

## The St. Eugene Deposit, British Columbia: A Metamorphosed Ag-Pb-Zn Vein in Proterozoic Belt-Purcell Rocks

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### Abstract

The St. Eugene deposit is an Ag-Pb-Zn vein deposit hosted by clastic sedimentary rocks of the Purcell Supergroup, which were metamorphosed during the East Kootenay orogeny. Hydrothermal metasomatism created an alteration zone surrounding the veins that we subdivide into four facies separated by gradational contacts: garnet-chlorite, internal, intermediate, and external. Chemical and isotopic exchanges between wall rocks and hydrothermal fluid created a chemical reaction zone that is characterized by gains in FeO, MnO, Pb, Zn, and Sb and by losses in CaO, Na<sub>2</sub>O, K<sub>2</sub>O, Sr, Rb, and Cs. Wall-rock  $\delta^{18}\text{O}$  values decrease from the vein selvage outward because of water-rock exchange with a metamorphic fluid with a high  $\delta^{18}\text{O}$  value. Sulfur in vein sulfides is derived from local wall rock. Mn-rich garnet formed near the quartz sulfide vein during metamorphism because the stability temperature of garnet is lowered in rocks hydrothermally enriched in Mn. The occurrence of manganiferous garnet in Belt-Purcell rocks should be regarded as a metallotect for syngenetic and epigenetic mineralization in those rocks.