

## Applied Quaternary geology and till geochemistry of the Loch Lomond region, Cape Breton Island, Nova Scotia

Fenton M. Isenor<sup>1</sup>, Ian S. Spooner<sup>2</sup>, and M. Beth McClenaghan<sup>3</sup>

<sup>1</sup>*University College of Cape Breton, Sydney, NS B1P 6L2*

<sup>2</sup>*Department of Geology, Acadia University, Wolfville, NS B0P 1X0*

<sup>3</sup>*Geological Survey of Canada, 601 Booth Street, Ottawa, ON K1A 0E8*

Southeastern Cape Breton Island is host to several former industrial minerals and base metals mines discovered by traditional prospecting methods but present exploration is hampered by a complex glacial history. Late Wisconsinan ice advances resulted in the deposition of five distinct tills. The basal grey till (LL-1) is a compact, fine-grained till found in local depressions. The regional red till contains 10–30% clasts, 20–30% clay, and was deposited by an eastward ice advance (LL- 2). Northward (LL-3) and southward (LL- 4) ice flows were responsible for two hybrid tills that formed in part through inheritance and overprinting. The local stony till was formed by a southeasterly ice flow event (LL-5) and contains 35–75% angular local clasts and less than 10% clay. The

southern half of the study area is dominated by 50 m high bedrock cored till ridges. Inter ridge areas are overlain by organic deposits and glaciofluvial sediments which can provide anomalous geochemical values. Till samples were collected at a 3–5 km spacing and the <0.063 mm fraction was analyzed. Till geochemical patterns are complex as a result of lithological repetition, complex glacial history, and numerous mineralization types. Considered together stratigraphic, geochemical, and till pebble data indicate that all 5 stratigraphic units have surface expression in the study area necessitating a multi-tiered interpretation of the geochemical datasets. The re-evaluated data suggest that the regional red till which is located primarily in the Loch Lomond basin is

best suited for the investigation of mineralization which may lie to the west of the study area.

Hybrid tills located east and west of the regional red till provide less useful data due to inheritance from the regional red till and overprinting by younger glacial events. Sampling

of local stony tills in the Mira Hills is recommended as the best stratigraphic target to delineate Cu (Au) concentrations in rocks of the Stirling Group. Complex Ba dispersal patterns may require a more detailed sampling strategy for future exploration.