Early Carboniferous hydrothermal events of the western Cobequid Highlands of Nova Scotia

J.D. Nearing
Department of Geology, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada

Qualitative petrological analysis and quantitative microprobe and whole rock geochemical data are used to document hydrothermal activity in intrusive bodies immediately north of the Cobequid Fault system. The plutons concerned are the Cape Chignecto, Hanna Farm, West Moose River and North River plutons. Airborne radiometric maps (scale 1:500,000) of the study area indicate elemental anomalies related to hydrothermal events. In particular, airborne radiometric maps indicate a strong potassic anomaly along the Cobequid Fault and associated igneous bodies.

Major hydrothermal activity is characterized by albitization and biotitization. Minor activity is marked by the presence of carbonate, chlorite, and rutile-hematite bearing fractures and veins. Possible REE mineralization is present within the Cape Chignecto granites. REE mineralization is marked by the presence of fluorite and REE-rich isotropic minerals hosted by vugs.

Albitization and biotitization of granites are early high-temperature events, based upon criteria of formation and cross-cutting relationships. Except for the North River pluton, albitization of K-feldspar and perthite is confined to mylonitic samples, petrologically marked by albite overgrowths. Geochemically albitized mylonitic granites have enriched Na_2O content coupled with depletions of K_2O and Rb. Biotitization of granites is generally constrained to clots and stringers confined to early stage fractures formed in a brittle environment.

Biotitization also occurs in gabbroic bodies of the Cape Chignecto, Hanna Farm and West Moose River plutons. Biotitization of the gabbroic intrusions involves primarily the replacement of hornblende by secondary biotite and changes in primary biotite textures. Biotitization textures within the gabbroic phases can be strongly correlated with potassic alteration documented in the Santa Rita prophyry copper deposit, New Mexico.

Chloritization, carbonatization, and hematite-rutilization are considered late-stage events, possibly related to mafic dyke emplacement in an extensional environment.