Introduction to the Selbaie Mine Reclamation and Role of the Pit

Bert J Huls and Denis Caron

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La Sarre load out facility

Central Pond at Selbaie

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

Plan Elements:
- Waste Rock and tailings pond Cover: stabilize and vegetate
- Cleanup of ARD spills during operations (East and West)
- Excavation of ARD waste, site vegetation
- Ditching, ARD collection, buried drain and pump stations
- Lime treatment plant
- Treatment of hydrocarbon contaminated soils
- Environmental monitoring
Removed nearly 2 million $\text{m}^3$ of metal-contaminated soil
31,225 m³ of hydrocarbon-contaminated soil have been excavated from:
(a) Camp site (25,000 m³)
(b) Industrial site (6,225 m³)
Biopile dimensions 235 x 62 x 2.5 meters, with total bulk volume of 35,000 m$^3$ filled to capacity.

Area about 120 X 60 m, up to 17 m deep.

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