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Temporal Evolution of the Majuba Hill Cu-(Mo)-(Sn) Deposit, Pershing County, Nevada

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The Majuba Hill intrusive complex of northwestern Nevada exhibits two superimposed hydrothermal mineral deposits. Quartz vein-hosted Cu-(Mo) mineralization occurring in Jurassic (~160 Ma) granodiorite was later overprinted by Oligocene (~25–28 Ma) subvolcanic rhyolite magmatism and related Cu-(Mo)-(Sn) mineralization.

The Jurassic hydrothermal system is characterized by early barren to molybdenite-bearing granular quartz veins and barren comb-textured quartz veins reopened by later tourmaline, calcite, and chlorite. Fractures in early veins provided pathways for tourmaline, calcite, chlorite, and later sulfide deposition. Hydrothermal Cu occurs as anhedral chalcopyrite overprinting earlier veins and gangue minerals.

Oligocene hydrothermal deposition commenced with granular quartz + (molybdenite) veins and barren comb-textured quartz veins crosscutting subvolcanic rhyolites. Euhedral cassiterite + tourmaline + quartz mineralization (~25 Ma) followed and accompanied significant tourmaline + quartz + sericite + fluorite deposition and alteration of porphyritic rhyolites. Anhedral chalcopyrite deposited as disseminated crystals overprinting altered K-feldspar phenocrysts and by infilling portions of open space-filling veins. Chalcopyrite also crosscuts euhedral quartz-arsenopyrite veins. Subequal amounts of pyrrhotite and minor sphalerite are spatially associated with chalcopyrite but occurred earlier in the paragenetic sequence.

Shallow portions of the Majuba Hill deposit were affected by a supergene fluid that deposited digenite + (covellite) along the margins of hypogene chalcopyrite crystals. Minor cuprite and native Cu were also observed in drill hole MHB9 but appear less common than digenite and covellite.

Paragenetic sequences from both the Jurassic and Oligocene hydrothermal systems suggest the sulfidation state of parent hydrothermal fluid(s) increased over the duration of each system. The genetic association between cassiterite, hydrothermal tourmaline + quartz, and emplacement of subvolcanic rhyolites suggests Sn endowment may be derived from a peraluminous and fractionated parent intrusion.