Sulfide paragenesis and alteration of the Shahumyan polymetallic vein-hosted epithermal deposit, Kapan district SE Armenia*

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The Lesser Caucasus is part of the west-central Tethyan metallogenic belt, which comprises multiple mining districts in Georgia, Azerbaijan, and Armenia. The Amulsar low-sulphidation epithermal deposit in Armenia and Gedabek an epithermal deposit in western Azerbaijan are examples of deposits found in two separate metallogenic periods. Amulsar is associated with Paleogene volcanic and intrusive rocks, whereas Gedabek is associated with Jurassic aged volcanic and intrusive rocks. Deposits found in the Kapan district of SE Armenia are similar in age to the Gedabek district and contain three prominent metallic deposits: Barabatum, Centralni, and Shahumyan. The latter is a polymetallic (Zn-Cu-Pb-Ag-Au), vein-hosted deposit and the only actively producing deposit in the district. The mineralization is hosted by the Barabatum volcanic unit, part of the Middle Jurassic volcanic complex composed of Bajocian and Bathonian andesite and dacite lava flows and intermediate volcaniclastic rocks. Currently, over 120 mineralized veins of varying thickness have been recognized at the deposit. The vein geometry is characterized by sub-vertical, south-dipping and E-W trending domains that contrast NW-trending Central, Eastern and Western Shahumyan faults.

The mineralization can be subdivided into two main mineralization stages: (I) a base metal (Cu, Zn ±Pb) rich phase, consisting of intergrown pyrite, chalcopyrite, galena and sphalerite and (II) a polymetallic phase (Au, Ag, Zn, Cu, and Pb), showing replacement of chalcopyrite and sphalerite by Pb, Bi, As, Sb ±Ag ±Au sulfosalts and precipitation of Pb-Bi-Au-Ag-Hg tellurides in fractures and along grain boundaries of pyrite, sphalerite and chalcopyrite. Vein textures include crustiform bands of alternating quartz-carbonate and sulfides as well as comb quartz textures. The alteration assemblages consist of quartz-sericite-pyrite (i.e., phyllic) envelope overprinted by a sericite-clay-pyrite-rich (i.e., argillic) assemblage proximal to mineralized veins with chlorite-pyrite-carbonate ± epidote alteration distally.

A preliminary alteration study consisting of shortwave infrared (SWIR) data shows systematic variations in the 2200 nm and 2250 nm features reflective of the white mica-illite and chlorite features, respectively. Three different population datasets were identified when the 2200 nm and 2250 nm features were compared to assay values. These populations show correlation to the two stages of mineralization, specifically, the polymetallic mineralization is associated with intermediate chlorite and intermediate mica. Current results may indicate that the different mineralization stages can be identified by characterizing alteration using SWIR data.