

# POLARIS MINE

### CLOSURE and RECLAMATION



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## **Presentation Agenda**

- Introduction
- Mine Site Components
- Site Reclamation

### LOCATION

- Approximately 100 km northwest of Resolute Bay, Nunavut
- 75°N & 97°W
- Flying time from Yellowknife approx. 2 hrs by 737





### MINERALIZATION

- ORE
  - Galena (lead sulphide)
  - Sphalerite (zinc sulphide)
- Host Rock
  - Limestone
- Important Characteristics of Ore Body
  - Non-Acid Generating
  - Enclosed Within Continuous Permafrost

### WEATHER CONDITIONS

- Mean annual air temperature -17°C
- Average Precipitation 250mm of which 200 is snow
- Average of 8 frost free days per year
- Temperatures range from about a high of 15 to a low of -50°C
- Average wind speed of 20 km/hr
- Snow melts starting early June, returns mid August.

### **PHYSICAL SETTING**

- Terrain Very gently rolling hills
- Overburden is a thin mantle over calcareous rocks. Surface material in the area of the mine is classed as a barren gravel
- Vegetation Arctic Tundra in clusters or as a dense mat and is low lying due to the harsh climate, high winds, and shallow soils.

## **HISTORY OF SITE**

- **1960** Discovery of lead-zinc deposit
- 1973 Resource of 25 million tons grading 14% zinc & 4% lead defined
- 1981 Mine started production
- 2002 Ore body exhausted
- 2002 2004 Decommissioning & reclamation
- 2005 2011 Site monitoring.

## MINE SITE COMPONENTS

- Mine Workings
- Processing Facilities / Concentrate Storage
- Deep Sea Dock / Ship Loading
- Tailings Disposal System
- Accommodations Complex
- Fuel Storage / Distribution System
- Landfills
- Freshwater System
- Roads / Other Services

## MINE SITE COMPONENTS

### **Mine Workings**

- Underground
  - 4 portals
  - Raisebore Holes
  - Subsidence Area
- Open Pits
  - North Pit small outcrop mined by open pit
  - LRD Limestone Quarry rock for CRF
  - New Quarry overburden for roads, etc.

## MINE WORKINGS



## PROCESSING FACILITIES



### BARGE CONTAINS

- Concentrator
- Offices
- Warehouse
- Dry

PRODUCT STORAGE BUILDING

#### PROCESSING FACILITIES



### PROCESSING FACILITIES Demolition / Re-Grading



#### **PROCESSING FACILITIES**



#### DEEP SEA DOCK / LOADING FACILITIES



#### DEEP SEA DOCK / LOADING FACILITIES Dock Demolition









### TAILINGS DISPOSAL SYSTEM

- Tailings Lines between Mill & Thickener
- Thickener Building
- Tailings Lines between Thickener and Garrow Lake
- Garrow Dam

## TAILINGS DISPOSAL SYSTEM



#### TAILINGS DISPOSAL SYSTEM Thickener Building Demolition





## TAILINGS DISPOSAL SYSTEM

#### Decommissioning of Garrow Lake Dam



#### ACCOMMODATIONS



#### ACCOMMODATIONS Accommodation Building Demolition





## FUEL STORAGE



#### FUEL STORAGE Tank Farm Demolition





#### LANDFILLS



#### LANDFILLS Capping Nearing Completion



## FRESH WATER SYSTEM









## SITE RECLAMATION

### CLOSURE PLAN ESTABLISHED CONSIDERING:

- Requirements in Water Licence and Land Leases
- NWT Reclamation Policy
- Corporate Environmental Policy Guide
- Feed-back from Consultants, Regulators
  & Local Communities

## SITE RECLAMATION

#### **OBJECTIVES OF CLOSURE PLAN**

- To provide a working document that addresses the concerns and requirements of the stakeholders
- Reclaim the site to a condition that health & safety of the public and the environment are protected.
- Reclamation to minimize or eliminate long term maintenance and monitoring.
- To return the site to an aesthetically acceptable condition.

## SITE RECLAMATION

#### LIMITATIONS OF TK

- Area not highly used for hunting so interest in area limited
- Nearest resident population not indigenous to area so knowledge is based on recent history
- Issues from local community were primarily economic rather than environmental or hunting issues.

## DETERMINING RECLAMATION STANDARDS

## SITE SPECIFIC STANDARDS

- Soils quality standards based on southern conditions that were not applicable to the north.
- Used risk based standards based on local knowledge of site usage
- Weather / Climate conditions were key in developing strategies

## **OTHER LIMITATIONS**

### SCIENTIFIC

- Limited baseline studies from before mine built
- Uncertainty of Global warming
- REGULATORY
  - Changing regulatory jurisdiction
  - Changing environmental standards
  - Changing bonding standards

## **BIGGEST CHALLENGES**

**FINANCIAL** 

Costs in the far north are extremely high.

#### REGULATORY

 Due to climate and costs, there are tight time frames for completing work. Decisions generally require Board approval rather than staff approvals for even simple changes which creates delays.

#### WEATHER

 Transportation costs and transportation delays were one of the most significant challenges.

#### SKILLS

 Local manpower was generally less skilled than would utilize in a southern project. For short duration work having to train on the job is a significant deterrent to local hire.

#### **TEMPORARY ACCOMMODATIONS**



## AUGUST 25, 2004 – ALMOST DONE!

ATTACK CONTRACTOR

