

Petrology and mineralogy of calc-alkaline intrusion hosted Ag-Bi-Pb-Mo-Cu mineralized quartz veins, Iskut River area, northwestern British Columbia

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The Iskut River area in northwestern British Columbia hosts numerous significant porphyry and epithermal occurrences. Regional mapping conducted in 2011 identified a previously unrecognized occurrence of polymetallic mineralized quartz veins hosted by an equigranular granodiorite intrusion (<5km²) to the northwest of Snip deposit. A transect across the intrusion was systematically mapped and sampled as part of this thesis in 2014. The undated intrusion was emplaced into a package of metasedimentary rocks including mafic volcanoclastic turbidite, graphitic slate, and marble. On the eastern margin of the intrusion, marble has been partially to completely reacted to garnet-diopside-actinolite exoskarn. The intrusion composition is predominantly hornblende granodiorite, but varies from quartz diorite to quartz monzodiorite. This lithological variation is similar to that observed in the Jurassic Texas Creek plutonic suite and Eocene Coast plutonic complex in the Iskut River area. Alteration of the host intrusion in proximity to the mineralized quartz veins is neither extensive nor intense, and consists of sericite, epidote, chlorite, carbonate, sausserite, iron-oxide and garnet. There is a general macroscopic bleaching of the host granodiorite towards the most intensely veined part of the intrusion. Within the intrusion, leucocratic dykes locally form subparallel to conjugate arrays. Polymetallic mineralization is hosted by millimetre to decimetre wide quartz veins within the intrusion. Polyphase veins predominantly form parallel sets, but also cross-cut and form weakly developed stockworks within the more differentiated granodioritic phases of the intrusion. Vein orientation is subparallel to minor shear zones within the intrusion. Some veins display structural features including extensional bends and off-sets. Mineralization comprises bismuthinite, galena, molybdenite, minor covellite, and pyrite, with disseminated blebs of intergrown bornite and chalcopyrite. With the exception of molybdenite, which replaces pyrite along fractures, all of the sulphide phases have been overprinted by pyrite. Assay results indicate that the quartz veins additionally host Ag ≤18 ppm, and contain trace amounts of Au, ≤15 ppb. Assay samples yielded highly variable results consistent with the nugget effect, due to the nonuniform distribution of mineralization and biased sampling. The apparent lack of Au, metal zonation, and extensive alteration differentiates this occurrence from proximal porphyry and epithermal deposits. As such, the occurrence is characterized as intrusion hosted polymetallic vein system, representing a new style of Ag-Bi-Pb-Mo-Cu±Au mineralization in the Iskut River area.