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The Geological Characteristics of the Newly Outlined Cu-Au Deposits at the Sharlo and Krasta Prospects, Northeast of the Chelopech Mine, Bulgaria

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The Sharlo Dere and Krasta prospects, located on the northeast flank of the Chelopech hydrothermal system, host newly defined zones of high-sulfidation (HS) Cu-Au mineralisation, that represent future mineral resource inventories at the Chelopech mine. The deposit is part of a large, Late Cretaceous magmatic complex formed in a back-arc basin.

The high-sulfidation (HS) mineralisation formed within a transition from a structurally influenced shallow intrusive related epithermal environment to an underwater hydrothermal vent system with sulfide- and sulfosalt-rich replacement zones. The mineralization is associated with a zoned advanced argillic alteration footprint and is hosted by a multi-phase 91.9±0.2Ma old dioritic intrusive system, which produced a variety of peperitic, mingling and fluidized features on the contacts. The Cu-Au (+Ag-Zn-Pb) mineralisation is manifested within a variety of settings and brecciation events, including structurally controlled subvertical phreatomagmatic feeders, stratabound breccia injections into the epiclastic formations, hydro-magmatic vent breccia flows, syn-sedimentary exhalative sulfide precipitates and reworked mineralised clasts in avalanche and debris flow deposits that were subsequently tilted according to the syn-formal basin architecture.

Mineralisation consists of pyrite, marcasite, sulfosalts, chalcopyrite, bornite, covellite, sphalerite, galena, with occasional presence of tellurides and other Cu sulfides (digenite, mawsonite, chalcocite, colusite) associated with quartz and barite. Two chalcophile associations can be distinguished by the geochemical analysis, including the economically more interesting Cu-Au-As-Sb-Bi-rich (sulfosalt-rich) and the Au-Mo-Tl-rich (pyrite-dominated) sub-domains, which shares similarities with the main ore bodies at the Chelopech deposit.

Two types of sulfosalt assemblages have been distinguished: enargite-luzonite and tennantite-tetrahedrite. The first one is characterized by high gold contents and is inherent to the more central parts of the ore bodies, the second occupies the outer reaches of the mineralized zones, being closely associated with the chalcopyrite-bornite paragenesis. An increased intensity of polymetallic minerals such as sphalerite, galena, and chalcopyrite is observed in the peripheral areas.