Mine remediation in New Zealand
Lessons from the (recent) past

Jenny Webster-Brown

Tui Mine, Te Anoha
1884-1890s
1967-1973
Abandoned site
Rehabilitation
2011-2013

Golden Cross, Waitakauri
1892-1917
1992-1998
Planned rehabilitation
1998-2003

Tui Mine

Golden Cross, Waitakauri

Tui mine adit drainage:
• Reporting to Tunakohoia Stream
• Copious Fe oxide
• Neutral pH
• High Zn and Cd.

Tui mine tailing drainage:
• Reporting to Tui Stream
• Copious Fe oxide
• Low pH
• High Cu, Pb, Zn & Cd

1987 2007

2007:
Load kg/yr
Fe  91
Mn 527
Cu  78
Pb 34
Zn 7300
Cd  43
As  0.5

Sarah Harvey
2003
Rem Sharplin
2008
Remediation
2011-2013

Phase 1: lime & plug adits ($6.5m)

Phase 2: Stabilise and revegetate tailings dam ($15.2m)

Recent (2014/15) sediment sampling of Tui and Tunakohoia catchments

Changes in mine drainage geochemistry?

TUI STREAM - Sediment quality

TUNAKOHOIA RIVER - Sediment quality

Golden Cross
A carefully planned site rehabilitation ...

- Diversion drains
- Controlled placement of acid-generating rocks
- Placement of sealing rocks (primary control layer – 1m thick)


2002/3:
Failing to meet site specific WQ criteria for;
Mn & ANZECC WQ guidelines for other metals

So ... WTP still operational, 12 yrs after mine closure!
Treating neutral pH mine drainage with high:
- Mn (16,000-20,000 µg/L)
- Zn (58-200 µg/L), and other metals

Potential demonstrated for native wetland plants to bioaccumulate Mn, and trap Fe oxide ... But did not take up Zn

Kieran Whelan 2007

Conclusion:
- Two mines closed within 25yrs of each other, but with very different rehabilitation approaches.
- Lack of rehabilitation has led to serious, long term sediment contamination at Tui ... particularly Mn, Cd and Zn
- Similar contamination of stream sediment would result from Golden Cross (Mn, Zn, As) but for ongoing WTP operation
- Need to identify these potential geochemical legacy issues before mining, and design an effective rehabilitation plan (or not mine).

Mine Environment Life Cycle Guide
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