

# Sludge Impact on the Stabilization of the Fire Road Mine in New Brunswick<sup>1</sup>

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The approximately 120 ha backfilled coal mine cut, located near Fredericton, New Brunswick, Canada, has been a source of acid rock drainage since the mid 1980's. The approximately 20 m mine cut was backfilled with run of mine sandstone rock containing iron sulphides, principally pyrite in the range of 1 to 2 wt.%. Lime neutralization of acidic drainage has been continuously ongoing to prevent discharge of approximately 200m<sup>3</sup>/a of untreated surface and ground water into the environment. Various reclamation schemes have been considered over the years, but engineering studies indicated either impracticalities associated with maintaining a flooded site or excessively high costs for an engineered cover while not necessarily eliminating the need for continuing drainage treatment operations.

Annual hydrated lime demand for water treatment has decreased from approximately 2000 t/a in the 1990's to less than 250 t/a today, primarily due to exhaustion of reactive sulphides in the unsaturated (vadose) zone. The periodic dredging of treatment ponds and ultimate disposal of the aluminum/iron-rich treatment sludge into the backfilled cut has shown no adverse effects on acid generation and may be acting as a source of residual alkalinity and as a "sealant," somewhat reducing the rate of acid generation. Detailed analysis of twenty years of mine water chemistry has indicated that the impact is negligible on the overall acidity of the mine water. In situ neutralization of generated acidity, due to reaction of acid with alkaline mineralization, has been the major contributor to the decrease in acidity over the years. Levels of trace metals in the drainage, from the area, have and are expected to remain at low concentrations during and subsequent to stabilization of the site.

Additional Key Words: lime neutralization sludge, acid mine drainage

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