amalgamation versus cyanidation tailings; and (3) examine the downstream impacts of drainage from the tailings piles. Forty three samples of tailings were collected from 15 different sites at Cochrane Hill in September 2003, and water samples were collected within and downstream of the tailings in October 2003. Efflorescent salts were also collected from the surface of the cyanidation tailings, and stream sediments were collected to determine the distance that tailings have been transported downsteam. Future laboratory work will include analyses of metal concentrations in the tailings using atomic absorption methods, X-ray diffraction and electron microprobe studies of the tailings mineralogy, and analyses of the water chemistry data using computer models.

Environmental geochemistry of the Cochrane Hill Gold District, Nova Scotia

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Since the first Nova Scotian gold rush in the early 1860s, gold mining and milling processes have generated tailings piles containing mercury, arsenic, cyanide, and other potentially toxic elements. Most of the gold deposits occur in the Cambrian-Ordovician Meguma Group of southern Nova Scotia, and mining has been carried out at more than 60 formal gold districts for a total production of 47 t of gold. The Cochrane Hill gold deposit is located in Guysborough County, approximately 15 km north of the town of Sherbrooke. The host rocks consist of amphibolite-facies quartzite and slate, and most of the gold is associated with quartz veins that intrude slate rich in arsenopyrite. Mining and milling of gold ore at Cochrane Hill took place from 1877 to 1928, and again from 1981 to 1988, resulting in two separate tailings piles. During the first period of operation, stamp milling and mercury amalgamation were used to extract gold from the ore, and the tailings were slurried into a local drainage. In the 1980s, ball milling and cyanidation were used to process the ore, and the tailings were deposited into an on-site impoundment. During gold extraction, mercury and/or cyanide can be lost to the tailings, which may also contain high concentrations of other toxic elements (e.g., arsenic, thallium) that occur naturally in the ore. As a result, windblown tailings and runoff from the tailings disposal areas may have a significant adverse effect on the surrounding environment. The main objectives of this study are to: (1) characterize the mineralogy and metal concentrations in the two tailings piles; (2) assess the relative reactivity of metals and metalloids in the