



**AVALON**  
RARE METALS INC.

## Hay River Reserve Scoping Sessions

David Swisher, VP, Operations

Rick Hoos, EBA Engineering

October 25-26, 2010

**MATERIALS FOR CLEAN TECHNOLOGY**

**TSX:AVL**

**OTCQX:AVARF**

# Presentation Content

- Introduction
- Current Initiatives
- Project Description
- Project Logistics
- Future Initiatives
- Environment & Mitigation
  - Baseline & Potential Interactions
  - Air Quality
  - Water Quality
  - Fish & Aquatics
  - Vegetation
  - Wildlife



# NECHALACHO, THOR LAKE

## *Introduction*

# Management, Directors & Strategic Advisors

## Management

- Donald S. Bubar, P.Geo,  
President, CEO & Director
- Jim Andersen, C.A., C.P.A.,  
V.P. Finance & CFO
- Bill Mercer, Ph.D., P.Geo.,  
V.P. Exploration
- David Swisher, B.S. Min.Eng.  
V.P. Operations
- Pierre Neatby, B.S.  
V.P. Sales & Marketing
- Finley Bakker, P.Geo.,  
Senior Resource Geologist
- Charlotte May, Corporate Secretary
- Cindy Hu, CA, CPA, CGA, Controller
- Virginia Morgan, B.Com,  
Manager, Investor Relations

## Directors

- Alan Ferry, CFA  
Non-Executive Chairman
- David Connelly, CStJ, CD, MBA,  
B.Comm
- Phil Fontaine, B.A., LL.D.
- Brian D. MacEachen, C.A.  
Audit Committee Chair
- Peter McCarter, B.A., LL.B., M.B.A.  
Chair Governance/Compensation ctte
- Hari Panday, C.A.

## Strategic Advisors

- F. Dale Corman, P.Eng.
- Gerald Prosalendis, Communications
- Joe Monteith, Business development



# Thor Lake Project General Location Map



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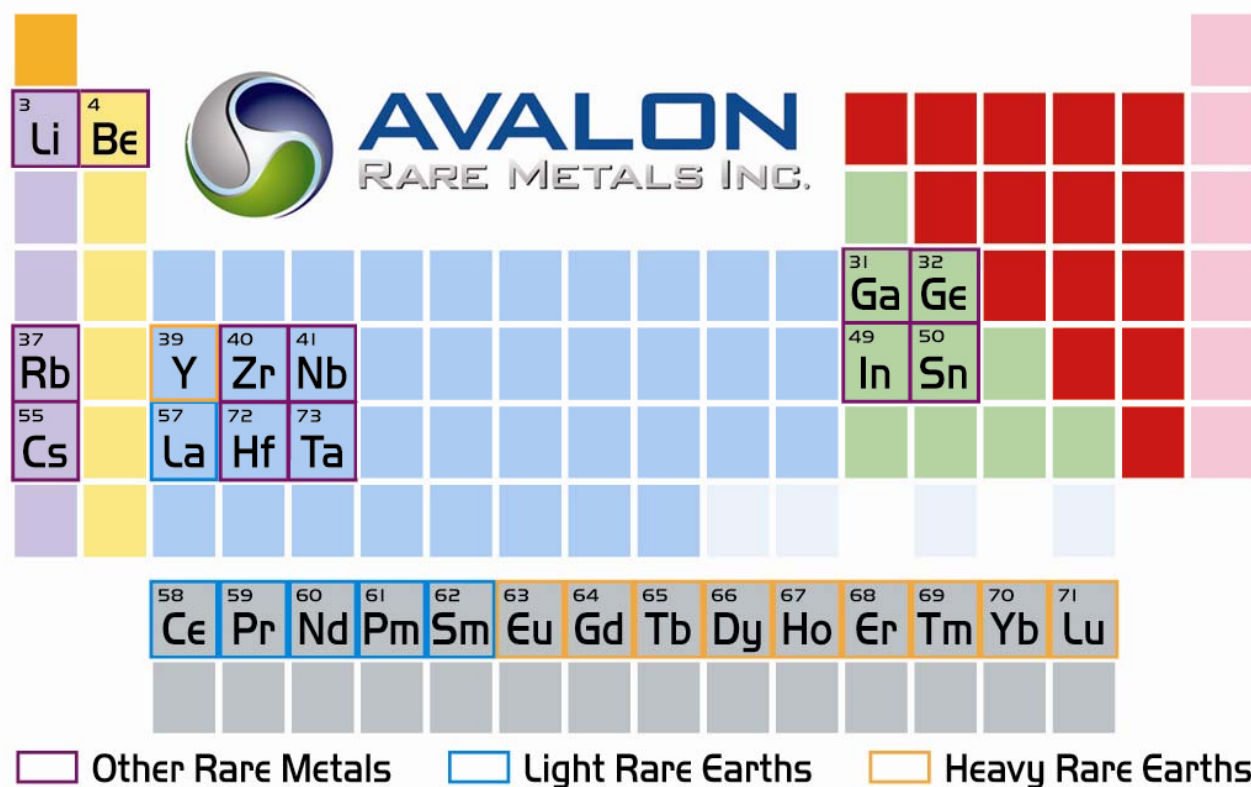


# Introduction

Avalon proposes to construct and operate a rare earths mine and process facilities as a competitive world supply of rare metals. These facilities are envisioned to contain the following key components in the NWT:

- Thor Lake Project
  - 2,000 tpd Underground Mine
  - Flotation Plant
  - Concentrate Loading and Storage
  - Temporary Summer Barging
  - 185 employees
- Pine Point Site
  - Temporary Summer Barging
  - Hydrometallurgical Facility
  - Product packaging & Shipping
  - Transport to Hay River Railhead
  - 90 employees

# What are Rare Earth Elements?



## Light REE:

La = Lanthanum  
 Ce = Cerium  
 Pr = Praseodymium  
 Nd = Neodymium  
 Sm = Samarium

## Heavy REE:

Eu = Europium  
 Gd = Gadolinium  
 Tb = Terbium  
 Dy = Dysprosium  
 Ho = Holmium  
 Er = Erbium  
 Tm = Thulium  
 Yb = Ytterbium  
 Lu = Lutetium  
 Y = Yttrium

Neodymium, Dysprosium, Terbium and Europium in highest demand

# REE Economics: A Question of Balance between “Heavies” and “Lights”



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- Only occur as a group and recovered as a group and separated at additional cost
- Most deposits contain the *light* rare earths (“LREE”)
- Deposits with a high proportion of *heavy* rare earths (“HREE”) are very rare
- Consequently, HREE are much more valuable
- Basal Zone of Nechalacho deposit has a high proportion of HREE ( >20%)



# South China Ionic Clays: *World's Primary Source of HREE*

- Low grade, but relatively easy to recover
- Uncontrolled, primitive methods causing environmental destruction
- Government now curtailing production for cleanup
- 50% of mines unlicensed, Government crackdown initiated Spring 2010
- In 2008, one-third of total volume exported was reportedly illegally smuggled out of China
- Estimated to be less than 15 years of reserve life



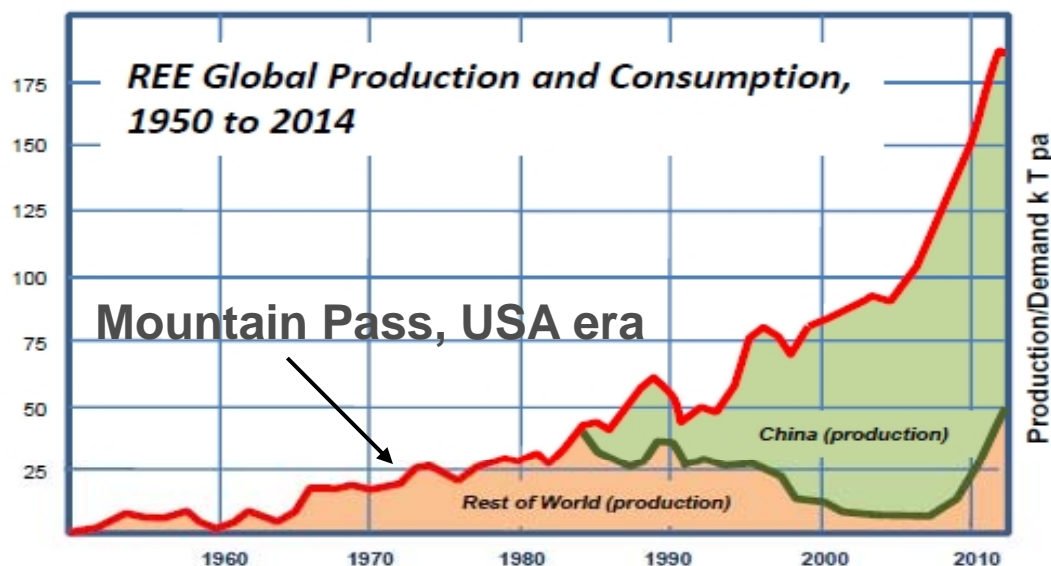
This abandoned mine in Guyun Village in China exhausted the local deposit of heavy rare-earth elements in three years. *Source: NY Times*

# China Dominates Global REE Production



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- China currently produces over 95% of global REE supply
- China now imposing export quotas and tariffs on REE
- New non-Chinese supply sources needed to maintain balance
- Supplies of key HREE from China (Y, Dy, Tb) will remain tight with potential for a complete export ban
- Japan totally reliant on China for supplies



Yet, Chinese companies are actively trying to acquire additional REE resources around the world. Why?

# Main *Clean Technology* Applications of Rare Earth Elements



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Application	Rare Earth Technology	REE Required
Hybrid, Electric and Plug-in Cars	REE permanent magnets	Nd, Pr, Dy, Tb
Wind and tidal power generation	REE permanent magnets	Nd, Pr, Dy, Tb
Flat screen displays and monitors	REE phosphors create the colors blue, green and red	Y, Eu, Tb, Gd, Pr, Ce
LED lights	REE phosphors enable light to match brightness and color with substantially less energy usage	Y, Eu, Tb



# Niobium, tantalum, zirconium – Medical Use



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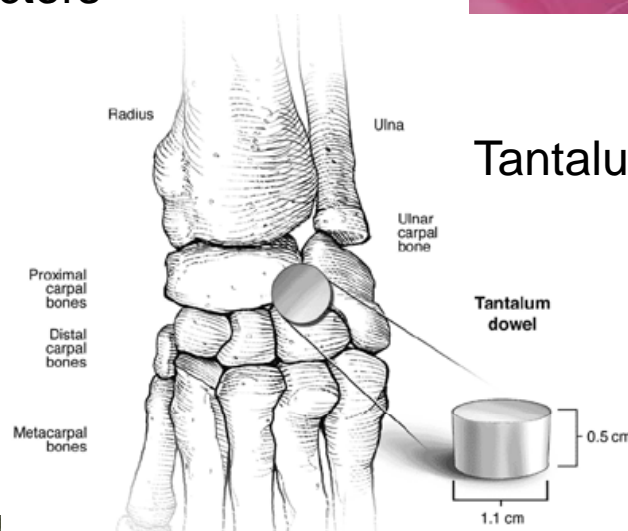


Niobium in superconductors

Zirconium in teeth implants



Tantalum in bone implants







## NECHALACHO, THOR LAKE

### *Current Initiatives*

# 2010 Construction Activities

## ✎ Airstrip:

- ✎ Construction by Deton Cho Logistics
- ✎ Clearing supported by YKDFN members
- ✎ 30 x 300 metres

## ✎ Reclamation:

- ✎ Reclaimed old waste rock piles for airstrip fill
- ✎ Repurposed old trailers for overflow camp facility



## 2010 Technical Activities

- Completion of prefeasibility financial analysis
- Hired Senior Resource Geologist, Project Manager & Process Engineer
- Knight Piesold conducted field work this summer in preparation for:
  - Geomechanical work to confirm the strength of underground rock properties & construction properties for Tailings Management Facility
  - Hydrology work to confirm surface & U/G water sources
- SGS Lakefield Laboratory
  - SGS & XPS completed optimized flotation plant design
  - SGS completed hydrometallurgical testwork



# 2010 Environmental Work and permitting



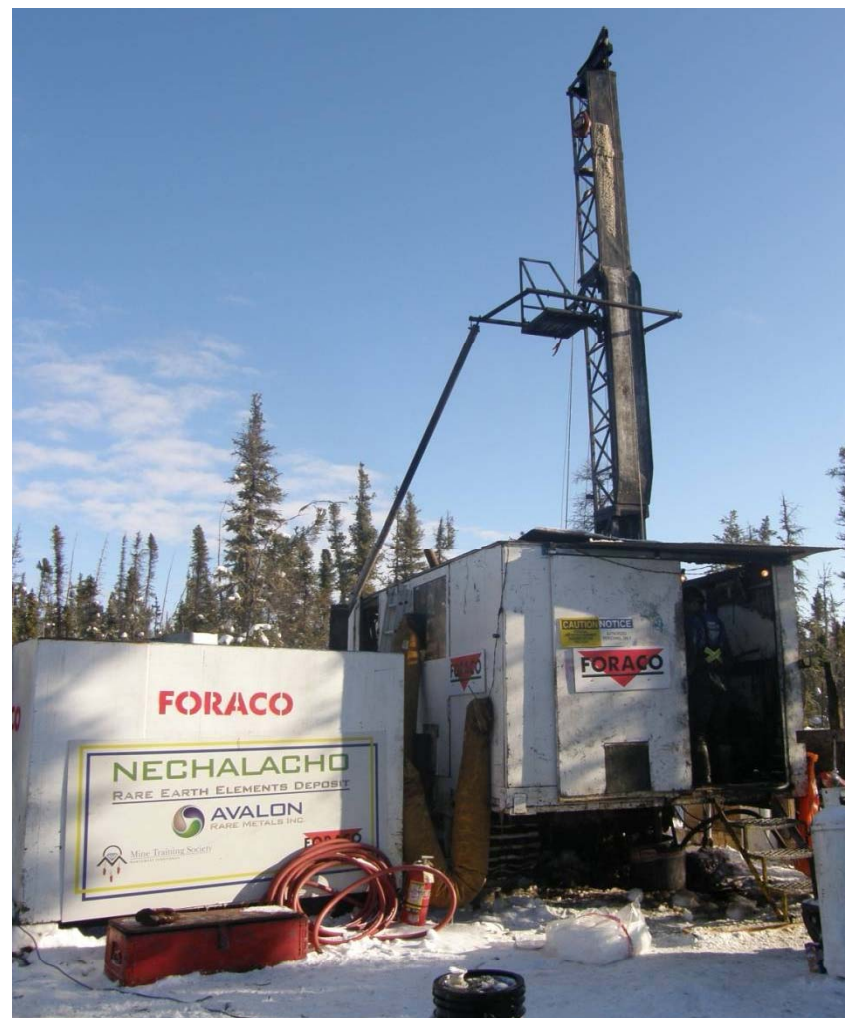
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- Have begun the Permitting Process
- Stantec has completed various site field surveys with aboriginal member assistance:
  - Hydrology & Hydrogeology
  - Aquatics & Fisheries
- EBA Engineering has begun field surveys at Nechalacho & Pine Point:
  - Vegetation & Wildlife surveys
  - Pine Point baseline work



# 2010 Drill Activities

- Winter program completed
  - 43 drill holes, 11,398 metres completed
- Objective #1: Increase Indicated Resources & Grade
  - New high grade surface zone
  - An adjacent zone in West Long Lake
- Objective #2: geotechnical drilling.
  - Five drill holes in proposed tailings managment site



# Community Engagement

- Community meetings
- Site visits
- Aboriginal Training
  - First Aid, Driller Helper
- Employment at site
  - 40% Aboriginal
- Business development
  - Major contractors with Aboriginal ownership
  - Contracts for ice road haulage, airstrip
  - Wind power evaluation





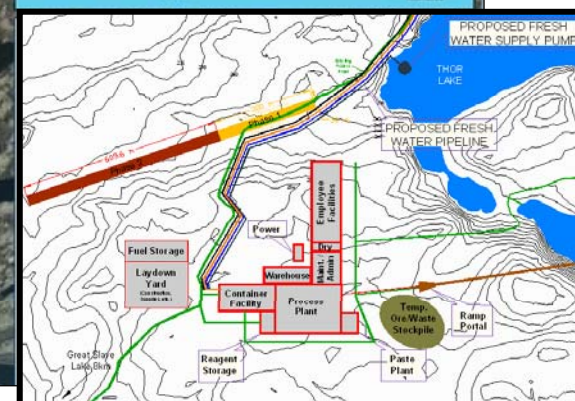
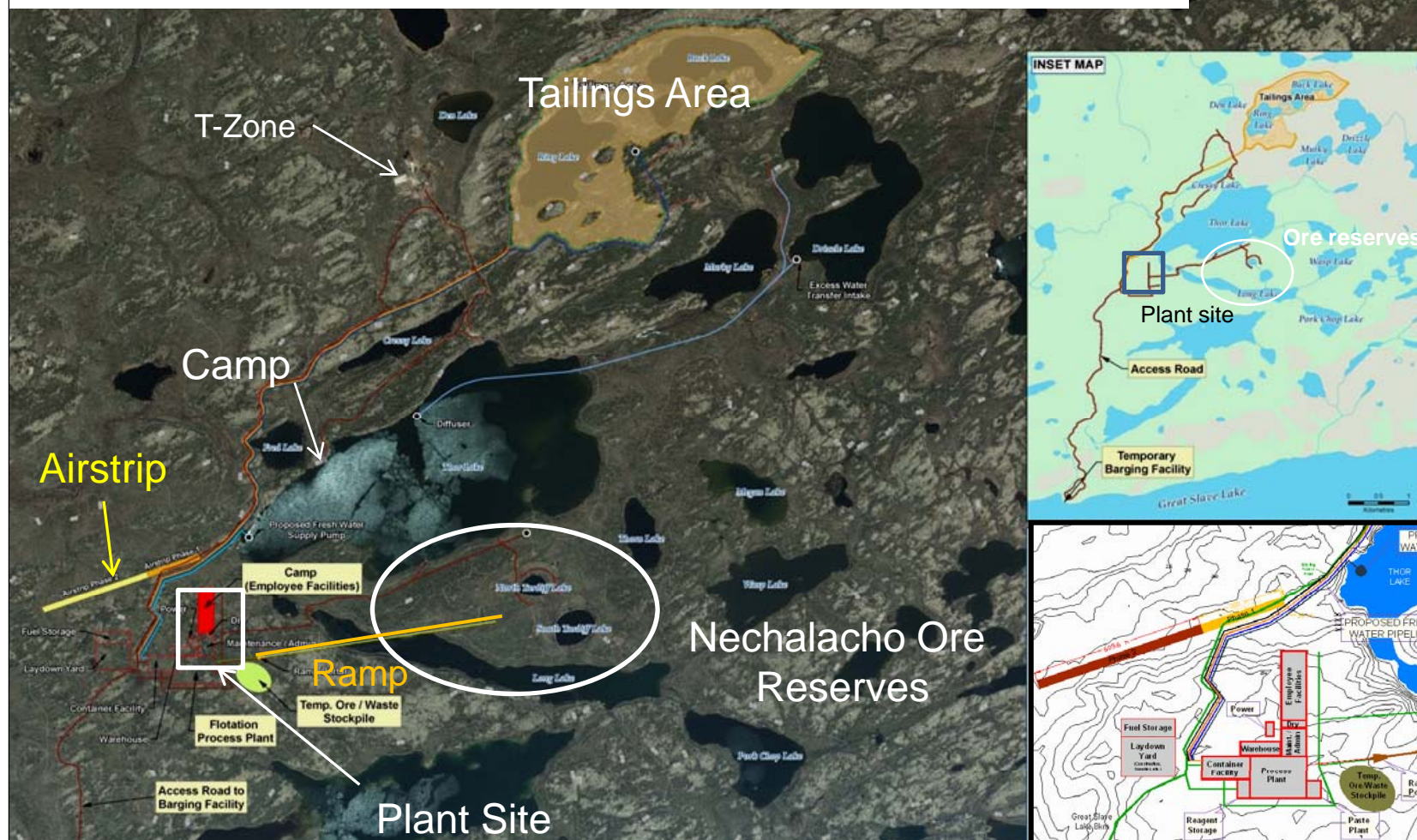
## NECHALACHO, THOR LAKE

### *Project Description*



# Proposed Nechalacho Site Plan

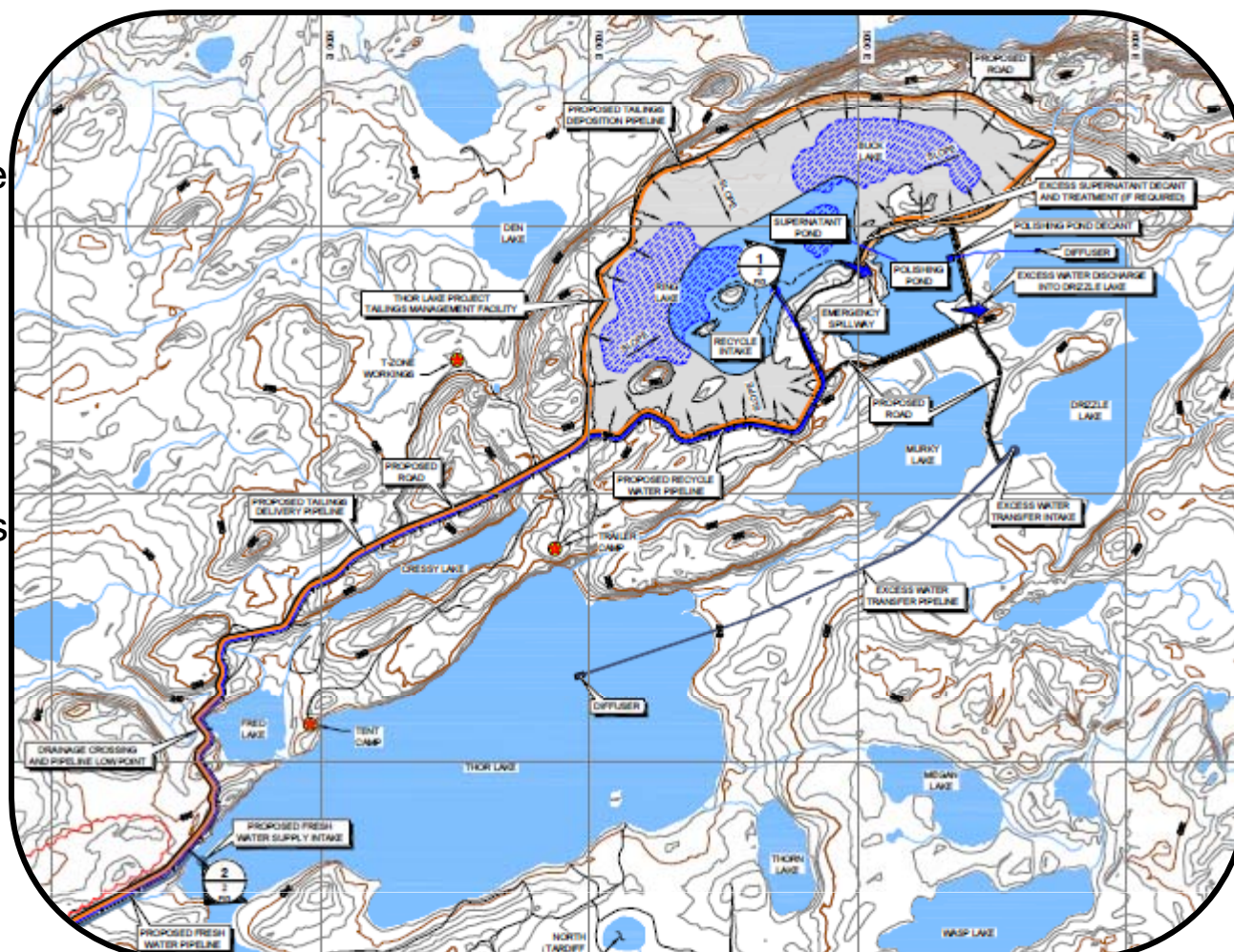
- Area of TMF = 115 ha, Area of Airstrip = 3 ha, Area of Mine = 20 ha





# Tailings Management Facility

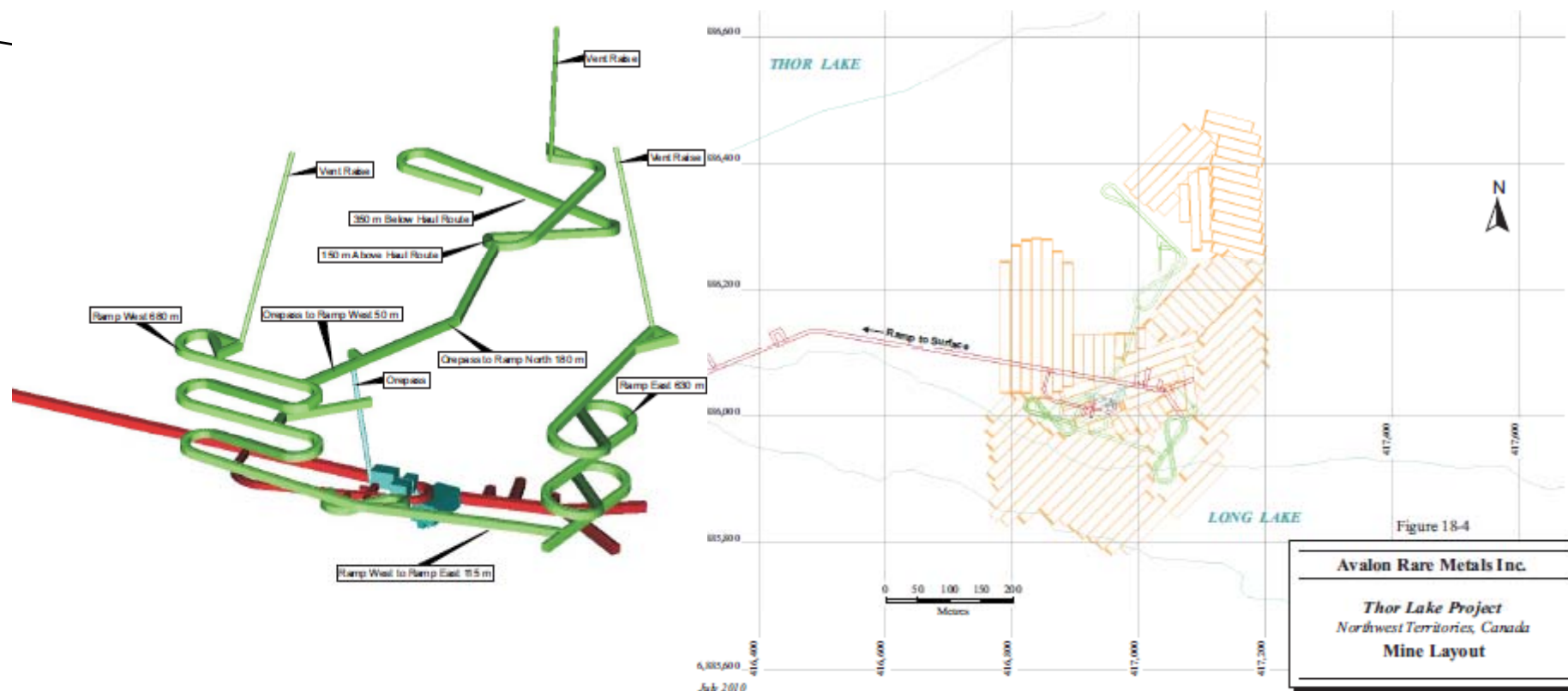
- Ring & Buck Lake
  - Natural Topo allows less fill
  - Accommodate mine life
  - Non-fish bearing
  - Drainage design ideal
  - Discharge to Drizzle Lake - non-fish bearing
  - Natural drainage to Murky then Thor Lake
  - Tailings inert & water flows will meet conditions
  - Closed loop design
  - Room for Expansion
- Fresh water supply - TL
- Alternative: Cressy Lake
  - Required 3x fill
  - 8 year life before alt.
  - Limited recycle
  - Could not close loop



# Nechalacho REE Deposit Conceptual Development Plan



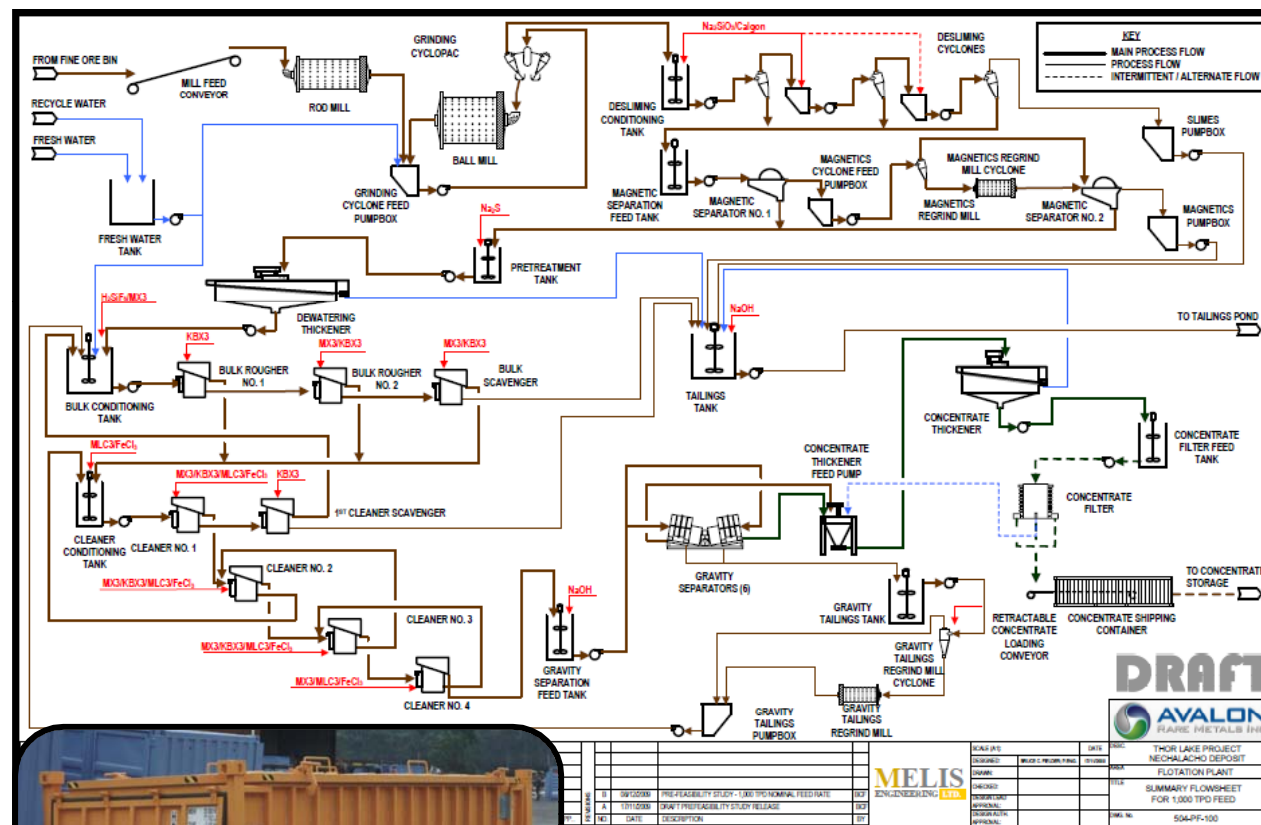
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- Mining underground room & pillar/long-hole stoping
  - Mining rate @ 2,000 tpd by year four
- Development drifts 5x5 m with mined stopes at 10x30 m

# Nechalacho Flotation Plant

- Mining @ 2,000 tpd
  - 1,640 tpd waste
    - 820 tpd tailings
    - 820 tpd paste fill
  - 360 tpd concentrate
- Concentrates loaded into 40 t sealed containers
- Stored at intermediate site for summer barging



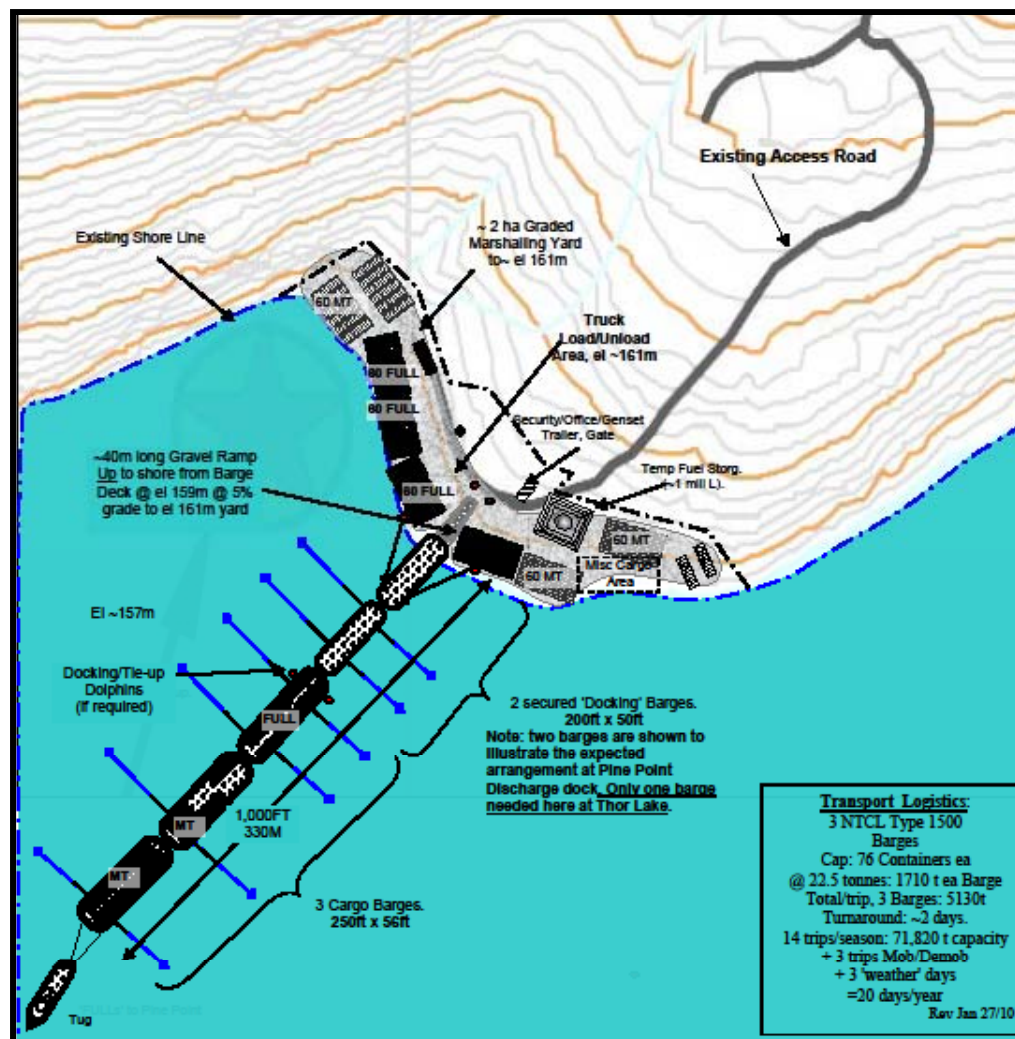


# Nechalacho Seasonal Barge Dock



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- Utilize existing road
- Marshalling yard ~2 ha composed of gravel
- 1 docked barge @ Thor & 2 @ Pine Point
- 1 Barge holds 38 containers for 1,710 tonnes
  - 78 barge trips required
  - 3 barges/tug
  - 2 tugs operating
  - 2 day cycle time
  - ~60 days to complete all shipments





# Nechalacho & Hydromet Project Location



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TSX:AVL OTCQX:AVARF

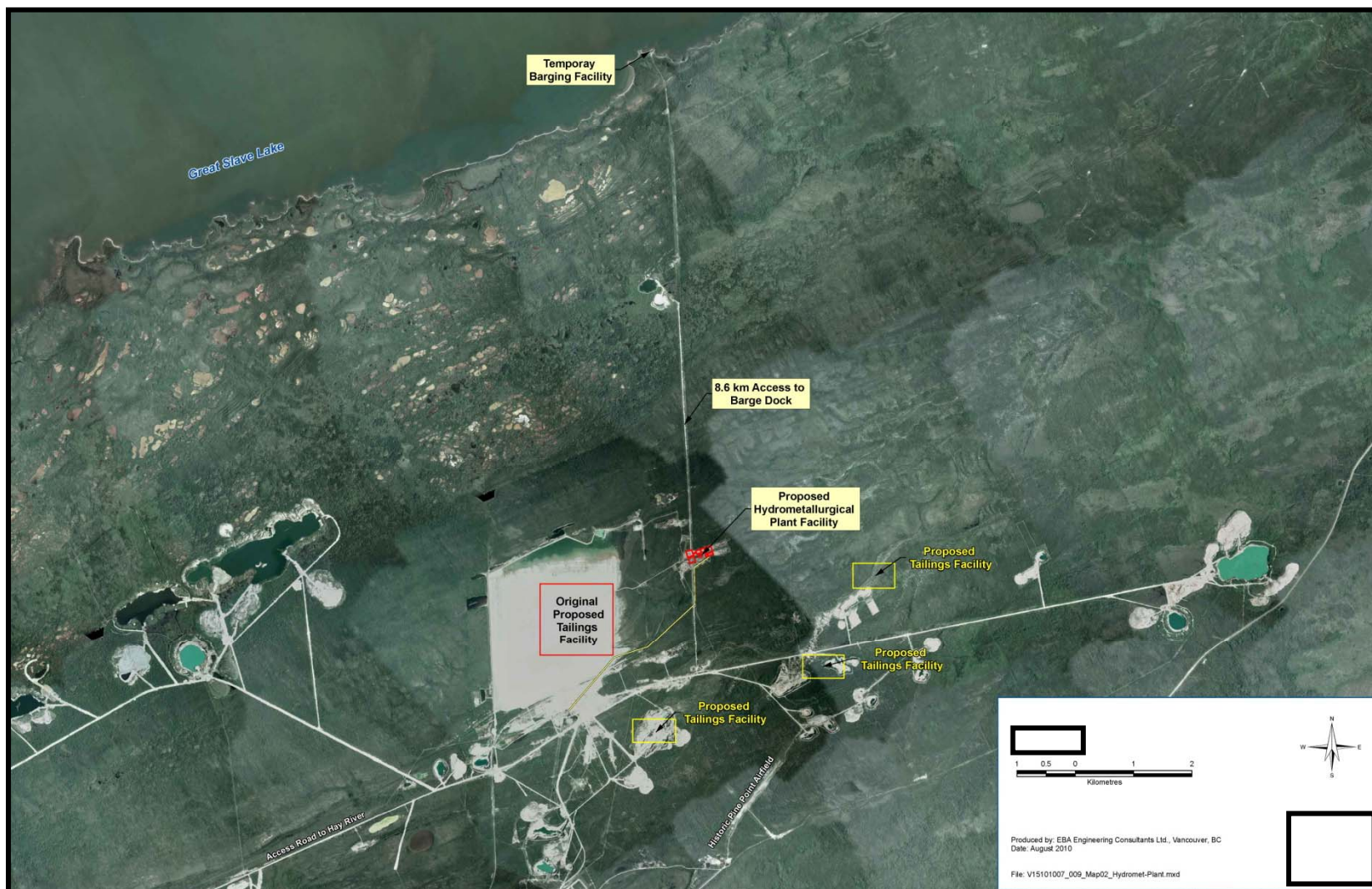




# Proposed Hydrometallurgical Plant Site



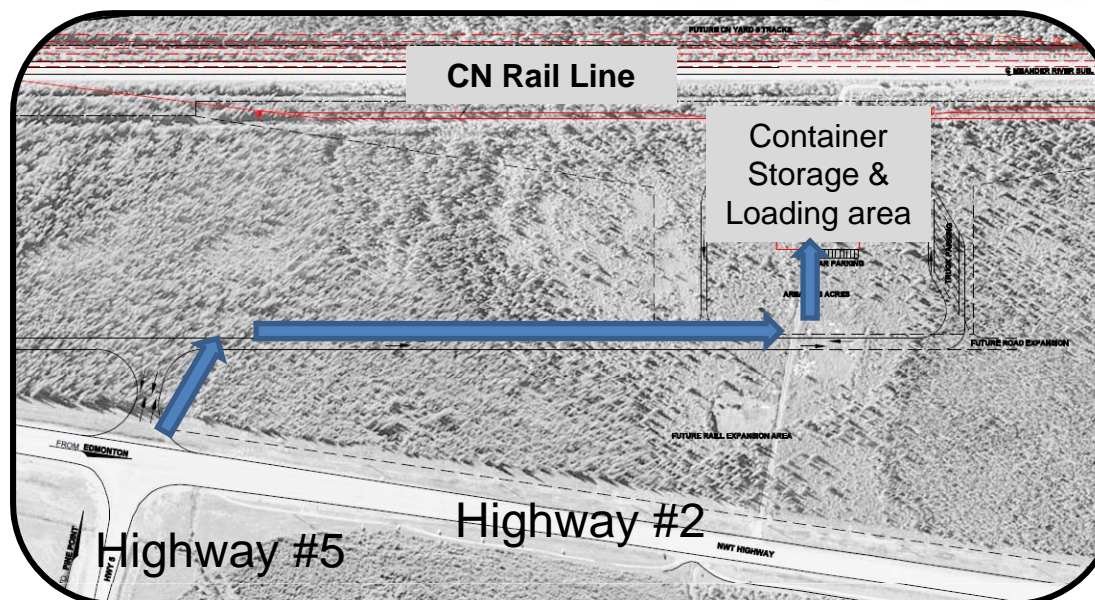
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# HydroMet Rare Metal Product Transport

- 85 km transport from HydroMet to Hay River Railhead
- Product will be shipped in sealed plastic drums/containers
- At 160 tpd, shipping would most likely occur once or twice per week depending on market demand
- 1,120 tpw or 28 (40mt) truck trips per week or 4 per day on backhaul of reagents
- Transfer containers to rail cars and ship to downstream users



Steel drum  
Lutetium Oxide



Double wrapped, drum  
then heavy black plastic  
then transparent plastic



## NECHALACHO, THOR LAKE

### *Project Logistics*

# Transportation & Supply Chain

## • Thor Lake Site:

- Out - 131,400 mt
- In - 4,025 mt reagents

## • HydroMet Plant:

- Out - 56,160 mt
- In - 566,400 mt reagents

## • Thor Lake Logistics:

- Barge sealed containers to Pine Point or Hay River
- Ice road as alternative
- Air support as alternative

## • HydroMet Plant Logistics:

- Trucking via all-season hwy.
- Rail to/from Hay River transload facility



# Power Requirements

## MINE

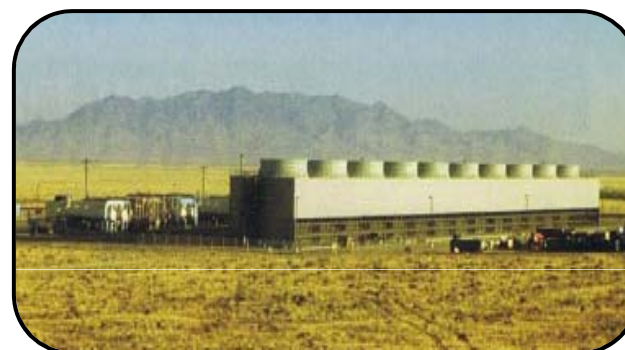
- Primary energy consumption is crushing and grinding
- 8.4 MW required

## HYDROMET

- Primary energy consumption is general plant and heat
- Start-up of 7.4 MW
- High Heat requires 19.9 MW current low-cost replacement is coal

## Potential replacement power source:

- Geothermal - captures hot fluids beneath the earth's surface to heat secondary fluid which vaporizes to operate power turbines.
  - Clean and safe for environment
  - Reliable and continuous power
  - Not effected by weather
  - Low cost and highly efficient





## NECHALACHO, THOR LAKE

### *Future Activities*

# Planned Drilling

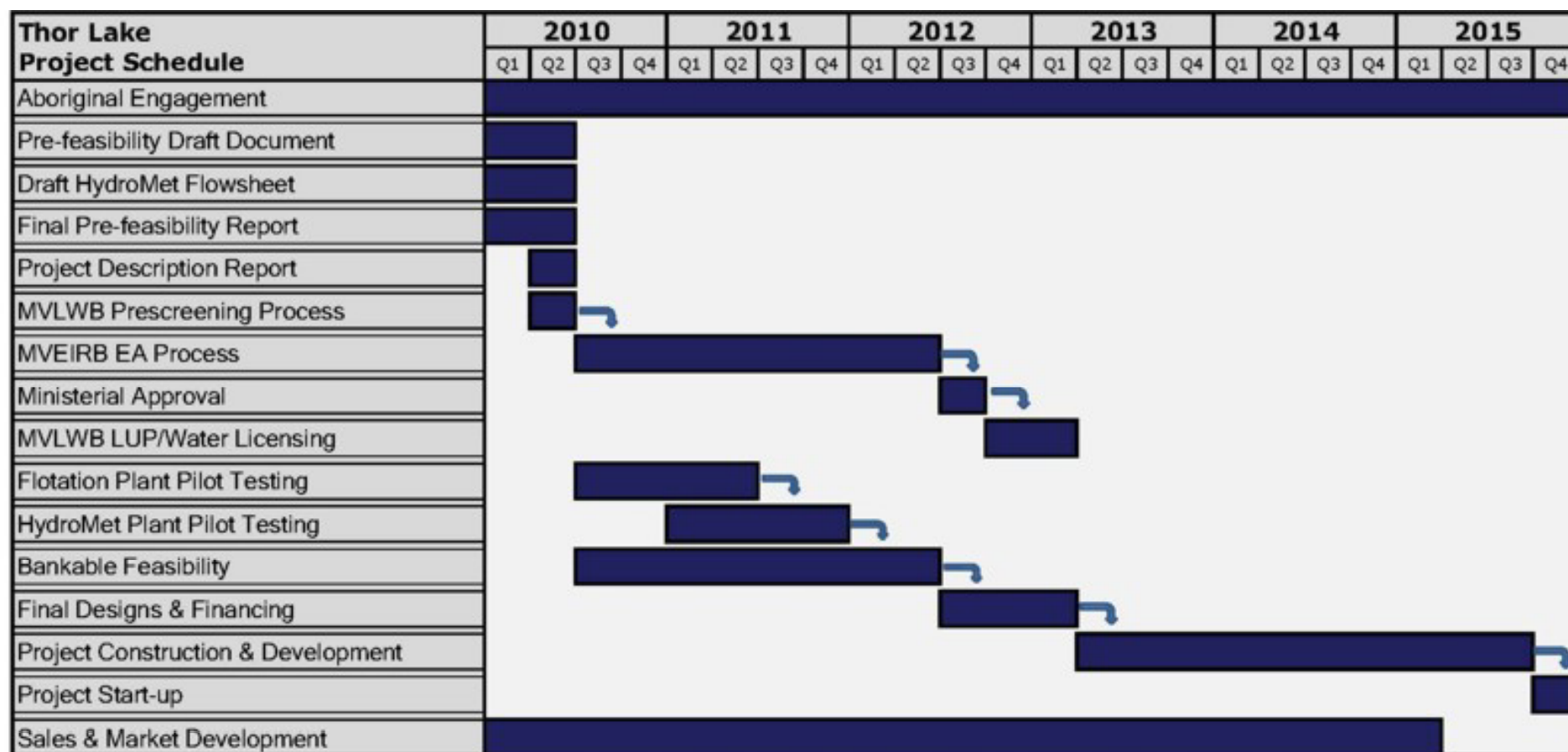
- Summer program planned
  - 40 drill holes, 10,000 metres
  - 3,000 metres PQ & 7,000 metres HQ
- PQ drilling
  - Objective #1: Upgrade Indicated to Measured Resources with 25m spaced holes
  - Objective #2: Large diameter for geotechnical and metallurgical purposes. Contingency for requirement of larger pilot plant in future.
- HQ drilling
  - Main objective: increased grade of indicated Resources, mainly west Long Lake
  - Condemnation drilling (3 holes: already completed)
- Future drilling (2010-2011 winter)
  - Planning to drill continuously, if possible, in order to complete Measured Resources and acquire ~ 20 tonnes for metallurgical pilot testing



# Future Activities

- Agreements with Participating First Nations
- Negotiation of Project Incentives with GNWT & INAC
- Agreements with key Contractors & Suppliers
- Re-model deposit including 2010 drill results
- Modify underground mine plan
- Flotation & HydroMet plant engineering & procurement
- Agreements with Construction & Management group
- Feasibility of alternative HydroMet location
- Geothermal & Biomass replacement power/heat
- Sales & Marketing agreements

# Schedule to Production in 2015





## NECHALACHO, THOR LAKE

*Environment & Mitigation*



# Environmental Baseline Work

- Initial environmental baseline studies conducted in the late 1980's by the Saskatchewan Research Council
- Further baseline studies conducted by Golder for Highwood in the late 1990's
- Updated environmental baseline studies initiated in 2008 and ongoing for Avalon by Stantec and EBA

# Environmental Baseline Work

## Current Avalon Studies – 2008 to 2010

- Meteorology – Weather Station (since June 2008)
- Hydrology (surface water)
- Hydrogeology (ground water)
- Water Quality
- Soils/Terrain/Permafrost
- Vegetation – ecosystem mapping/rare plants
- Fish and Aquatic Resources
- Wildlife and Wildlife Habitat

# Local and Regional Study Area





# Valued Ecosystem Components

VEC Grouping	VEC's
Air Quality	Air Quality (indicators)
Water Quality	Surface / Groundwater Quality (indicators)
Fish and Aquatic Resources	Fish and Aquatic Invertebrates
Terrestrial Vegetation	Traditional Use Plants / Rare Plants
Wildlife	Moose  Caribou - Barren-ground & Woodland  Black Bear  Fur-bearers  Breeding birds  Raptors  SARA listed Species

# Potential Environmental Interactions

THOR LAKE PROJECT: NECHALACHO MINE & FLOTATION PLANT SITE ENVIRONMENTAL ISSUE MATRIX					
Project Component	Air Quality	Water Quality	Fish	Wildlife	Vegetation
Site Preparation and Construction	✓	✓	✓	✓	✓
Underground Mining	✓	✓			
Mine Rock Storage		✓	✓	✓	✓
Acid Rock Drainage (ARD) if present		✓	✓		
Thor Lake Flotation Plant	✓	✓	✓	✓	✓
Power Generation	✓			✓	✓
Sewage		✓	✓		
Tailings Containment		✓	✓	✓	✓
Water Supply/Water Management		✓	✓		
Solid and Hazardous Waste Management	✓	✓	✓	✓	
Airstrip	✓			✓	✓
Access Roads	✓	✓	✓	✓	✓
Temporary Docking Facility		✓	✓		✓
Seasonal Barge Traffic	✓	✓	✓		

# Potential Environmental Interactions



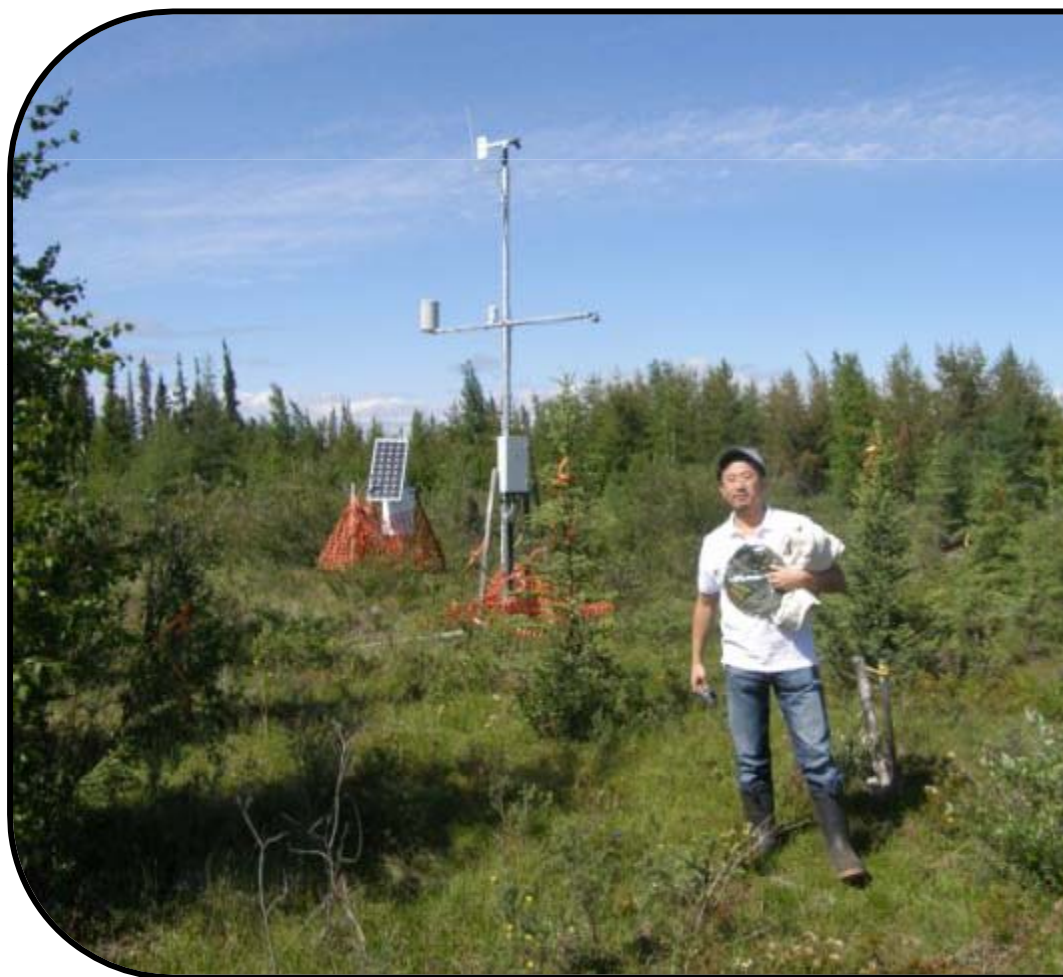
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THOR LAKE PROJECT: HYDROMETALLURGICAL PLANT SITE ENVIRONMENTAL ISSUE MATRIX

Project Component	Air Quality	Water Quality	Fish	Wildlife	Vegetation
Site Preparation and Construction	✓			✓	✓
Hydrometallurgical Plant	✓	✓	✓	✓	✓
Power Generation (back up)	✓			✓	✓
Sewage		✓			
Tailings Containment		✓	✓	✓	
Water Supply/Water Management		✓			
Solid and Hazardous Waste Management	✓			✓	
Haul Road and Site Access Roads	✓	✓		✓	✓
Dock Facility		✓	✓		✓



# Air Quality



# Air Quality

Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Temporary localized dust generation from clearing /surface construction activities	Dust suppression GNWT Guideline for Dust Suppression
Underground Mining	Limited air emissions CO, SO <sub>2</sub> and NOx, particulates	GNWT, WCB standards for mine air quality
Processing & Power Generation	air emissions CO, SO <sub>2</sub> and NOx, negligible particulate emissions	Guideline for Ambient Air Quality Standards in the Northwest Territories
Other Infrastructure (e.g. access road, airstrip)	Temporary localized dust generation	GNWT Guideline for Dust Suppression



# Water Quality



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# Water Quality

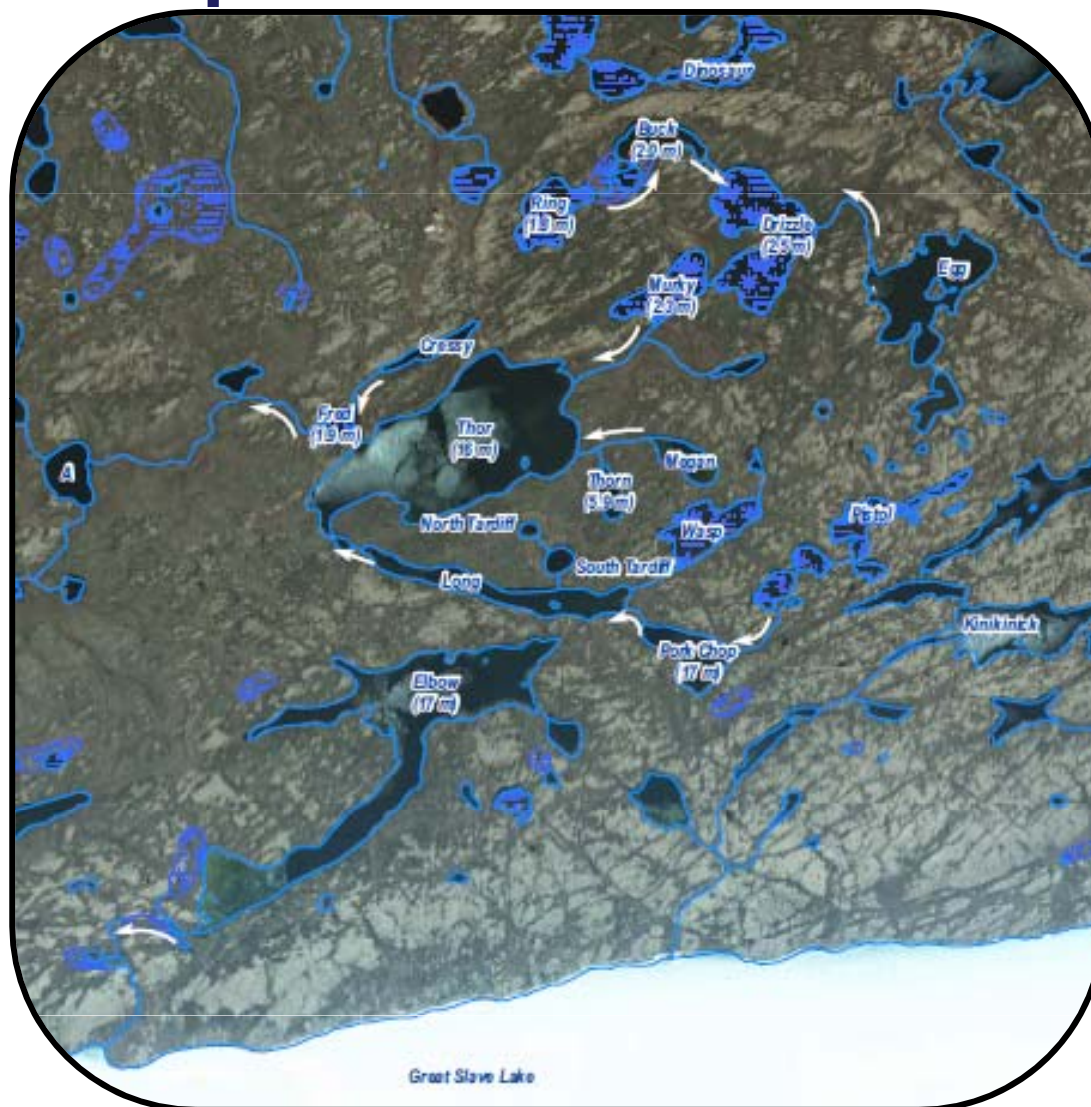
Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Localized sedimentation	Silt barriers and runoff retention basins as necessary during construction activities
Underground Mining	Discharged mine water	Mine water used in process plant or directed to engineered tailings containment facility
Processed Waste Storage	Suspended solids or metal concentrations	Tailings retention/polishing at both project sites. Compliance with MVLWB and MMER criteria
Sewage	Nutrients and bacteria to groundwater	Treatment using packaged RBC plants at both project sites
Water Consumption	Process water sourced from Thor Lake for mine and groundwater for hydromet plant	Excess water directed to engineered tailings containment facilities at both project sites
Hazardous Materials	Impacts on water quality	Management Plan(s) covering the transportation, use, disposal, and emergency response

# Fish and Aquatic Resources





# Fish and Aquatic Resources





# Fish and Aquatic Resources

Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Localized sedimentation	Silt barriers and runoff retention basins as necessary during construction activities
Underground Mining	Discharged mine water	Mine water used in process plant or directed to engineered tailings containment facility
Processed Waste Storage	Suspended solids or metal concentrations	Use of non fish bearing water bodies for tailings containment  Use of non-fish bearing water bodies for tailings containment  Tailings retention/polishing at both project sites. Compliance with MVLWB and MMER criteria
Sewage	Nutrients and bacteria to groundwater	Treatment using packaged RBC plants at both project sites.
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# Vegetation





# Vegetation

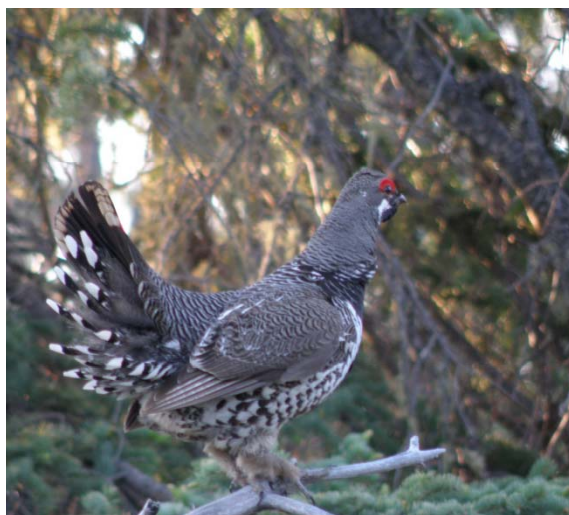




# Vegetation

Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Minor loss of vegetation; potential loss of rare plant habitat, dust generation	<p>Minimize footprint - maximize use of existing disturbed terrain (e.g. at hydromet plant and associated tailings containment facility)</p> <p>Minimize off-site activities. salvage mineral topsoil; implement erosion control measures</p> <p>Avoid development on rare ecosystem types</p> <p>Use of dust suppressants</p>
Operations	<p>Compaction of mineral soil,</p> <p>Air emissions, dust generation</p>	<p>Disposal of all hazardous wastes in approved manner</p> <p>Conformance with Guideline for Ambient Air Quality Standards in the Northwest Territories</p> <p>Use of dust suppressants</p> <p>Progressive site reclamation</p>

# Wildlife



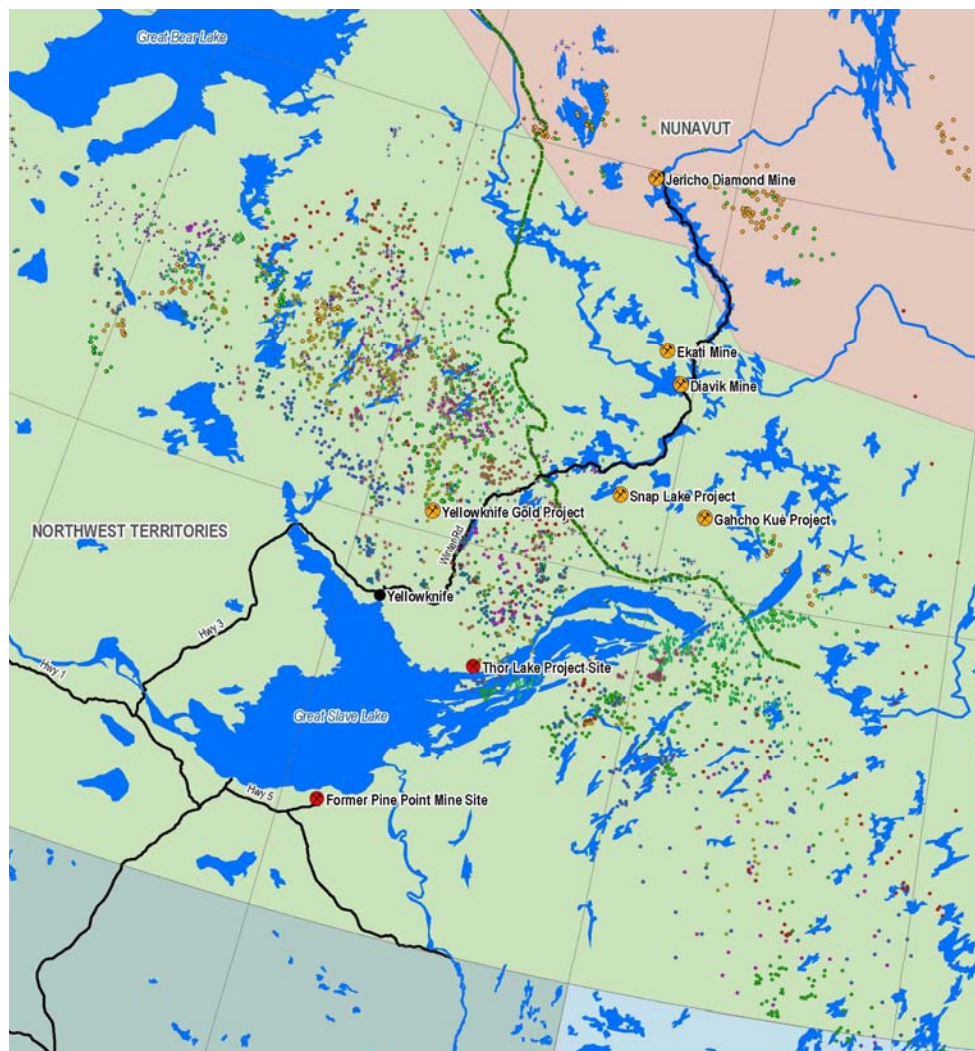


# Barren-ground Caribou – Winter Range

- Satellite Collared Caribou 1996-2009



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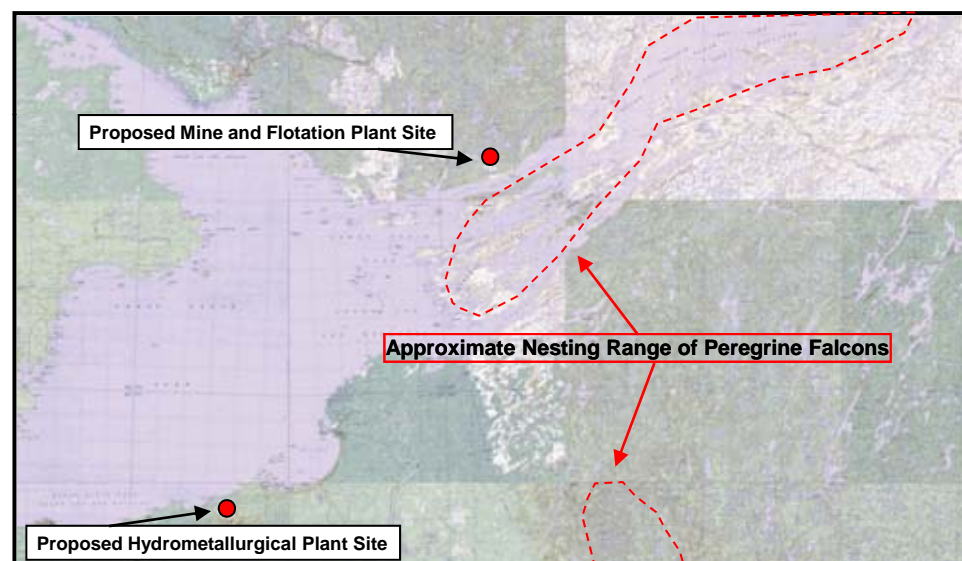
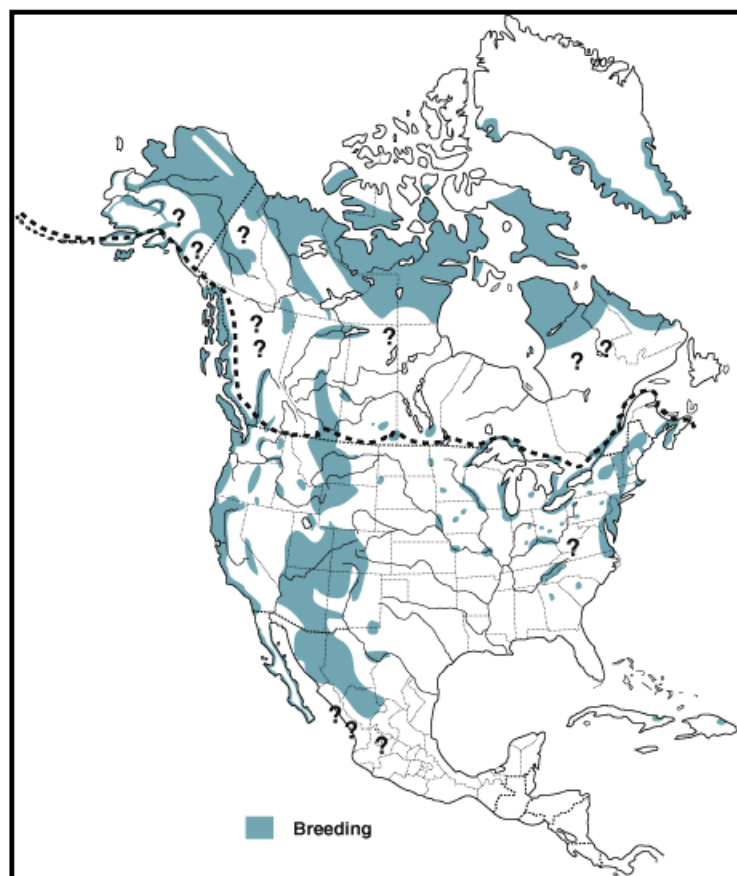




## Wildlife: Woodland Caribou

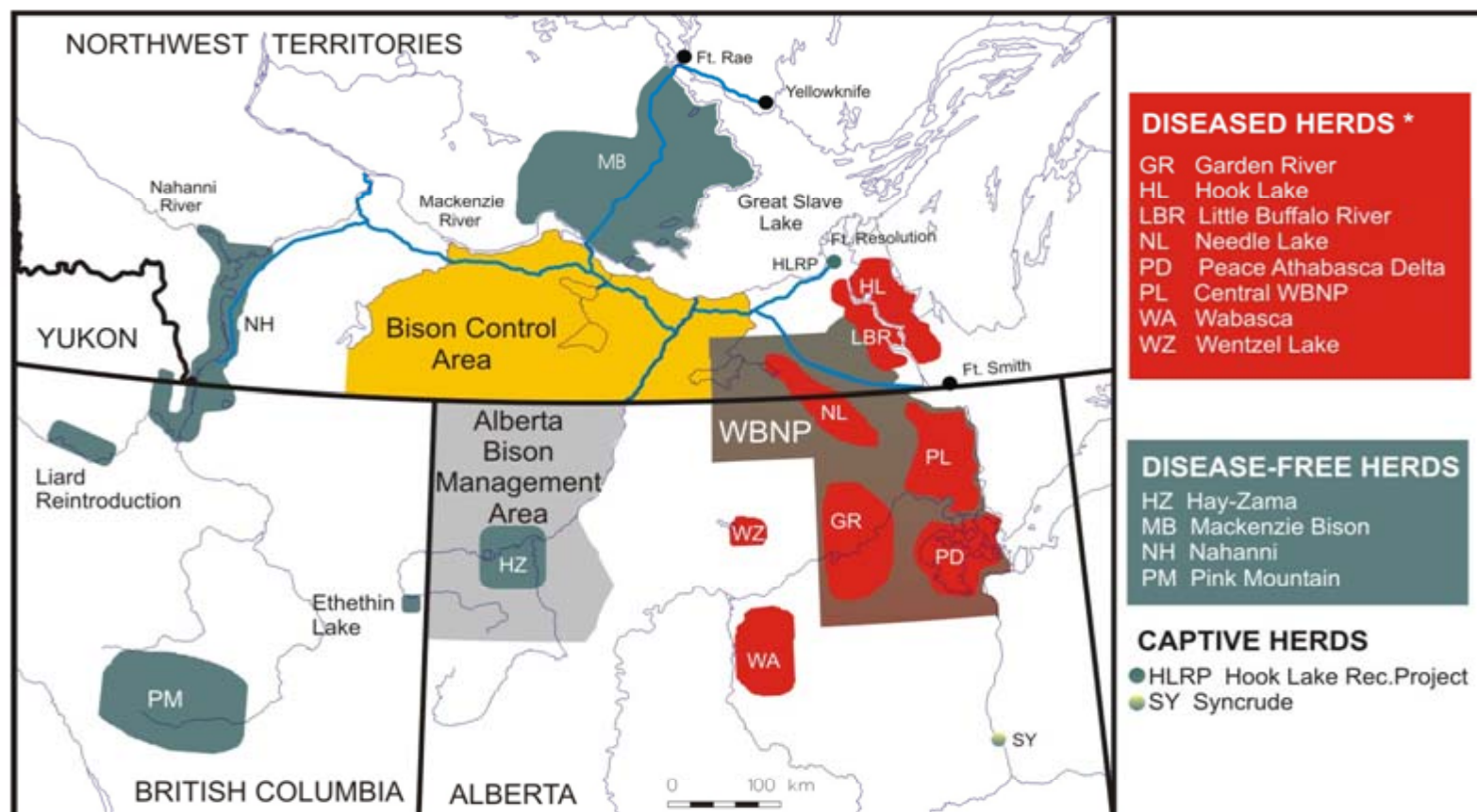
- Woodland Caribou occur in low numbers in Hydromet Plant area year-round
- Calve in upland wooded areas - not present in Project area

# Wildlife: Peregrine Falcon



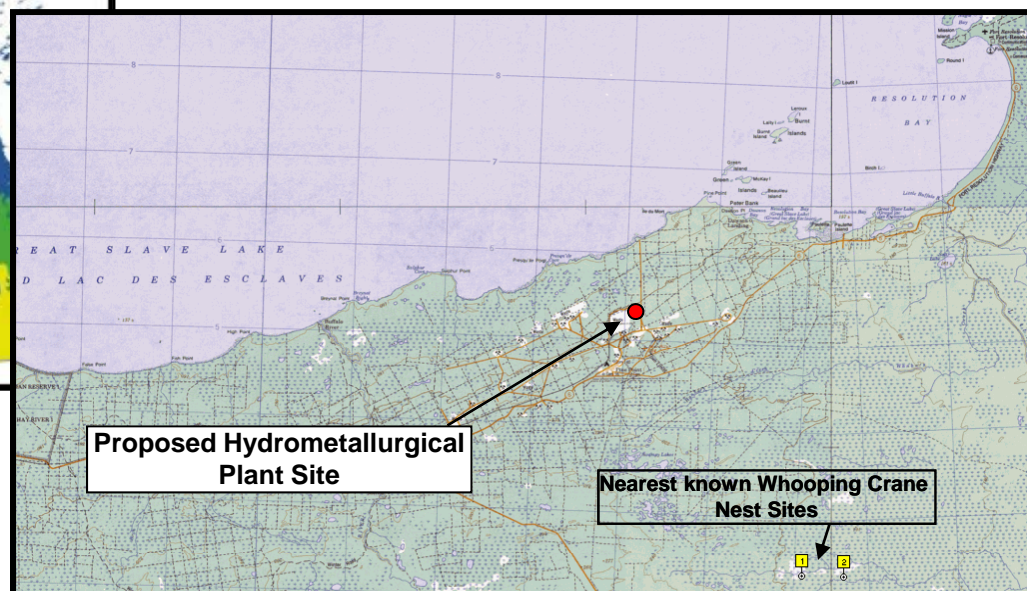
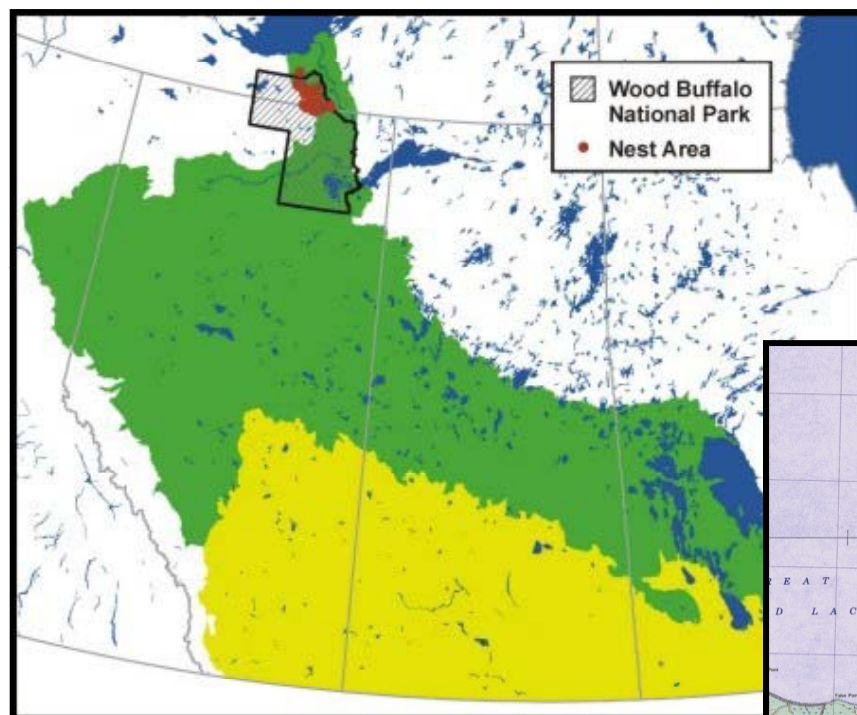
# Wildlife: Wood Bison

## Project Located in Bison Control Area





# Wildlife: Whooping Crane



# Wildlife



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Project Component	Potential Impact	Mitigation
Site Preparation and Construction	Disturbance and removal of wildlife habitat	Minimize footprint, maximize use of existing disturbed terrain, avoid sensitive areas
Plant Site	Disturbance and removal of wildlife habitat	Minimize footprint, maximize use of existing disturbed terrain, avoid sensitive areas
Underground Mining	No impacts anticipated	None required
Process Wastes	Potential hazard to local wildlife	Process wastes contained in engineered tailings containment facilities to be reclaimed in accordance with Avalon reclamation plan and regulatory requirements
Solid Waste and Hazardous Waste	Some solid wastes can attract wildlife, which can become a safety hazard	Combustible wastes incinerated - Hazardous wastes stored & disposed of in approved manner
Other Infrastructure	Temporary, reversible disturbance	Application of wildlife protection measures - wildlife have the right-of-way

# Current Environmental Management Activities – Spill Response Training



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# Current Environmental Management Activities – Drill Site Reclamation



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August 2010



July 2009

# Summary of Anticipated Environmental Effects

Avalon is confident that with the application of:

- sound engineering environmental planning and best management practices, and,
  - compliance with anticipated permits, licenses, approvals, existing federal and territorial environmental regulations and guidelines,
- that the environmental issues associated with the development and operation of the Thor Lake Project can be effectively addressed and managed.
- Avalon's goals for closure and reclamation will be consistent with INAC's guidelines for closure and reclamation planning for mines as well as the requirements of the anticipated Land Use Permit.



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