
**Fluid and melt evolution during the formation of
the Berg copper molybdenum porphyry deposit,
British Columbia**

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[Poster]

The purpose of this study is to delineate the chemical and physical evolution of hydrothermal fluids and the associated silicate melts in a molybdenum-rich copper porphyry calc-al-

kaline deposit located within the Hazelton Mountains, British Columbia. Within the Berg deposit are two main zones of mineralization: the Northeast zone that contains hypogene, as well as some supergene, mineralization, and the Southeast zone, which contains widespread supergene mineralization. Ore-forming processes are not very well understood in porphyry copper-molybdenum systems compared to porphyry copper-gold systems. This study will focus on determining whether molybdenum gets concentrated in a porphyry environment by the same processes that influence copper and gold.

The fluid and melt inclusions studied are very well preserved and found within quartz phenocrysts of the Eocene-aged monzonite intrusion within the Berg copper-molybdenum deposit. The intrusion, based on bulk rock geochemistry is a typical potassic-altered calc-alkaline arc monzonite with LREE > HREE, a subtle depletion in Nb and Ta (rutile retains these elements in the source region), and a strong depletion in Ni and Cr, also typical of arc magmas. Fluid inclusions are primary or pseudo-secondary and are two-phase (at room T) containing aqueous liquid and vapour. Less common are polyphase inclusions containing aqueous liquid, two-phase bubbles composed of CO₂ liquid + vapour, halite and other salt crystals, and occasionally hematite. Melt inclusions are less common but are of primary origin and are recrystallized. Two-phase fluid inclusions and melt inclusions of primary origin were also identified in apatite.

Methods used to study the inclusions and associated host rocks include optical petrography, photomicrographs, microthermometry, scanning electron microscope (SEM), cathodoluminescence (CL), electron microprobe (EMP), and laser ablation ICPMS. The origin of the inclusions is being constrained by CL; preliminary results show that quartz phenocrysts have a complex zoning pattern related to resorption and regrowth during interaction of the quartz phenocrysts with the surrounding magma. Biotite-apatite thermometry of the host rocks indicate that the monzonite crystallized at relatively low temperature (<650 °C assuming a 2 kbar crystallization P); apatite is end-member fluorapatite, indicating a high F content in the associated melts from which the apatite crystallized. These conditions will be used to help constrain temperature of entrapment for primary inclusions in the apatite and early quartz phenocrysts (apatite and quartz were both early crystallizing phases).