Mineral composition of the Late Cretaceous Breznik-Bardoto Au epithermal ore occurence (preliminary data), Western Srednogorie Belt, Bulgaria

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The Bardoto prospect is a part of the Breznik epithermal gold occurrence, which is located in the Western Srednogorie zone, near the town of Breznik, approximately 35 km west from Sofia. The zone is part of the Late Cretaceous Apuseni-Banat-Timok-Srednogorie belt, which is a major copper and gold metallogenic province in southeastern Europe. This province is characterized mainly by porphyry-Cu and Au-Cu epithermal deposits, which are typically clustered in major mining districts, such as Bor-Madjanpek in Serbia and the Panagyurishte ore district in Bulgaria. The Breznik epithermal gold occurrence is hosted in hydrothermaly altered Late Crateceous volcanic and volcanoclastic rocks of andesitic, trachyandesitic and trachybasaltic composition. The Bardoto prospect is the central part of the ore occurrence. It is characterized by ore mineralisation typical for epithermal gold deposits formed at low temperatures.

The opaque assemblage consists of pyrite (including arsenian pyrite, As: 7-10wt%) chalcopyrite, galena, sphalerite, tennantite, tetrahedrite, pyrrhotite, native gold, electrum, magnetite, hematite, marcasite, ilmenite, chalcocite, covellite, malachite, cuprite and cerusite.

Pyrite is the most abundant opaque mineral. It forms mainly semi-euhedral, xenomorphic, euhedral or rarely colloform rounded grains and aggregates from 20 μm up to 2–3 cm. On the basis of its textures and chemical composition at least three varieties of pyrite are distinguished. The first one is related to pre-ore hydrothermal alteration and consists of fine disseminated grains of pyrite without any trace element contents over 0.0X wt%. The second variety is associated with other sulphide minerals, which generally replace or crosscut the pyrite. This pyrite has significant contents of Cu and lower contents of Ni. The most unusual is the third variety of pyrite forming rounded colloform aggregates with zonal textures. Their central parts have Cu and As concnetrationsabout 0.5 wt% and they are rimmed by layers of pyrite with extremely high contents of As and significant contents of Cu and Sb. The outermost part of the aggregates comprises very fine crystals of marcasite.

Chalcopyrite is associated with pyrite as irregular aggregates cutting early formed pyrite or fine nests among large pyrite aggregates. Chalcopyrite is typically associated with tennantite, in some cases tennantite rims chalcopyrite and in the marginal parts, chalcopyrite appears to be replaced by tennantite. The most probable is that both minerals are formed in narrow interval of mineralization process. Chalcopyrite also has high contents of As and low concnetrations of Sb.

Galena is present as fine, isometric slightly rounded inclusions in pyrite and asrare, irregularly shaped inclusions in chalcopyrite. Inclusions found in pyrite do not contain any trace elements while those in chalcopyrite are characterized by the presence of Se and Ag.

The obtained data show some differences in mineral composition with respect to ores reported in previous studies from the northern part of the area. The reported mineral association is more typical for intermediate to low sulphidation types of copper-gold deposits. The absence of enargite, luzonite, arsenosulvanite, colusite and other minerals usually found in the high sulphidation type are not observed here. Arsenic is present in high quantities in arsenian pyrite, which is one of the rare findings of this variety in Bulgaria. It is also registered in chalcopyrite and As-rich members of the tennantite-tetrahedrite series are distinctly dominant in the samples of this study. From this point of view, there is a misevaluation, and the prospect should be reclassified as a transitional type between intermediate to low sulphidation types of Au epithermal deposits.