

Hydrothermal Alteration, Mineralization, and Ore-forming Fluid Characteristics of the Thmei North Prospect of Andong Bor Porphyry Copper Deposit, Northwest Cambodia

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The Thmei North Prospect is located in the Loei Fold Belt, which formed as an uplifted mountain range associated with subduction-related magmatism during the Late Paleozoic to Early Mesozoic. The hydrothermal deposits along the belt are associated with intrusive rocks, which are characterized by vein-type Au deposits, skarn, and porphyry-type deposits. The geochemistry of the soil in this prospect indicates notable anomalies of gold (Au), copper (Cu), and molybdenum (Mo) up to >400 ppb, >1000 ppm, and >40 ppm, respectively. The preliminary drill core indicates approximately 35 m of unconsolidated sediment overlaying the diorite and hornfels, which are cross-cut by several types of veins. Replacement textures of hornblende by biotite, biotite by chlorite, and feldspar by sericite were observed. The mineral assemblages were identified as biotite-K-feldspar, chlorite-sericite, and quartz-sericite, representing the overprinting of potassic alteration by chlorite-sericite alteration and phyllic alteration. Observed ore minerals and associated minerals include chalcopyrite, molybdenite, magnetite, rutile, and pyrite. Chalcopyrite was observed along the vein networks in both host rock types and as disseminations within the diorite, particularly associated with the potassic alteration and chlorite-sericite alteration zones, whereas the phyllic zone appears to lack mineralization. Furthermore, molybdenite was observed only in B veins associated with potassic alteration. Magnetite and rutile are likely to occur in the early stages of mineralization, while pyrite is predominant in the late stages. The Log fS_2 vs. 1000/T diagram illustrates the occurrence of mineralization in an intermediate sulfidation state, with salinity and the homogenization temperature (Th) ranging from 2.2 to 8.3 wt% NaCl equivalent and from 300 to 415 °C, in the early stage, and ranging from 3.39 to 6.45 wt% NaCl equivalent and from 185 to 233 °C, in the late stage, respectively. The hydrothermal alteration and the mineralization characteristics indicate potential for a porphyry Cu-Mo deposit.