

In-Pit Mine Drainage Treatment System in a Northern Climate

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Presentation Sequence

Original Treatment System and Challenges

Hydrology at Raglan

Current Treatment System



Raglan

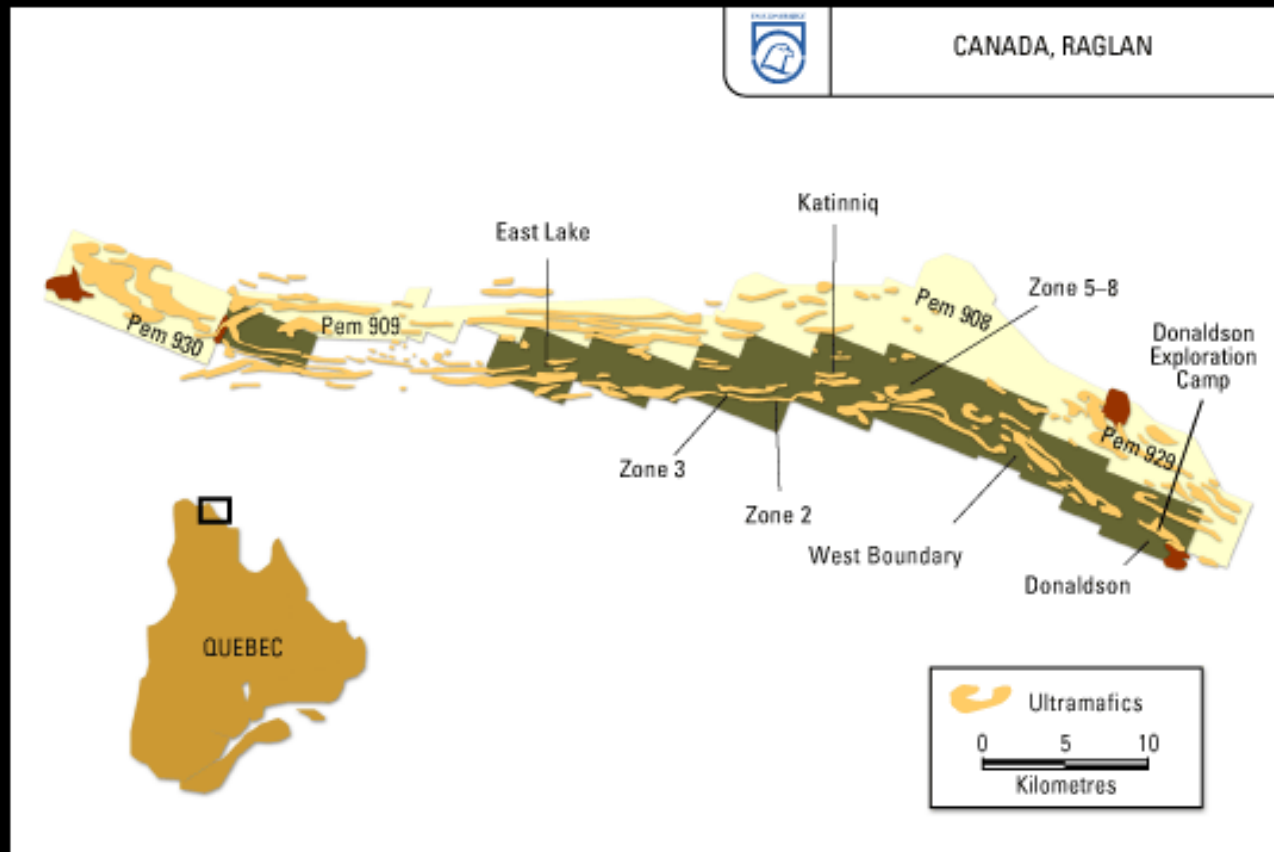
Raglan Mine

SMRQ (Société Minière Raglan du Québec)

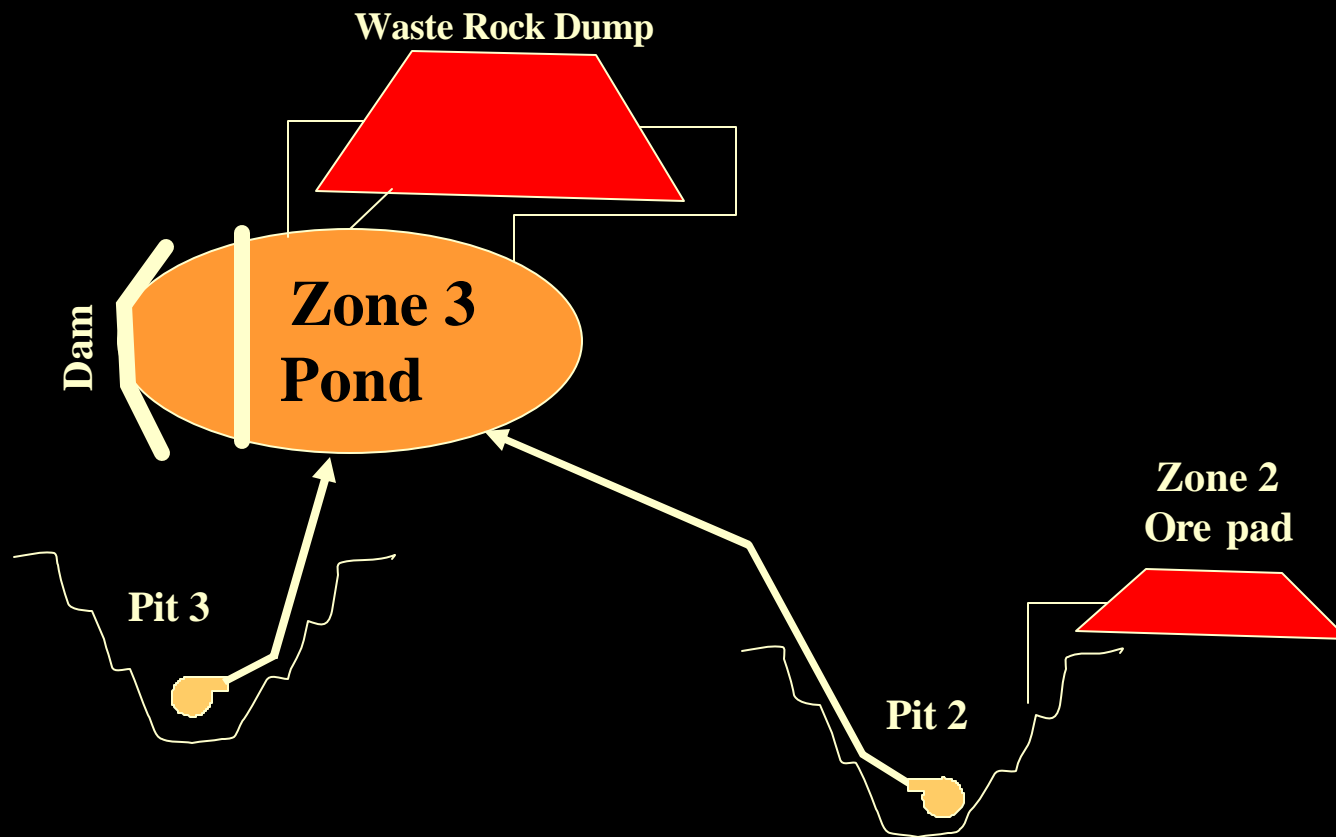
- North Québec (~100 km from northern coast)
- Tundra
- Permafrost
- Mean temperature of -10°C
- Operating since 1997



Site Detail



Zone 3 Previous Water Management



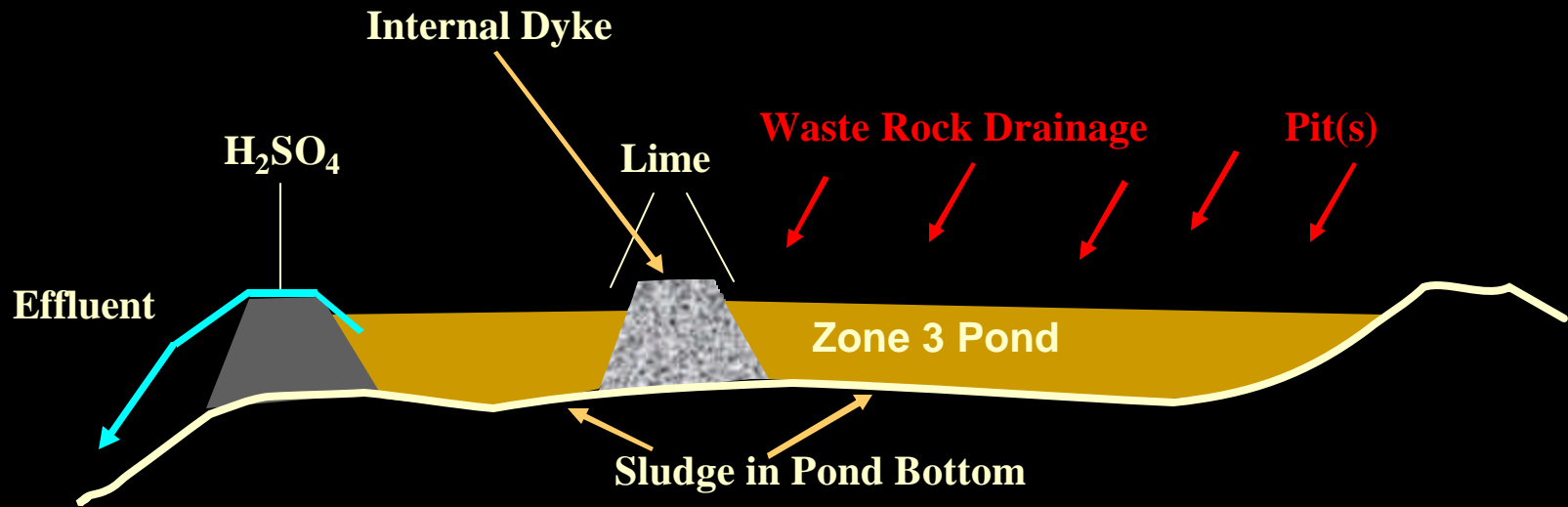
Chemistry of Mine Drainage

Parameter	Raw Water (average)	Effluent Limits
pH	7-8	6.5-9.5
Ni (mg/L)	25	0.5
Cu (mg/L)	1	0.3
Fe (mg/L)	0.1	3
Other		Non-toxic



Zone 3 Treatment

Previous Conditions



Zone 3 Pond

Internal Dyke



Zone 3 Treatment

- Treatment Problems:
 - raising pH of large pond
 - suspended solids (shallow pond, winds)
 - short treatment window (frozen pond)
 - lime/neutralisation efficiency
 - sludge management (dredging feasible?)



Raglan Hydrology

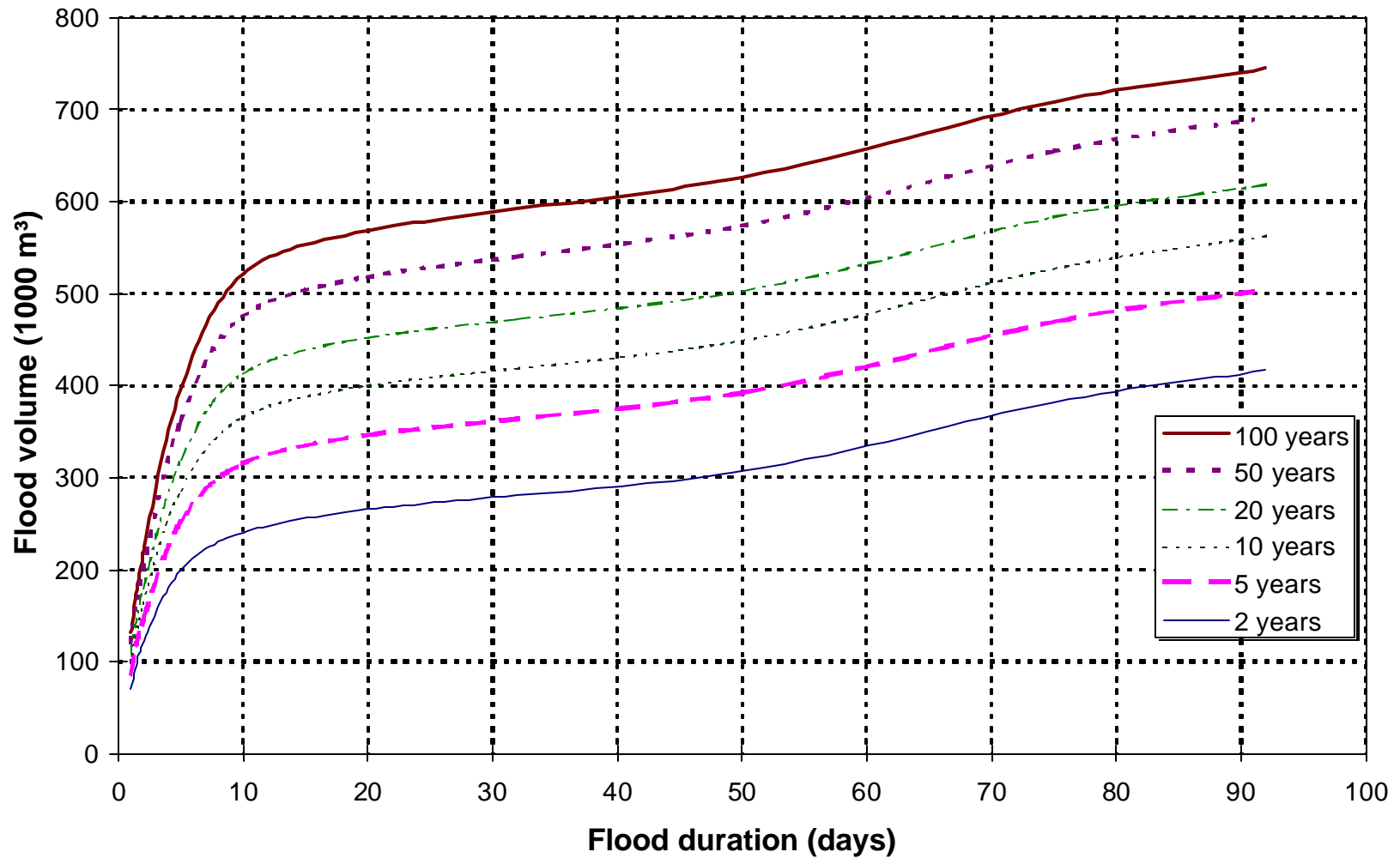
- To upgrade treatment system, need to understand site hydrology
- Measurements taken by SMRQ
- Hydrological modelling was completed (SNC-Lavalin)



Snow by roadside (Nov 99)



Flood volume at Raglan Mine for a 1 km² watershed



Hydrology

- Yearly precipitation is 80% snow
- Quick thaw - 100% runoff on permafrost
- Can receive more than 50% of total yearly runoff in 2 weeks
- Key to water management is storage

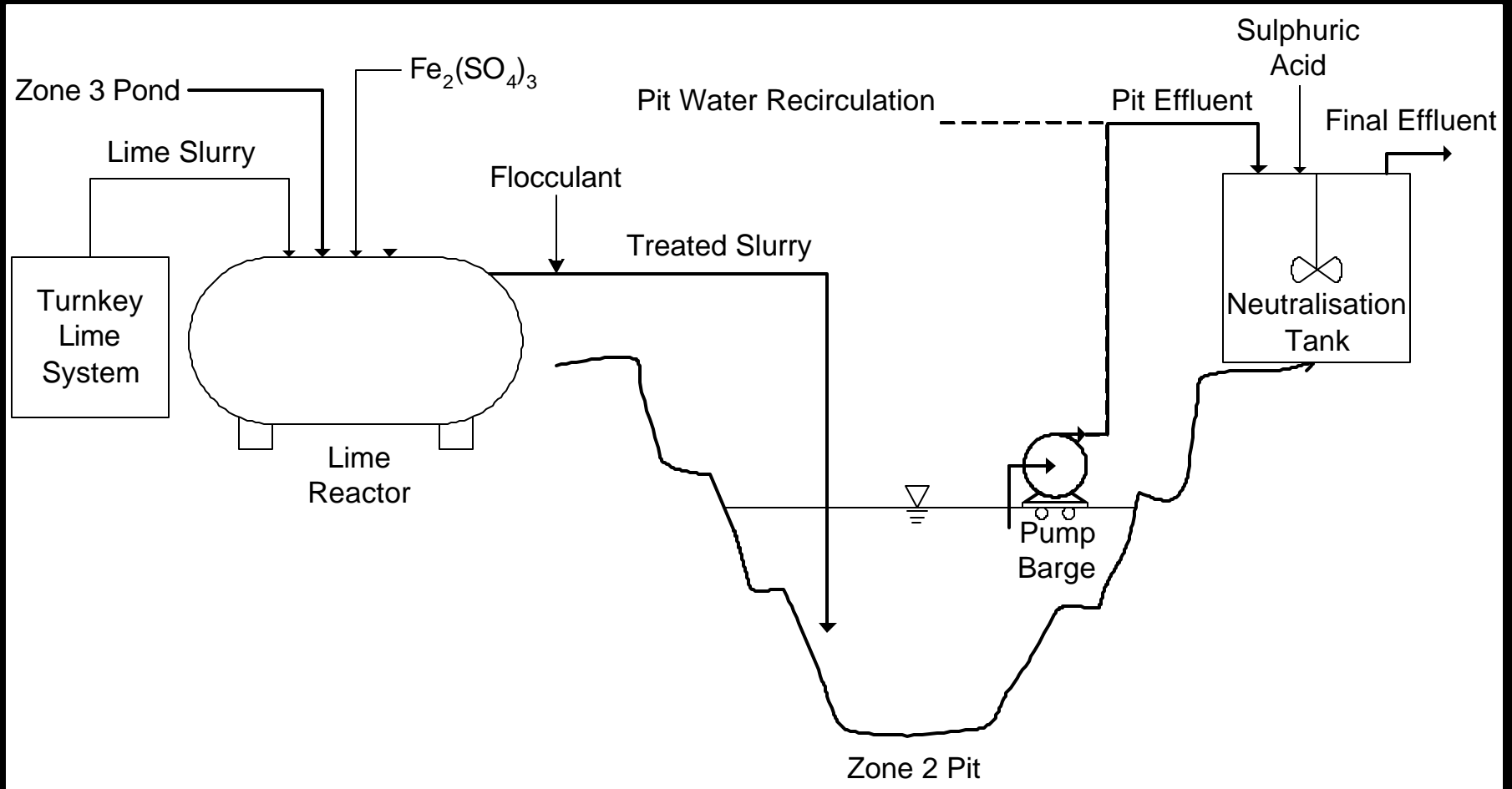


Water Treatment

- For storage, use Pond 3
- For treatment, use decommissioned Pit 2
 - pH controlled prior to feeding pit
 - partial wind protection
 - useful depth for sludge storage
 - reasonable capital cost



Treatment System



Treatment System



Treatment Plant



Lime System



Acid Plant



Treatment System Results

- Meets effluent guidelines
 - with reasonable costs
 - and low capital investment
- Temporary situation
 - waste rock to return to pits



On-Going Challenges

- time: 90 to 120 days of treatment per year
- treating initial pit water
- uncontrolled Ni sources
- weather effects





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