

SEG 100 Conference: Celebrating a Century of Discovery

ST.158

Composition of Epidote from around the Highland Valley Copper Porphyry Deposits and the nearby Nicola Batholith and Country Rocks: Prospectivity and Footprint Insights

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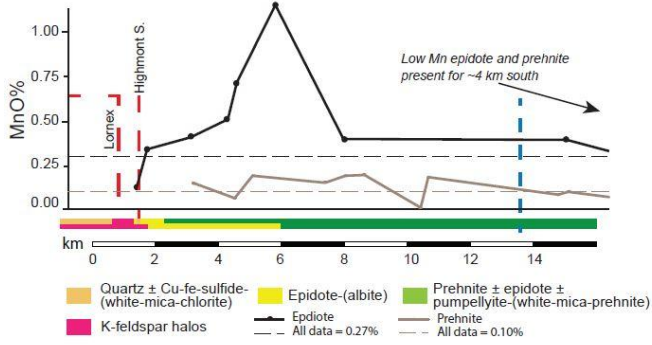
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Four major porphyry Cu-(Mo) systems, hosted in the Late Triassic Guichon Creek batholith (GCB), occur in the Highland Valley Copper (HVC) district in British Columbia. The HVC district is host to Canada's largest and longest operating Cu mine. Veins of epidote occur with sodic-calcic alteration and propylitic alteration around the HVC porphyry centers and throughout the GCB. The composition of epidote from these veins and from other geologic environments were analyzed using wavelength-dispersive spectrometry on an electron microprobe and by laser ablation-inductively coupled plasma-mass spectrometry.

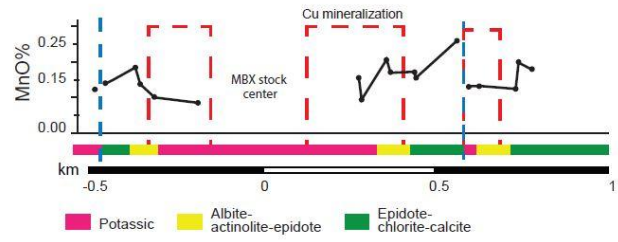
A coherent Ge anomaly (>30 ppm) in epidote veins forms a halo around the porphyry centers for ~5 km. Epidote veins with the highest As and Sb values (~>20 ppm) occur within ~4 km of the porphyry Cu centers. The elements Mn (>6,000 ppm) and Zn (>25 ppm) are most enriched in epidote between 1.5 and 4 km of the porphyry centers, whereas Pb enrichment (~>120 ppm) occurs between ~4 and 6 km away. Systematic variation in the Mn concentration of epidote with respect to Cu mineralization has been documented at several porphyry Cu deposits (Fig. 1). Based on this study and patterns evident in the other porphyry systems, the Mn concentration in epidote increase inwards through propylitic alteration to a maximum at the transition from propylitic to higher-temperature assemblages and then decreases sharply inward to Cu-mineralized domains.

Epidote veins from the fertile HVC porphyry district can be discriminated from the epidote occurring in nonprospective geologic environments by a combination of compositional features: large positive Eu anomaly, low sum HREE concentration, moderate negative REEN slope, and principally by localized analyses of >30 ppm As and Ge and >10 ppm Sb. Considerable range in trace element concentrations and complicated major and minor element zonation patterns, however, occur on an intrasample basis in the HVC sample suite. This variability necessitates careful characterization and a high number of analyses and presents challenges in determining representative sample strategies for exploration.

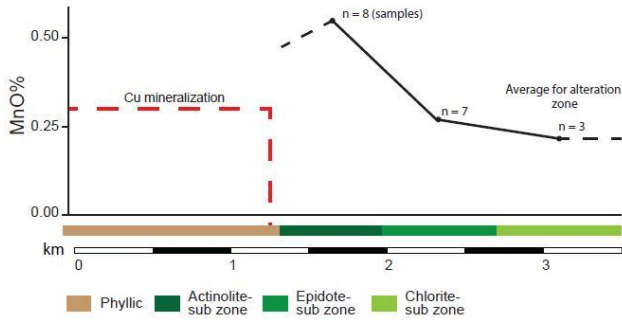
Highland Valley Copper, BC, Canada, Porphyry Cu-(Mo)



Mt Milligan, BC, Canada: Porphyry Au-Cu



SW Tintic, Utah, US: Porphyry Cu-(Mo)



Sierrita, Arizona, US: Porphyry Cu-(Mo)

