

Glacial dispersion of refractory minerals from the Gibraltar porphyry copper deposits, southcentral British Columbia.

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Indicator mineral method has been successfully applied in diamond exploration. We initiated a project in the summer of 2016 to evaluate the feasibility of this method in exploration for porphyry copper deposits, and selected the area around the Gibraltar mine as a test site. The deposit is hosted by the Granite Mountain Batholith of late Triassic age in southcentral British Columbia. The batholith intruded into the Nicola Group volcanic rocks. The region is in large part covered by till deposited during three phases of ice flow: southeast, southwest and north to northwest. Our study examined grains of red rutile (64 grains from 5 sites), zircon (185 from 5 sites) and epidote (191 from 4 sites) between 200 and 500 μm in size from glacial tills collected at a total of 12 sites in the proximity (< 12 km) of the Gibraltar deposit. Epidote grains are grass green in color and Ca-rich (22-25 wt%) with varying $\text{Fe}_2\text{O}_3(\text{t})$ (12-20 wt%). Most grains (ca.40%) contain titanite inclusions, which show varying Al_2O_3 between 1 and 5 wt%. They also contain inclusions of zircon, quartz, apatite, magnetite and actinolite at all sites. Grains of red rutile commonly contain ilmenite inclusions. SEM-EDS analysis indicates that the rutile has a composition close to the end member with >99 wt.% TiO_2 . Ilmenite inclusions are composed of approximately 35-45 wt.% $\text{FeO}(\text{t})$ with up to 2 wt.% MnO . Zircon grains contain many inclusions. Tabular, euhedral apatite grains are common, but most inclusions are unidentified. SEM-CL images reveal oscillatory zoning, suggesting igneous origin. The composition, textures and inclusions of these three minerals are similar to those in the mineralized bedrock at Gibraltar and the alteration halo as revealed by a complimentary study (see poster by Kobylinski et al. at this conference). In addition, they are similar throughout all study sites regardless of the proximity and directions to the Gibraltar mine. The results suggest that the mineralogical footprint in till derived from this porphyry copper deposit extends over 12 km.