
**Metallogeny of the Caledonian Highlands,
southern New Brunswick: a pilot study**

J.M. TEXIDOR-CARLSSON, S.M. BARR,
AND C.R. STANLEY

*Acadia University, Department of Geology,
Wolfville, NS, B4P 2R6 <076396t@acadiau.ca>*

The Caledonian Highlands consist mainly of volcanic, sedimentary, and plutonic rocks formed in a continental margin magmatic arc complex in combination with later extensional tectonic events over a span of at least 70 million years in the Late Neoproterozoic. The southern and eastern parts of the highlands are dominated by the Broad River Group, an assem-

blage of ca. 620 Ma volcanic and sedimentary rocks with associated co-magmatic plutons. The ca. 560–550 Ma Coldbrook Group, together with related plutons forms most of the western part of the highlands, but also extends into the eastern part, where it is inferred to originally have had an unconformable relationship with the underlying Broad River Group.

The Caledonian Highlands contain numerous mineral occurrences which have not previously been studied on a regional basis. Some mining work took place during the late nineteenth and early twentieth centuries (e.g., Teahan, Lumsden, Chambers Settlement, Vernon) but was discontinued due to poor returns and/or lack of geological understanding. During the 1960s through 1980s, Noranda, U.S. Borax, and Irving Exploration uncovered massive sulphide anomalies which were deemed unprofitable at the time of their discovery. The number of mineral occurrences and the results of previous exploration work suggest that an understanding of the metallogenic processes in the Caledonian Highlands might lead to the discovery of new deposits and a better understanding of known occurrences.

During the summer of 2005, over 70 reported occurrences of mineralization in the Caledonian Highlands were compiled from assessment files. Except for those in the Cape Spencer area, which were excluded from the study for logistical reasons, most occurrences were visited, described, and sampled. The majority are hosted by the Broad River Group, and include vein systems with and without surrounding disseminated mineralization, disseminated systems, fault breccia mineralization, and a few suspected VMS occurrences. Most known occurrences are of the disseminated type, in some places associated with quartz/carbonate veins.

Geochemical and petrological analyses of samples collected during two transects of the alteration system at the Chambers Settlement occurrence have yielded a strong Cu and Mo anomaly, and enriched Bi, As and Hg values, surrounded by an argillic alteration envelope containing pyrophyllite, as confirmed by XRD. Although varying degrees of alteration hamper precise identification of the tuffaceous host rocks, conserved element analyses suggest that there may be at least two different rock populations, with one of them bearing the bulk of the alteration and Cu enrichment. Core samples from the Vernon occurrence and samples from outcrop in the old mine area yielded a Cu anomaly and moderate Ag and As values. Minor Au was reported from one sample. The host rocks contain regional-strike parallel alteration bands which gave Cu, As, and Mo anomalies. Core samples from the Teahan VMS(?) occurrence yielded high Cu, Zn, Pb, and Ag values, with moderate amounts of Hg, As, Cd, and Tl. Geochemical analyses of samples from the waste pile at the Lumsden returned high Cu and Zn values, and moderate Hg, Mo, Bi and Cd values. Identification of conserved elements and PER analysis is expected to help establish mineralization models for these occurrences.