

Geochemical trends in a river receiving treated mine water, Bathurst, New Brunswick

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Effluent from the tailings ponds at the Brunswick No. 12 mine has been discharged into Little River since 1964. In 1993, a water treatment plant began operation, resulting in decreased metal concentrations and increased pH in the effluent released to Little River. Following implementation of the water treatment process, water sampling along the river indicated a decrease in pH downstream. This research examines the trend in pH and other geochemical parameters observed along the river. The mine is situated at the headwaters of the south branch of Little River. The discharge in the south branch is dominated by effluent from the water treatment plant. The length of the river from the mine to its discharge point in the Bathurst Basin is approximately 22 km. Aqueous geochemical and stream-sediment sampling were completed from June to August, 1998. Results of this sampling reveal a correlation between suspended and

dissolved metal concentrations (Pb, Zn, S) in the upper reaches of the south branch of Little River, and elevated metal concentrations (Pb, Zn) in the river sediments (45-125 μ m fraction). Decreases in alkalinity, dissolved oxygen and pH were observed in the first 1-2 km downstream of the water treatment plant. Alkalinity and dissolved oxygen rise to background values within 2 km of their respective minimum, whereas the pH recovered to an average value of 6.3. This pattern is consistent with the release of low concentrations of acidity (Fe^(II) or intermediate sulfur oxidation species) from the water treatment plant. In association with these trends in pH, metals transported in the stream are transferred between the aqueous phase and adsorption sites on suspended sediment particles.