

Risk Assessment at East Kemptville

Maxine Wiber

BHP-Billiton Base Metals

NOAMI Workshop , Winnipeg

October 26, 2006



Introduction

- Reclamation and Closure – sustainability
- Financial Disclosure and Risk Assessment
- Risk Assessment Process
- East Kemptville example
- Lessons learned

Financial Disclosure considering Risk and Uncertainty

- For public mining companies, accounting for closure liabilities has been impacted by the changes in corporate governance and disclosure rules.
- Because of the long time period and changes during the operating years of a mine, risk and uncertainty associated with closure costs and appropriate provisions can be significant.
- International Accounting Standards 37, para 25 “ the use of estimates is an essential part of the preparation of financial statements and does not undermine their reliability. This is especially true in the case of provisions, which by their nature are more uncertain than most other balance sheet items...an entity will be able to determine a range of possible outcomes and can therefore make an estimate of the obligation that is sufficiently reliable to use in recognising a provision.”

Page 3



bhpbilliton

Process for Risk Assessment in Closure Planning and Cost Estimating

- **Select the risk assessment team**
- **Conduct a site specific risk assessment of the closure plan**
 - Identify risks for each major component of the plan
 - Identify residual risks expected to remain after execution: for these, identify likelihood and possible outcomes, and costs
- **Develop or update closure plan(s) & costs**
 - Identify activities & costs to mitigate key risks to a tolerable level
 - compliance with applicable State/Province and Federal regulations
 - compliance with BHP Billiton HSEC / EWRM Standards / Charter
- **Model the data to generate “Expected “ Cost estimate - includes costs associated with known risks and uncertainty in the revised plan**

Page 4

bhpbilliton

East Kemptville Site Operated 1985-1992



EKM Acid Run-off Collection



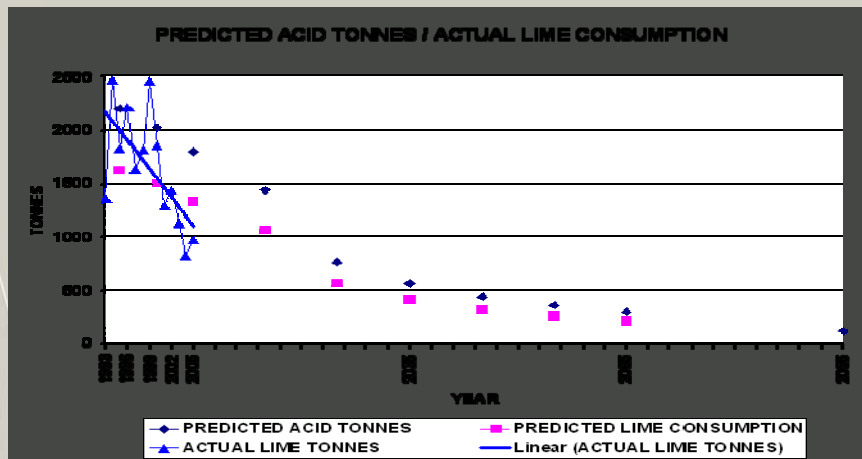
East Kemptville Reclamation Plan

- Address public safety hazards
- Collect and treat acidic run-off from coarse tailings and mine waste rock (70 year treatment period)
- Maintain fine tailings in saturated condition
- Eliminate large pools of acid water (tailings pond, and pit lake)
- Establish sustainable tailings vegetation
- Surface and groundwater monitoring
- Environmental effects monitoring



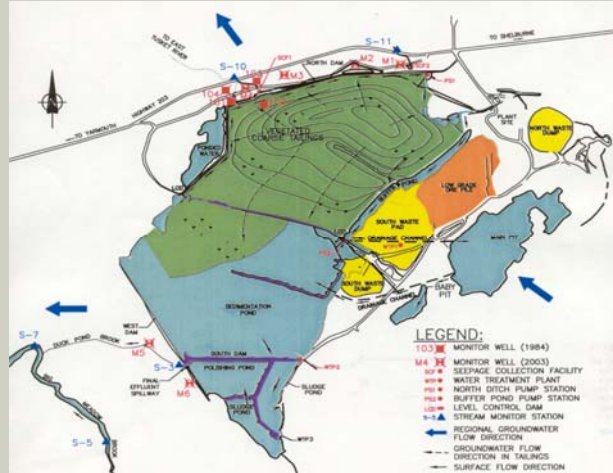
Page 7

East Kemptville Acid Generation/Lime Consumption



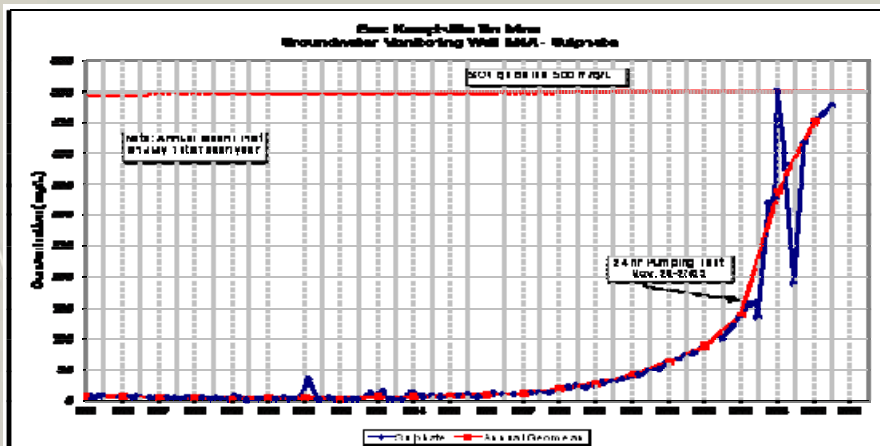
Page 8

Regional Groundwater Flow Patterns (Conceptual, JW 2005)



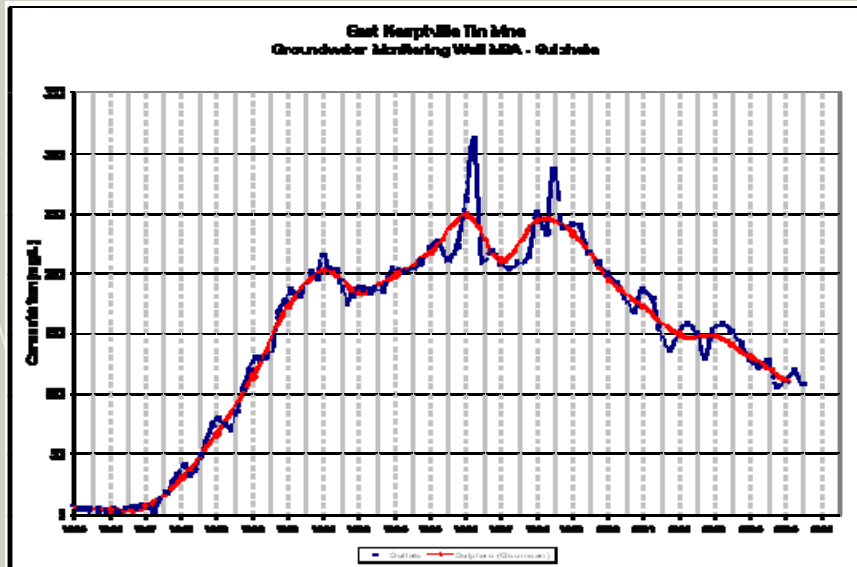
Page 9

Groundwater Monitoring Results Sulphate at M4A



Page 10

Groundwater well M6A - Sulphate



All Sources Sulphate and Zinc

(Jacques Whitford, 2005)

Loading Source	Sulfate		Zinc	
	kg/day	%	g/day	%
Groundwater Plumes	284	3.4	1,755	14.0
West Dam Outfall (S-3)	5,116	60.6	2,223	17.7
Background Surface Water	3,035	36.0	8,580	68.3
Total	8,435		12,558	

kg/day – kilograms per day; g/day – grams per day; % - percent

Groundwater Study Conclusions

(Jacques-Whitford, 2005)

- Effects on East Branch Tusket River predicted to be small to negligible
- GW Plumes contribute estimated:
 - 3.4 % of total SO₄, and
 - 14 % of total Zn loading on River.
- Expect to reach steady state within 30 years from the start of the tailings deposition (by 2015 or sooner)

Page 13



Residual Risks and Likelihood at East Kemptville

Quantitative or subjective decision on likelihood

Residual Risks

- Dam breach – 0.01% (annual basis, from literature)
- Loss of tailings vegetation – 15% *
- Loss of powerline – 35%
- Acidic water overflow from ditch – 40%
- Groundwater effects require controls – 5%

Other major areas of potential variability

- Labour costs
- Lime costs

*Sherman Kent Scale



Page 14



East Kempville Risk Management

Key Risks Identified	Risk Management
Tailings Dam Failure	Routine inspection, refresher training Dam monitoring & maintenance Operating Manual kept current Independent Dam Safety Review every 7 years
Tailings Vegetation cover	Sustainability study underway Annual fertilizer applications Treat bare spots
Acidic water overflow from seepage ponds	Storm water modelling Emergency generators for backup power supply
Groundwater effects	Ground water modelling shows no effects Stream and groundwater monitoring Trends for acid generation and expected water quality
Labour costs	Improve operability Reduce need for intervention
Lime costs	Update predictions and understanding of site water chemistry

Page 15



Lessons learned

- Risk Management process in mine closure provides:
 - rigorous planning tool for future site closure and reclamation
 - risk-informed decision making
 - strong technical basis for plans and costs
 - documentation for review and audit purposes
 - early identification of emerging trends
 - risk reduction at the site

Page 16



Acknowledgements – East Kemptville Players

Michele Wamboldt, EKM Reclamation Manager
Paul Muise, Environmental Coordinator and Gerry Deveau, Operator
David MacFarlane and John Brown, Jacques Whitford
Cynthia Russel, Minnow Environmental
Les MacPhie, and Daniel Damov, SNC-Lavalin
Brian Lewis, Original Plan designer (assisted by SENES and SNC-L)



Page 17

