

**Petrological and geochemical attributes of the Benjamin River
porphyry Cu deposit, northeastern New Brunswick**

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A mineralogical and multielement geochemical study was undertaken on the most mineralized cupolas of the Benjamin River porphyry Cu deposit in order to ascertain the controls on the Cu and Mo mineralization. The Benjamin River porphyry Cu deposit is located about 13 km south of Chaleur Bay in Restigouche County, New Brunswick. The Early Devonian intrusive phases that host most of the mineralization range from a tan coloured hypidiomorphic granodiorite that contains 8 to 15% biotite to a variably porphyritic variety. The host rocks are pink to red, feldspar-phyric rhyolite and fine-grained, dark grey, green and black mafic volcanic rock of the Middle Silurian Bryant Point Formation. The primary pyrite-chalcopyrite mineralization is dominantly disseminated within an alkalic-type alteration (\pm phyllic) in varying proportion throughout the granodiorite, but to a lesser extent in

mafic and felsic host rocks. The secondary mineralization is in the form of sulfide-rich pyrite-base-metal veins that cut disseminated mineralization. Molybdenite commonly occurs in secondary quartz-bearing veins. Crosscutting relationships are uncommon, but where present appear to indicate that the quartz veins were emplaced later than the sulfide veins. Weak pervasive propylitic alteration is superimposed on much of the host primary mineralization alteration, although some is vein controlled.

Drill core samples and existing pulp samples from drill core were selected from the variably mineralized and altered parts of the cupolas sampled. Microprobe analysis is planned on the biotite-alkali feldspar-magnetite assemblages from the unmineralized intrusive phases to the mineralized alkalic-type alteration to help ascertain the hydrothermal conditions for

chalcopyrite mineralization. The drill core samples were assayed for Cu, Mo and Au by Stairs Laboratory, Beresford, New Brunswick, in order to be compared to existing data. Major- and trace-element analysis of the pulps is to be performed by the pressed pellet X-Ray Fluorescence Spectrometry at Memorial University of Newfoundland. An additional eight samples were analysed using Inductively Coupled Plasma-Mass Spectrometry for additional petrogenetically important elements. Preliminary analysis of the geochemical data indi-

cates that the granodiorite phases are cogenetic and that they represent relatively depleted, calc-alkaline I-type intrusions. These geochemical attributes are similar to other Middle Devonian Cu-mineralized intrusive systems in northern New Brunswick, as well as the porphyry hosting the mineralization at Mines Gaspé, Quebec; therefore, the Benjamin River Cu deposit is part of a much larger arc-like intrusive metallogenic province.