

## **A geophysical study of the Gullbridge tailings facility, central Newfoundland, Canada**

Andrew Blagdon and Alison Leitch

*Department of Earth Sciences, Memorial University of Newfoundland, 300 Prince Philip Drive, St. John's, Newfoundland and Labrador A1B 3X5, Canada*

In recent years concerns have been raised over the physical stability of the Gullbridge tailings dam in central Newfoundland. The dam was designed to act as a barrier separating copper tailings produced by the former Gullbridge copper mine from a schedule 2 salmon river and intervening wetlands to the west. The mine was in operation from 1971– 1974 and during this period over 1 million tonnes of acid-generating tailings were deposited within the wetland area.

The main focus of this study is the Gullbridge dam site. Research conducted on the dam site will involve examining its structure and in particular looking for leaks and associated erosion. The spontaneous potential survey is of great importance to dam monitoring studies as it is the only method that responds directly to fluid flow. Electrical methods such as the direct-current resistivity survey are effective at locating conductive seepage paths causing internal erosion, and are often combined with other surveys such as ground penetrating radar for locating voids in embankments. Magnetic surveys will be deployed to examine the magnetic signature along the embankment, and electromagnetic survey methods will be used to measure lateral and vertical changes in conductivity associated with conductive copper tailings.

A secondary focus of this study is the wetland site. Research conducted in the wetland will use ground penetrating radar to characterize its structure by examining the bathymetry of the bog material. Electromagnetic ground conductivity surveys will be used as a possible means of tracking metal contamination.

Little information is known about the construction history and design of the dam, and tailings dams as such the one in Gullbridge require continuous monitoring over time. In order to repair the physical instabilities of the dam, the structure of the dam must be extensively interpreted and analyzed.