Alteration, Mineralization and Geochemical Characteristics of the Arakompa Intermediate Sulfidation Epithermal Gold Deposit, Kainantu District, Papua New Guinea

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The Arakompa intermediate sulfidation epithermal gold deposit is located in the Kainantu Cu-Au district, Eastern Highlands Province, Papua New Guinea. It is associated with the NNE-trending Arakompa Fault which crosscuts dioritic stocks of the Akuna Intrusive Complex (~15 Ma) formed during the mid-Miocene Maramuni Arc event. This project aims to increase ore body knowledge and develop a genetic model for Arakompa through detailed characterization of its mineralogy, geochemistry, textures and paragenesis. Hypogene mineralization at Arakompa is characterised by massive sulfide-quartz lodes, sulfide-carbonate-quartz veins, hydrothermal quartz-sulfide breccias and clay-sericite fault breccias. Alteration halos include intense phyllic (i.e. sericite-quartz), sericite-carbonate and sericite-chlorite-epidote assemblages, which overprint earlier propylitic and sodic-calcic alteration. Whole rock geochemistry shows strong depletions in Sr, Na and Ca which correspond to the feldspar-destructive phyllic alteration and high-grade gold mineralization. These Au-rich, Sr-Na-Ca-depleted zones also exhibit sporadic enrichments in K, Mg and Ca relating to muscovite, chlorite, calcite, and epidote alteration. Epithermal quartz displays colloform, crustiform, lattice, moss, cockade and drusy textures indicative of variable hydrothermal fluid conditions and syn-mineral deformation. Multiple generations of quartz, pyrite and chalcopyrite have been recognised based on grainsize, texture, and mineral inclusions. Inclusions in late-stage chalcopyrite include gold (100-200 μm) intergrown with bornite (6 μm), Te-Bi sulfides (70 μm), and pyrite (30 μm). Inclusions in late-stage pyrite include microscopic gold (10-20 μm), chalcopyrite, Cu-Bi sulfide (wittichenite), and Te-Bi sulfide. Bulk rock gold assays also show positive correlations with Te, Bi, Cu, Ag, Fe and As at a factor of 0.7 to 0.5 respectively for drillholes intersecting the epithermal veins. Sulfur isotope ($\delta^{34}S$) analysis of pyrite and chalcopyrite at -0.77 to -3.26 per mill are indicative of oxidized (sulfate-predominant) magmatic-hydrothermal fluids typical of porphyry-epithermal systems in the Maramuni Arc. Detailed characterisation of Arakompa will improve our genetic models for the deposit and district.