## Geological and Geochemical Evolution of the Supergiant High-Grade Resolution Cu-Mo Deposit, Arizona

Takeshy X. Coaquira, David R. Cooke, Lejun Zhang
University of Tasmania, Hobart, TAS, Australia

Copper mineralization at Resolution is related to four main paragenetic stages. Stage 1 is characterized by early chalcopyrite mineralization related to potassic alteration, along with its associated A veins, coupled with the unidirectional solidification textures recognised in early dacite porphyries, all of which provide important insights to the understanding of early hydrothermal activity in this complex system, which did endow some Cu mineralization. However, the bulk of the Cu-sulfides at Resolution are associated with overprinting white mica alteration from stage 2, which is characterized by phyllic alteration, which is extensive throughout the ore zone and overlying volcaniclastic rocks, where it produced greenish-gray to white micas and clays associated with abundant pyrite. Massive chalcopyrite veinlets, a few millimetres to several centimetres in width, are associated with phyllic alteration throughout the ore zone; they can have chalcopyrite-bearing white mica alteration halos, demonstrating the importance of this alteration type to mineralization. Stage 3 is characterized by advanced argillic alteration, with bornite and chalcocite as common Cu mineral species at Resolution, occurring dominantly as replacements of chalcopyrite. Bornite at Resolution does not follow the classic porphyry model, where it is localized in the potassic core. Instead, bornite at Resolution was added during the phyllic and later advanced argillic events. The transition with time from chalcopyrite to bornite-stable ore-forming conditions indicates that fluid chemistry was evolving to higher sulfidation states. Even higher sulfidation assemblages formed later—these are typically structurally controlled, producing chalcocite-digenite-bearing veins and magmatic-hydrothermal breccias that are closely related to APS-kaolinite-dickite ± alunite alteration. The latest paragenetic stage that enhances copper at Resolution is characterized by supergene kaolinite with steely chalcocite ore blankets. However, the bulk of high-grade ore is genetically related to hypogene enrichment processes.