MINERALOGY OF THE IRON CROWN, IRON SKARN DEPOSIT VANCOUVER ISLAND, BRITISH COLUMBIA

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The Iron Crown calcic iron skarn is one of several skarn deposits of maritime British Columbia which have produced Fe, Cu, Au, and Ag. Skarn is developed mainly in the Quatsino Limestone and Karmutsen volcanic rocks at the contact with the granodiorite - diorite border phase of the Nimpkish quartz monzonite pluton.

Skarn developed in plutonic rocks consists mainly of garnet veins with pyroxene and/or epidote - albite envelopes and calcite - magnetite cores. Early garnet is enriched in Al (to 19.6 wt % Al_2O_3) and Mn (to 1.0 wt % MnO). Late garnet is enriched in Fe (to 15.9 wt % FeO) and Ti (to 1.5 wt % TiO_2). In contrast, early garnet in volcanic and carbonate protoliths is isotropic and enriched in Fe (to 18.7 wt % FeO) and Ti (to 0.9 wt % TiO_2). Later skarn garnet is birefringent and rich in Al (to 16.6 wt % Al_2O_3) and Mn (to 1.6 wt % MnO). Skarn pyroxene is dominantly diopsidic. Early pyroxene in volcanic and plutonic host rocks is enriched in Al (to 6.6 wt % Al_2O_3) and Ti (to 1.9 wt % TiO_2 in endoskarn). Later skarn pyroxene, developed in a limestone protolith, is enriched in Fe (to 9.9 wt % FeO) and Mn (to 1.7 wt % MnO). Epidote is enriched in Fe and depleted in Al and Mn toward the marble. The ratio Fe:Al = 1:2 in most skarn. A single analysis of epidote from the ore zone shows Fe:Al = 1:3. Ti is highest where epidote has replaced early skarnoid pyroxene.

Magnetite and sulfides, including pyrite, chalcopyrite, and sphalerite, were deposited during retrograde skarn destruction. Quartz, calcite, and sulfides heal brecciated magnetite.

Most fluid inclusions observed are small (< 5u), liquid rich Type I inclusions. Daughter salts, believed to be halite, are observed in late pyroxene formed in limestone. Homogenization temperatures of inclusions in pyroxene yield a range from 390 C to 465 C. Higher temperatures were obtained for pyroxene in proximal volcanic protolith and in the ore zone. Lower temperatures were obtained in pyroxene in more distal skarn developed in limestone. A single homogenization temperature of a secondary inclusion in garnet yielded 165 - 170 C. A single homogenization temperature for an inclusion in epidote yielded 245 - 250 C.