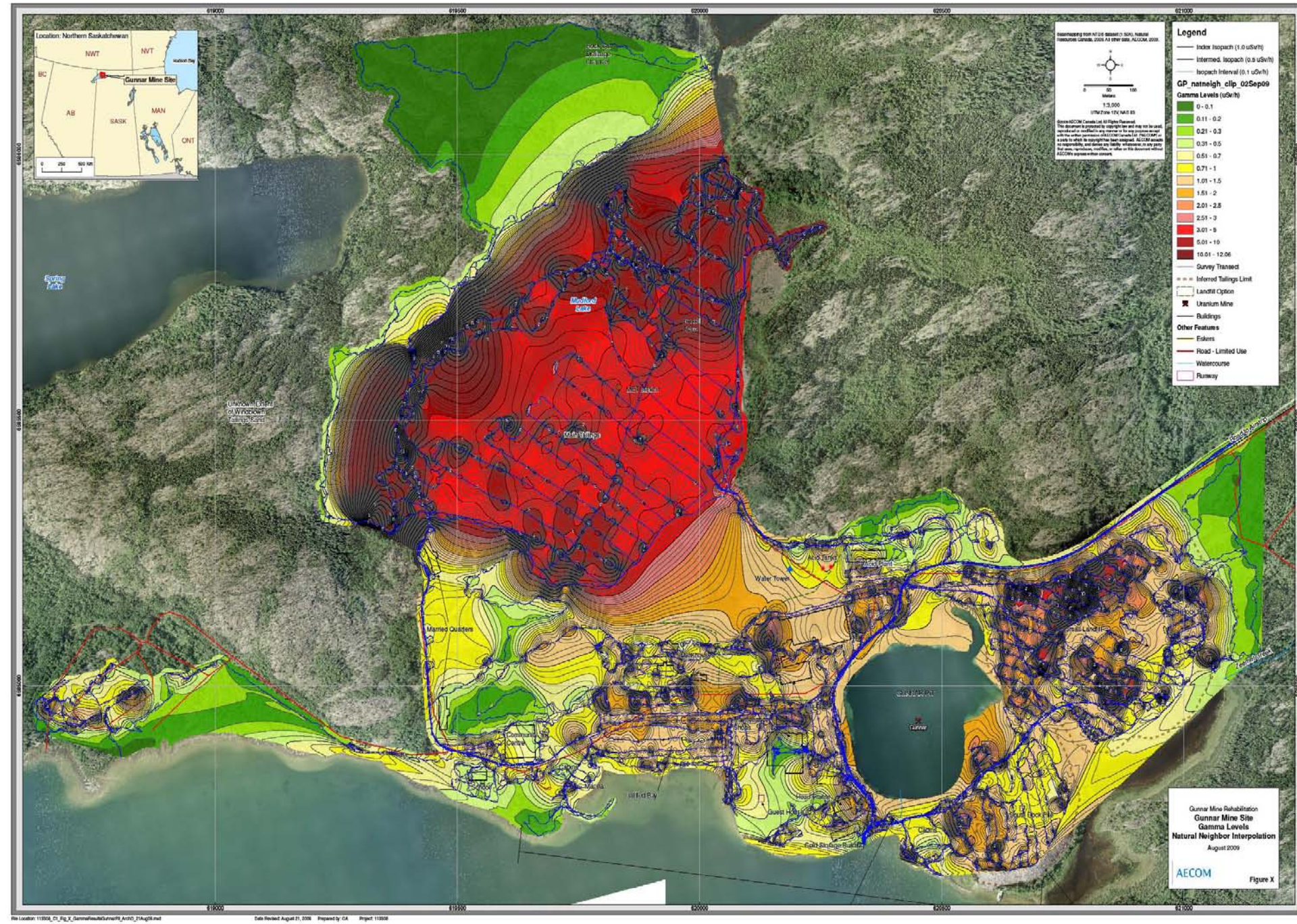


*Saskatchewan & Saskatoon levels from Health Physics, 1994

Gamma radiation survey

(reading taken every 2 seconds, over 40,ooo gamma measurements collected)





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Gamma Radiation
Possible Remedial Options

- Do nothing
- Relocate tailings to pit and bury (requires treating displaced pit water)
- Bury in place with sand and gravel
- Bury in place with waste rock

Buildings and Structures

Married Persons Quarters

Single Workers Residence

Unauthorized salvage

Buildings structurally unsound

Many of the residence buildings are in very poor condition

Buildings and Structures

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Head Frame

Crusher, Mill, Acid Plant

Buildings and Structures

School

South Side of Gunnar Site

Mill Building

Ore Storage Bins

Product Packaging Area

Acid Plant corroded and structurally unsound

Buildings and Structures - Possible Remedial Options

- Underwater Disposal
  - Gunnar Pit
  - Lake Athabasca (unlikely)
- Single Landfill
- Multiple Landfills (three)
- Hauling metal off-site
- Mine monument?
- Others?

Hazardous Materials

- Asbestos
- PCB- containing electrical devices
- Sulphur
- Blasting materials
- Miscellaneous chemicals

Asbestos

Friable -spray on asbestos insulation & pipe insulation

Non-friable asbestos siding

Asbestos requires specialized handling and disposal techniques

Sulphur, barged in from Alberta, was used to make sulphuric acid required in the refining process. Several cubic metres of sulphur still remain on site

Tailings Areas

A total of 4.4 million tonnes of tailings were discharged from the mill This material is located in 3 main tailings deposits on the Gunnar site:

- Gunnar Main
- Gunnar Central
- Langley Bay

Gunnar Tailings Areas

Gunnar Main Tailings Area

Gunnar Main looking south towards Lake Athabasca

Water ponder on Gunnar Main (note wind blown dust)

Tailings
- Possible Remedial Options

- Do nothing
- Natural Controls and Re-vegetation
- Water/Rock Cover/Borrow Material cover
- Impermeable Engineered Cover
- Use of constructed wetlands – next slide
- Combinations of above
- Others?

Constructed Wetlands

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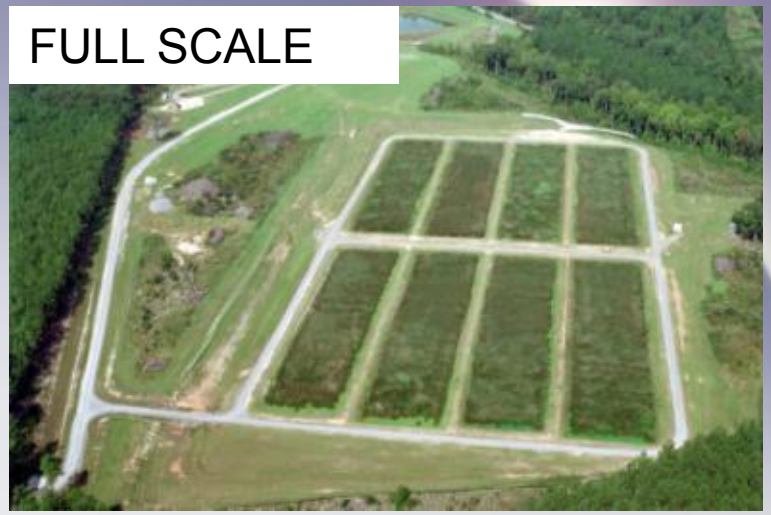
PILOT SCALE

FULL SCALE



APPLICATIONS in SOUTHERN AND NORTHERN CLIMATES

Point Sources – Oil refinery

Uranium Mine Contaminated Site Restoration

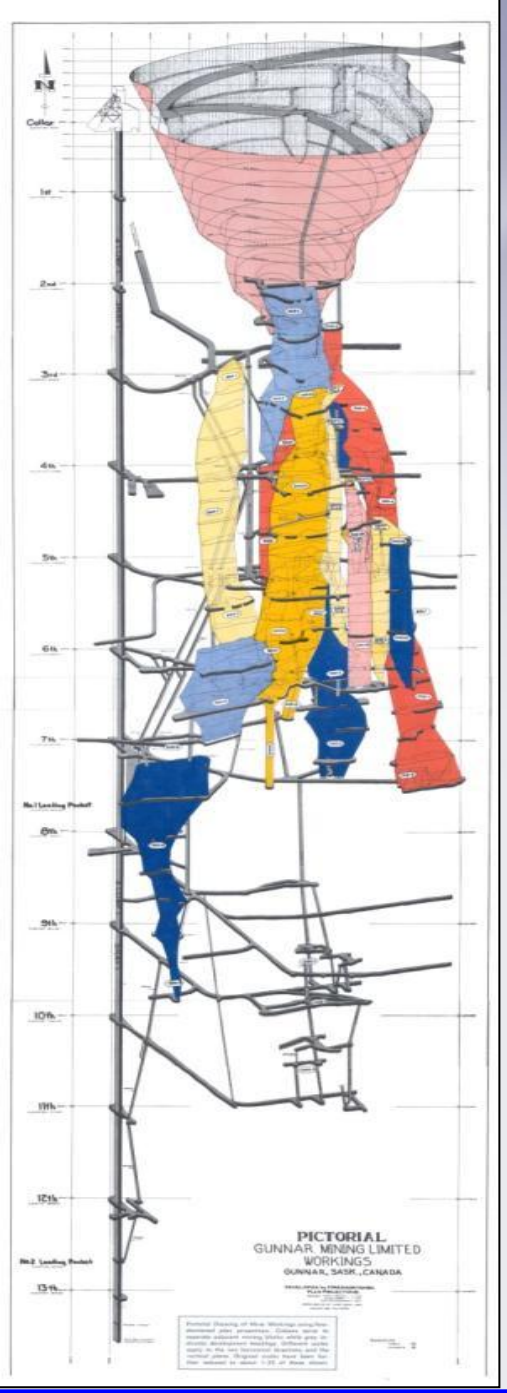
Oil Sands Process Water

Waste Rock

2.7 million m^3 of waste rock located adjacent to the shore of Zeemel Creek and Lake Athabasca

Waste Rock
– Possible Remedial Options

- Do nothing
- Contouring
- Engineered Cover
- Move part of the piles away from Lake Athabasca
- Reroute Zeemel Creek
- Others?



Gunnar Pit (1963-1964)

Gunnar Pit

Gunnar Pit - 1964

116m deep, and approx. 300m dia.

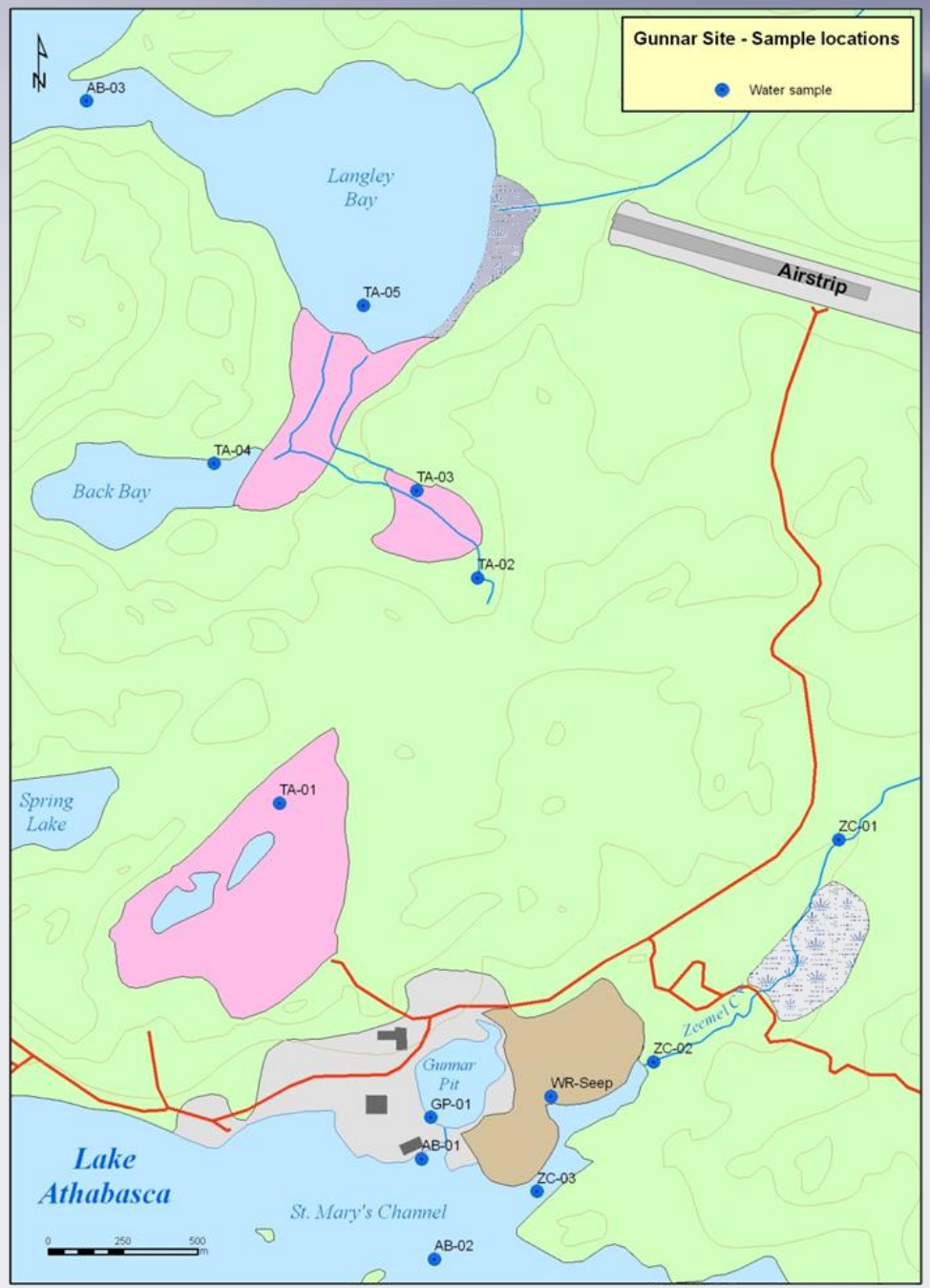
50 m from shore of Lake Athabasca

Gunnar Pit today

Flooded and supporting a population of northern pike

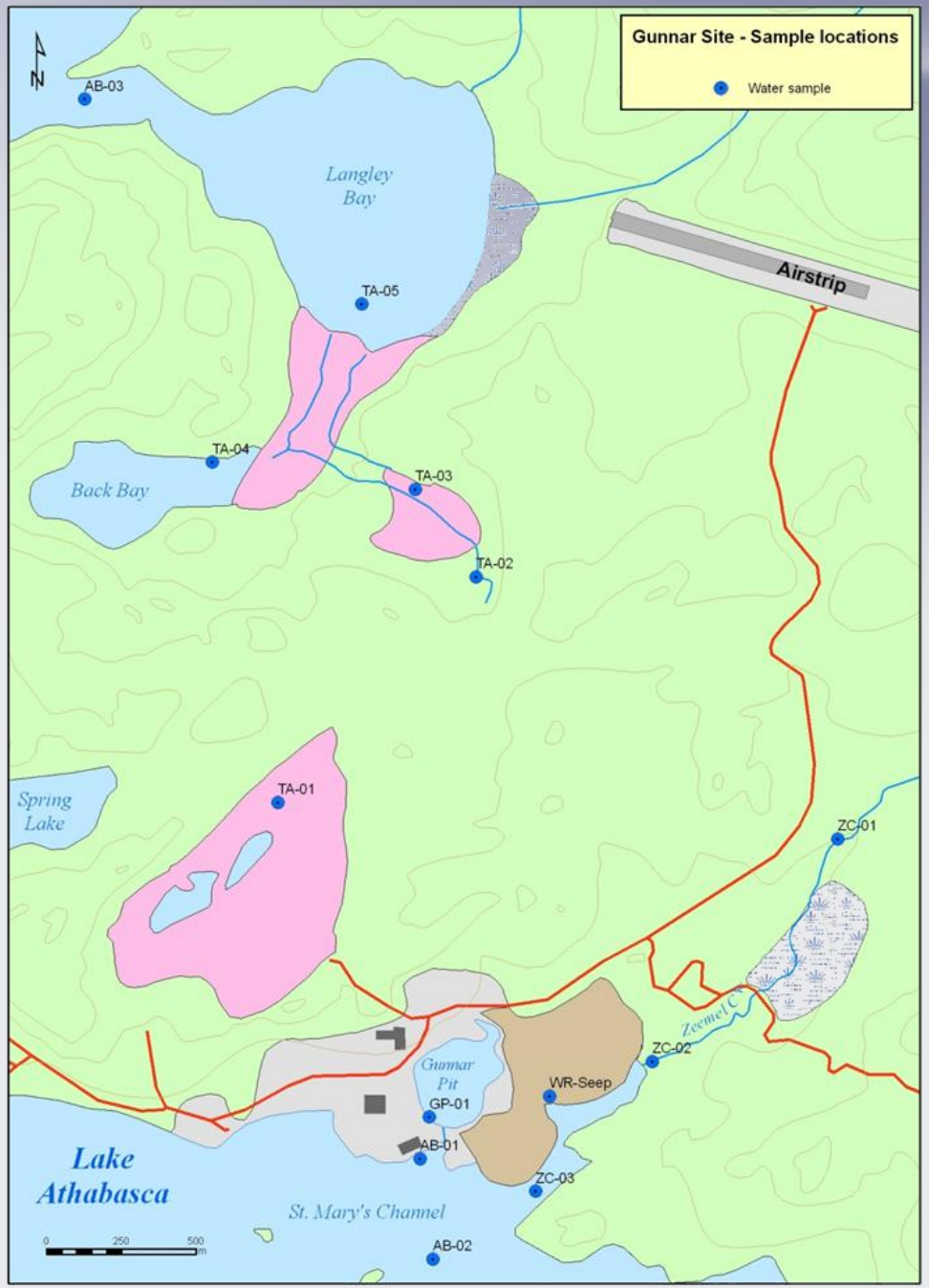
Gunnar Pit
- Possible Remedial Options

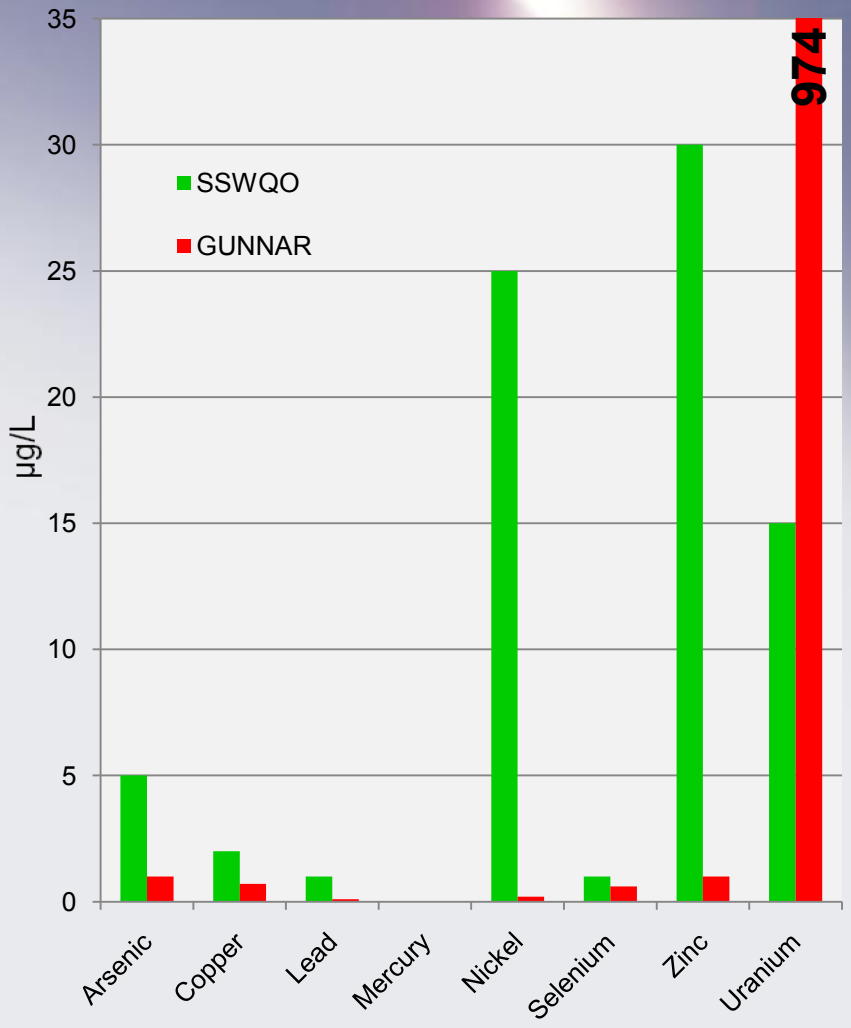
- Do nothing
- Stabilize the sides of the pit
- In-filling of pit with mine buildings
- In-filling of pit with tailings
- Treatment of displaced pit water if pit in-filled
- Addressing the water seepage issue
- Other?



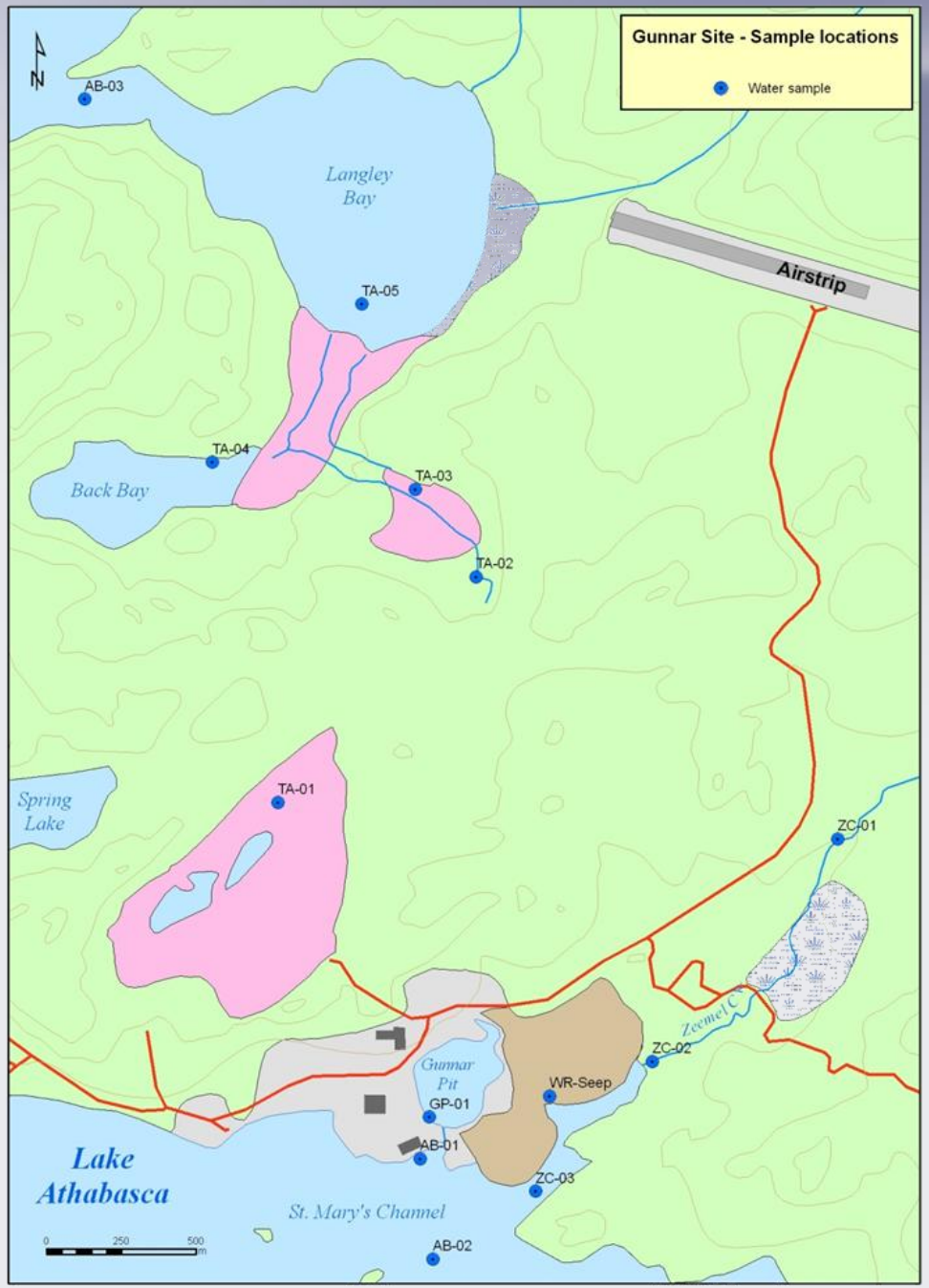
Surface water sample sites at the Gunnar mine site

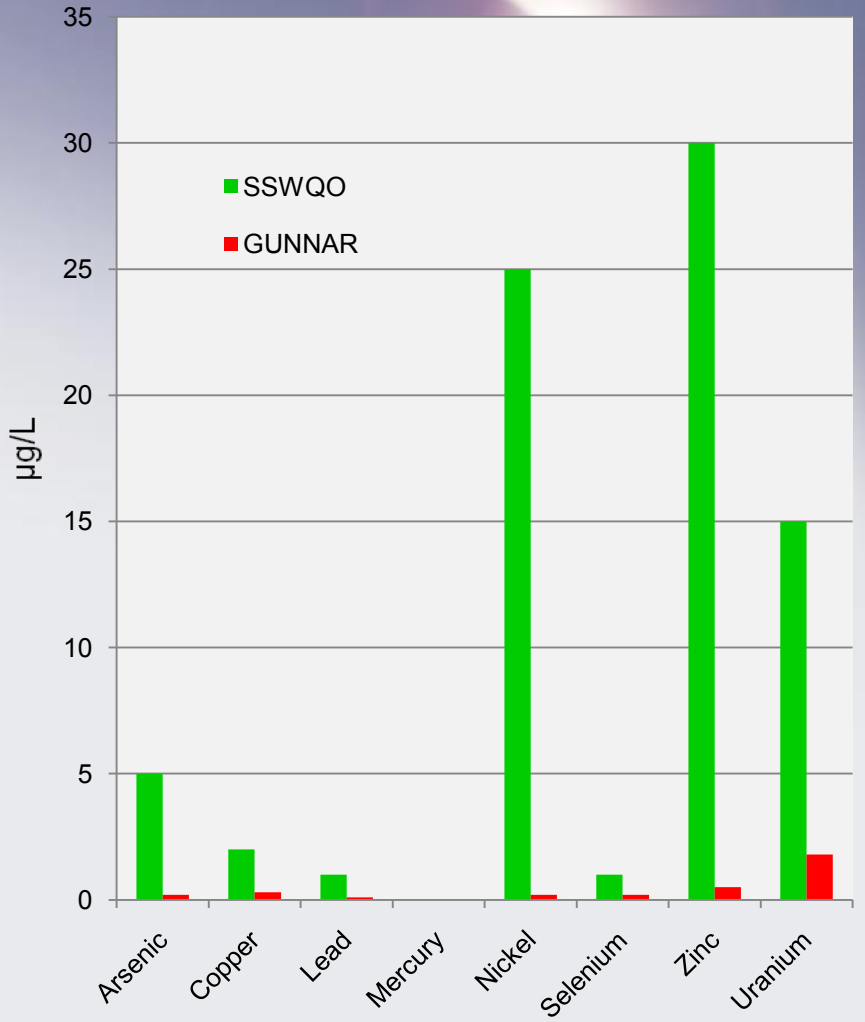
Gunnar Pit Water Quality GP-01



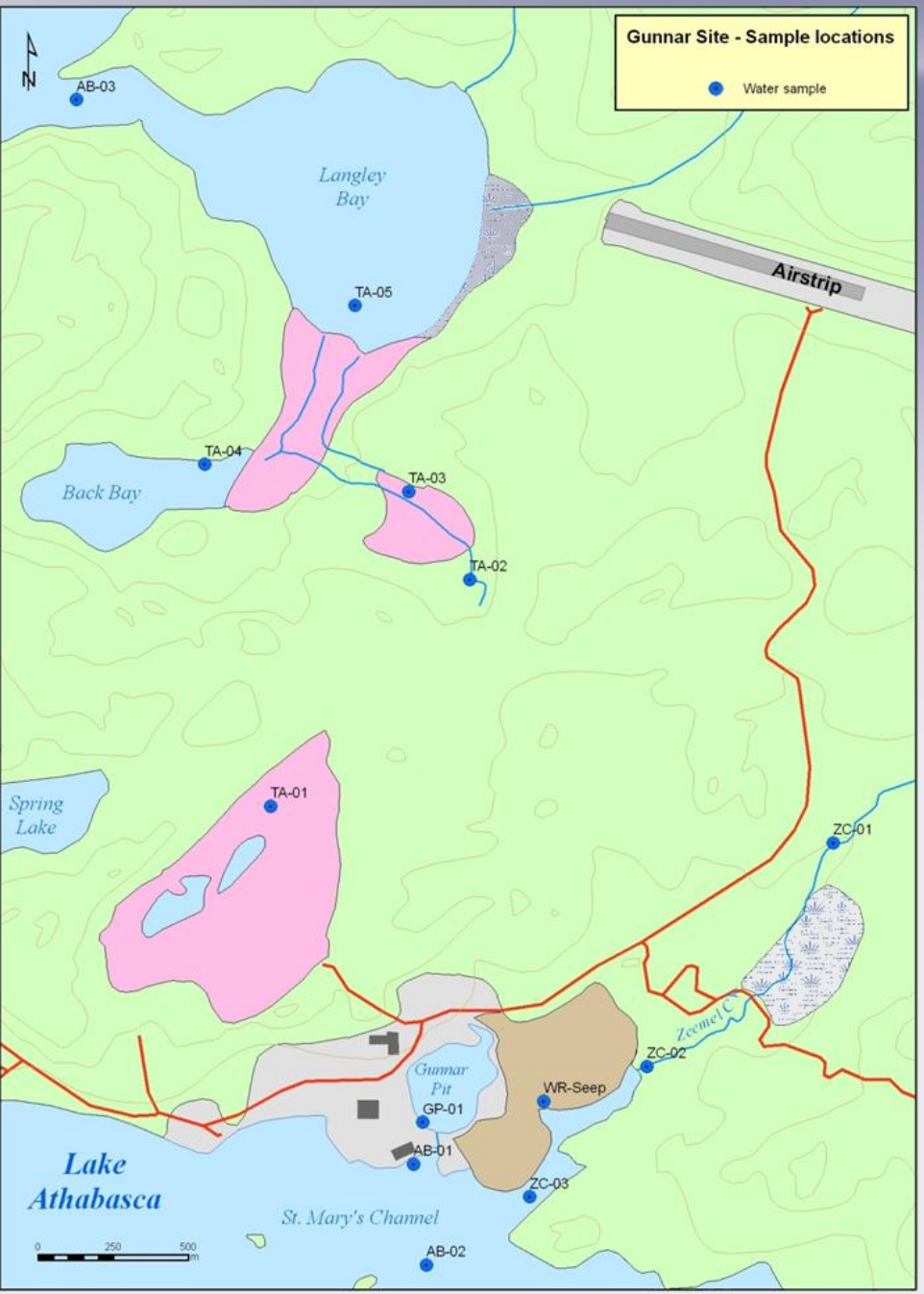


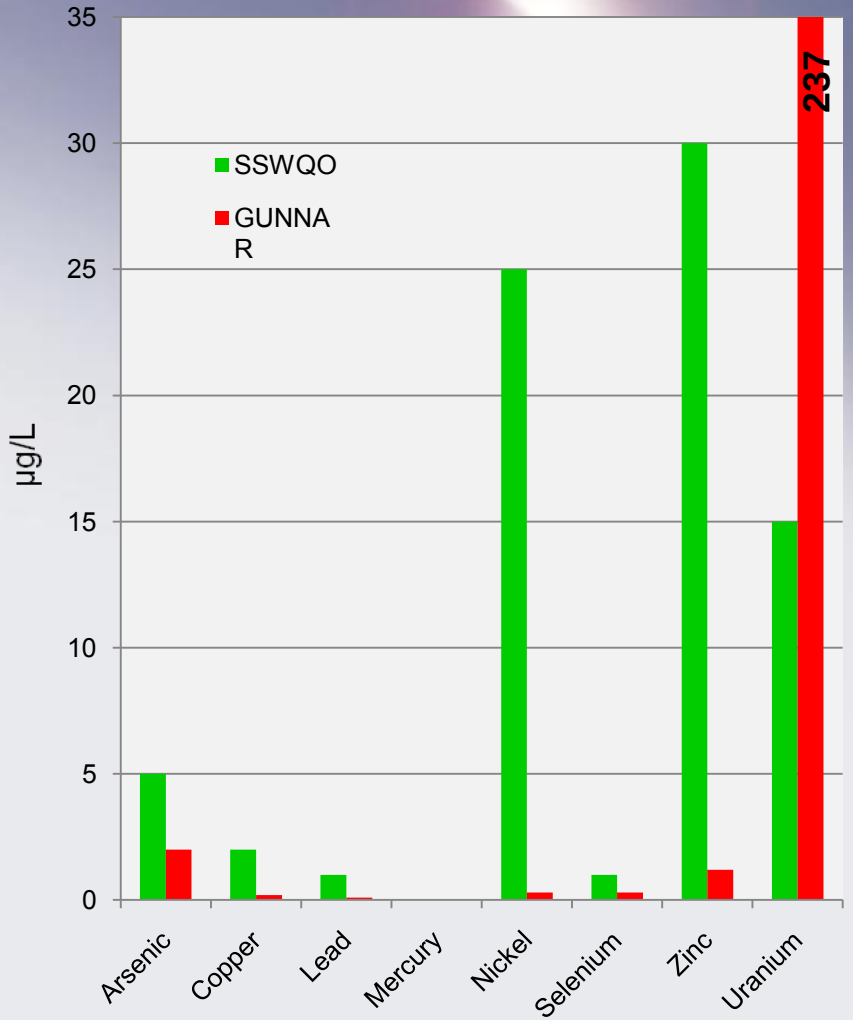
St. Mary's Channel
Lake Athabasca
AB-01



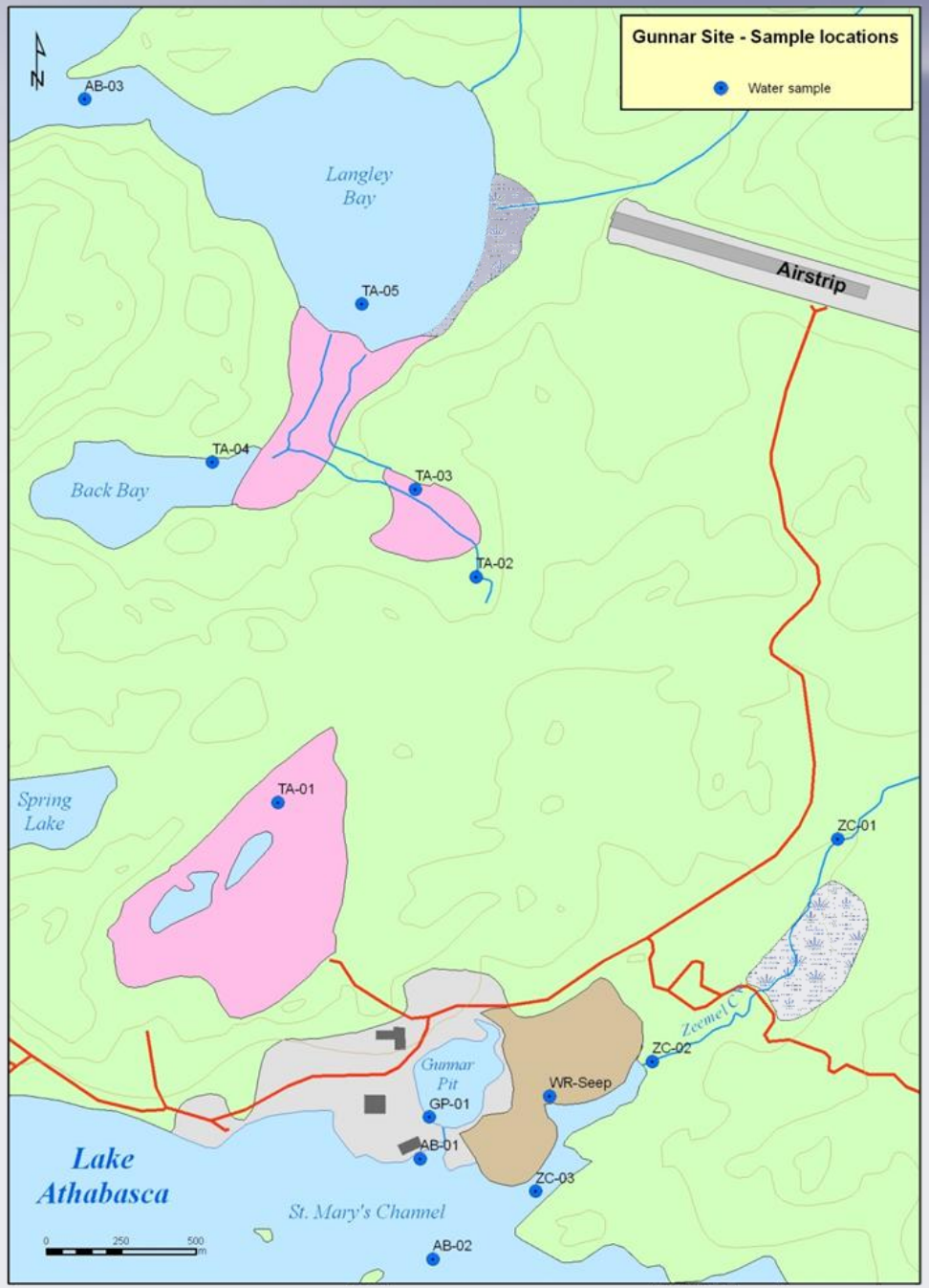


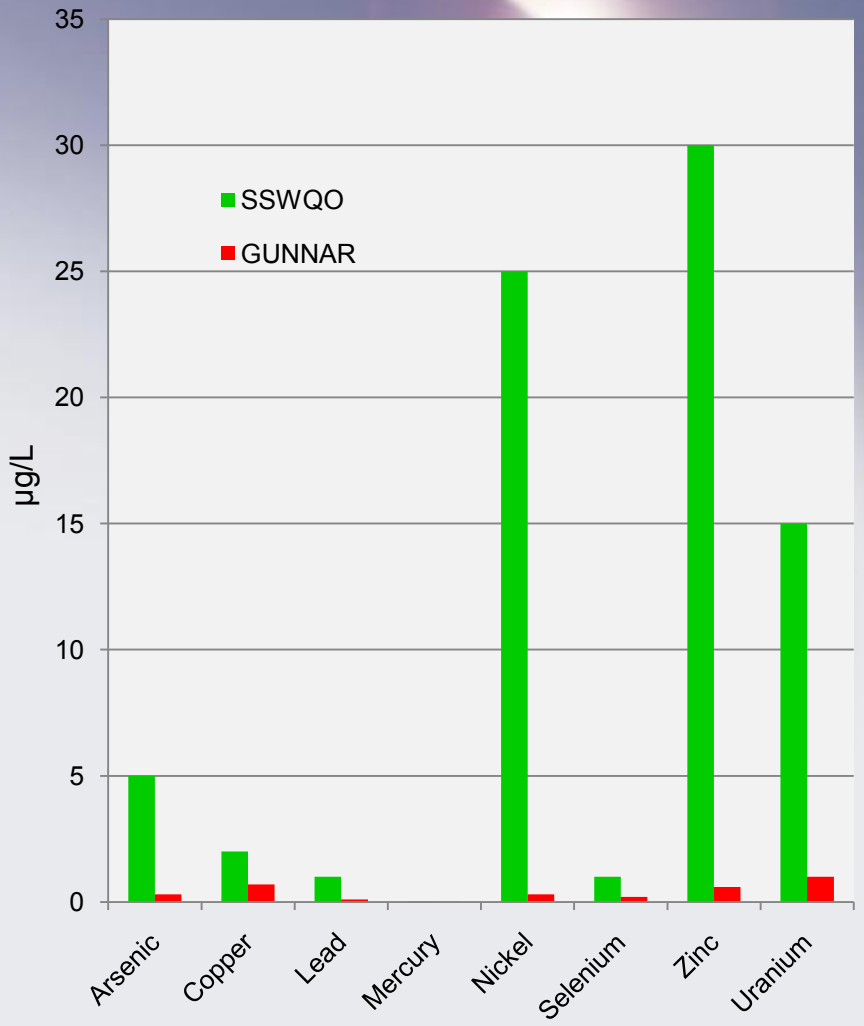
Gunnar
Main Tailings
TA-01





Langley Bay
Lake Athabasca
TA-05





Community Consultation

Project Review Committee (PRC)

- Uranium City
- Camsell Portage
- Fond du Lac
- Stony Rapids
- Black Lake
- Hatchet Lake
- Uranium City Métis Local #50
- Prince Albert Grand Council, Athabasca Vice Chief

Thank You…

CLEANS logo designed by a student from an elementary school in Fond du Lac, SK

www.saskcleans.ca