

## **Geochronology, geochemistry, and fluid inclusion study of the Newton epithermal gold deposit, British Columbia**

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### **Abstract**

The Newton epithermal gold deposit is located in central British Columbia. Gold is mainly disseminated in quartz-sericite altered felsic volcanic rocks, granodiorite porphyry, and quartz-feldspar porphyry, with ages between  $72.1 \pm 0.6$  Ma and  $70.9 \pm 0.5$  Ma (Amarc Resources Ltd., unpublished data). New U-Pb dating of the granodiorite porphyry yielded an age of  $72.1 \pm 0.6$  Ma, while a cross-cutting barren diorite intrusion has an age of  $69.07 \pm 0.52$  Ma. Gold mainly occurs as electrum and gold-silver telluride inclusions in pyrite and marcasite. Three stages of mineralization are identified at Newton: (1) pyrite-gold; (2) marcasite-gold-base metal; (3) polymetallic base metal veins (pyrite-chalcopyrite-sphalerite-arsenopyrite). Re-Os dating of molybdenite in stage 1 veins yielded an age of  $72.1 \pm 0.3$  Ma (McClenaghan, 2013). Minor mineralized quartz veins are present in quartz-sericite-altered felsic volcanic rocks and quartz-feldspar porphyry. Fluid inclusions data from these veins indicate that the first stage of mineralization was formed from relatively hot and saline fluids (average Th =  $294 \pm 2^\circ\text{C}$ ,  $5.16 \pm 0.2$  % NaCl equiv., n = 18) of probable magmatic origin. All the volcanic and intrusive rocks at Newton have similarities in major and trace element compositions, such as enrichments in incompatible large-ion lithophile elements and depletions in Nb, Ta, Ti, and P. The volcanic and intrusive rocks have a narrow age range of ~3 m.y., and likely comprise a comagmatic volcanoplutonic complex. This magmatism is part of a major Late Cretaceous suite of continental-arc volcanism and plutonism in British Columbia caused by subduction of the Pacific plate beneath North America. This magmatism is associated with several other large porphyry and epithermal deposits in the Newton region, such as the Prosperity Cu-Au porphyry deposit (79 Ma; Cooke and Hollings, 2005), and the Blackwater epithermal Au deposit ( $67.4 \pm 0.5$  Ma; Friedman et al., 2001).