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Paragenesis of Alteration and Silver Mineralization of the Pomperia Veins Hosted in the Tacaza Formation, Southern Peru

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Silver is one of the most important metals for modern industry. Around 57% of the world's silver production comes from the Americas. In 2020 Peru was the second largest producer with 110 million ounces of the 784.4 million ounces produced in the world. The central Andes hosts important Ag mineralization such as Antamina, Uchucchacua, and Inmaculada. In southern Peru there are several low- and intermediate-sulfidation deposits hosted in the paleo-neogene Tacaza Formation. In 2006 the Santa Ana and Corani world-class Ag deposits were discovered by Bear Creek in southern Peru. Santa Ana is hosted in the Tacaza Formation. Hydrothermal stages responsible for Ag mineralization have yet to be well defined in veins hosted in the Tacaza Formation. Our study was carried out on the Pomperia veins, 100 km north of Santa Ana near Puno, Peru. The aim is to study the paragenesis of alteration and mineralization and its relationship with silver geochemical variation.

Pomperia is a structurally controlled Ag-rich vein occurrence with mineralogical similarities to intermediate sulfidation epithermal deposits such as Santa Ana, but the quartz-poor character and the lack of adularia at Pomperia are distinctive. Veins cutting the Tacaza Formation lavas are composed of pyrargyrite, proustite, argentite, galena, sphalerite, hematite, chalcopyrite, and pyrite. Four paragenesis stages have been determined: I) fluidized breccias with a rock-flour matrix, which is believed to be the channel of the mineralizing fluids; II) barite, low-temperature quartz, specular hematite, and rutile; III) pyrargyrite, proustite, argentite, galena, and sphalerite (main mineralization); and IV) carbonates and amethyst quartz.

Mineralogical composition and identification of Ag mineralizing stages are significant in the mining cycle and can serve as a guide to exploration initiatives of the Tacaza Formation. Mineralogy of veining will be increasingly more important for geometallurgical evaluations as projects like Corani and Santa Ana continue to develop.