## Introduction to the Selbaie Mine Reclamation and Role of the Pit

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### Selbaie History

Remote location, part of James Bay municipality, Producer of copper (~24 % Cu, 9% Zn, 1.5 % Pb) and zinc concentrates (~55% Zn, ~1.2% Cu and ~1.1 % Pb)

- 1978-81 Development by HBO&G
- 1985 BP, Esso, TCP partnership
- 1989 Billiton acquires Esso share
- 1992 Billiton acquires 100%
- 1994 Gencor acquires Billiton building East Waste Pile
- 1996 building West Low Grade Pile
- 2001 BHP Billiton merger
- December 2001, closure of pit operation, processing of stockpiles
- 2004 January Operations ceased Start reclamation program
- 2006 Completion of Reclamation program



#### Selbaie Reclamation Programme

#### **Strategy to minimize sources of ARD that require treatment:**

- o Prevent ARD from tailings,
- o Eliminate other ARD sources
- o Single source of ARD from the mine waste rock pile

#### Plan Elements:

- o Waste Rock and tailings pond Cover: stabilize and vegetate
- o Cleanup of ARD spills during operations (East and West)
- o Excavation of ARD waste, site vegetation
- o Ditching, ARD collection, buried drain and pump stations
- o Lime treatment plant
- o Treatment of hydrocarbon contaminated soils
- o Environmental monitoring



## Removed **nearly 2 million** m<sup>3</sup> of metal-contaminated soil



#### Soil Risk Analysis





# Biopile dimensions 235 x 62 x 2.5 meters, with total bulk volume of 35,000 m3 filled to capacity



#### Treatment Process : Ex Situ Biopile







## Role of pit

- Deposition of tailings from Sept 2001 to closure in Jan 2004 of operation
- Deposition of East/West peat excavations, low grade contaminated rock & soils
- Clarify treated water, sludge storage
- Sludge storage capacity greater than 100 years



#### Summer 2005 – Questions Remained on Pit Lake

- Rate of pit water filling and year/season it begins to overflow
- Pit water quality limits for discharge met except for Zinc --Zinc limit 0.5 mg/L vs 10 mg/L--
- Waste materials effect on zinc levels as pit fills (lake pH less than 8)
- Ability to achieve zinc levels through effluent from Water Treatment Plant alone to gradually raise pH
- Surface and groundwater inputs of dissolved zinc and compliance risk



Studies and measures initiated to remediate pit lake water and understand future behaviour

- Pit lake hydrology (SNCL)
- Defining source terms (Ecometrix)
- Pit lake model (Lorax)
- In-situ treatment of pit lake (Enviraube and SNCL)



#### Following presentations

- Ron Nicholson, Ecometrix
  - characterization of the contaminated soil and peat placed in the pit, and potential effect on pit lake water quality
- David Flather, Lorax
  - pit lake model results based on the information provided by Selbaie, SNCL, Ecometrix and on their own measurements and observations
- Bernie Aubé, Enviraube
  - the effects of the in-situ lime treatment and resulting sampling profiles
- Denis Caron, Selbaie
  - closing discussion on contingency and mitigation plan

