

Advances in Knowledge: High-Grade Cu-Au-Ag Mineralization Hosted in Tourmaline Breccias at Soledad, Peru

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The Soledad project is located in the Cordillera Negra of west-central Peru, within the Miocene Metallogenic Belt. Initial exploration focused on tourmaline breccia pipes hosting sulfide mineralization with strong Cu-Au-Ag grades. In 2022, an initial inferred resource was published on seven breccia pipes from the surface to an average depth of 330 m, containing 6.7 Mt grading 0.88 g/t Au, 0.88% Cu, and 54.2 g/t Ag. This resource reflects only a small portion of the potential of the Soledad mineral system as the tourmaline breccias are just one of several mineralization styles related to a major intrusive center at Soledad that are subject to ongoing exploration.

The pipes cut Cretaceous volcanic and epiclastic basement unconformably overlain by Tertiary Calipuy Formation with subaerial andesite flows, lithic tuff, and lesser dacite tuff ranging in age from 52.34 ± 0.67 to 40.03 ± 0.25 Ma. The magmatic-hydrothermal system lifespan spanned ~ 1 m.y., beginning with granodiorite at 15.65 ± 0.18 Ma and ending with mineralized breccia at 14.71 ± 0.07 Ma. All the intrusions have a fertile porphyry copper prospectivity signature according to Sr/Y and V/Sc ratios. The structural intersection of the NE with N-NW faults is a favorable location for breccia pipes.

Mineralization was introduced immediately after breccia pipe formation, initially with gold-bearing pyrite and arsenopyrite; followed by chalcopyrite-tetrahedrite, then Sb-Pb-Cu-Bi-Ag sulfosalts; and finally, electrum. Surficial oxidation extends to ~ 35 -m depth. Within a pipe the upper levels are higher in Au-Ag, phyllic alteration is notable, and textures are shingle to mosaic. At lower levels, chaotic textures dominate, Cu is higher, with stronger quartz-tourmaline replacement.

Geometallurgical studies are ongoing to 1) resolve precious and critical metal deportment in sulfide and sulfosalt minerals to optimize mineral processing options, and 2) identify deleterious element deportment in sulfide and sulfosalt minerals for effective waste management planning.