

Geology and Mineralization of the Mt Carbine Deposit, Northern QLD, Australia

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The Mt Carbine wolframite-scheelite sheeted vein deposit is located ~80 km NW of Cairns, northern Queensland. It was the largest vein-type W deposit in Australia and accounted for 43% of Australia's annual W production in 1986, prior to closure because of an international Sn-W market crash. The hard rock resources at Mt Carbine at last review were Indicated Mineral Resource 18 Mt at 0.14% WO₃, and Inferred Mineral Resource 29.3 Mt at 0.12% WO₃.

The vein system in Mt Carbine is hosted in Ordovician to Devonian Hodgkinson Formation metasedimentary rocks, which include turbiditic metasediments composed mainly of graywacke, siltstone-shale, slate, basalts, conglomerates, and chert. There are at least three types of felsic igneous rocks in the mining district, including porphyritic biotite granite, equigranular coarse-grained biotite granite, and fine-grained felsic dike (which cuts the orebody). There is no contact between equigranular coarse-grained biotite granite and the mineralized vein system; thus, their relationship is unclear. Mineralized quartz veins and chlorite alteration occur in the porphyritic biotite granite, whereas no quartz vein and alteration are present in the fine-grained felsic dike, indicating that the porphyritic biotite granite was earlier than mineralization and the felsic dike later than mineralization.

There are four 30- to 40-m-wide vein zones in the open pit with different orientations, with Zones 1 to 3 being ~300°/80° (strike/dip), and Zone 4 is 270°/65°. Based on drill core logging and open pit inspection, six types of veins including three types of quartz-dominant veins have been identified. They are type 1, curved and discontinuous quartz-dominant vein in Hodgkinson Formation metasediment; type 2, continuous quartz-dominant vein with irregular and curved margins; type 3, straight and continuous quartz-dominant veins with sharp boundaries; type 4, calcite vein; type 5, feldspar vein; and type 6, fluorite-feldspar vein. The W mineralization is mostly in quartz veins (types 1-3), with no mineralization in the other three types of veins. Ore minerals are wolframite and scheelite. Wolframite is typically euhedral and occurs in quartz veins, whereas the occurrences of scheelite are as follows: (1) filling the interstices between wolframite grains, (2) as a pseudomorph after wolframite grains or cutting across wolframite grains as veinlets, and (3) as scheelite clots in Hodgkinson Formation meta-sediments. Scheelite was later than wolframite. The gangue minerals include muscovite, chlorite, fluorite, albite/feldspar, biotite, and calcite, and sulfides include arsenopyrite, pyrrhotite, chalcopyrite, sphalerite, and minor molybdenite. A paragenesis study is currently underway.