

PB-ZN MINERAL DEPOSITS ASSOCIATED WITH BLACK SHALES IN THE SASA-TORANICA ORE DISTRICT, REPUBLIC OF MACEDONIA (SOUTHEASTERN EUROPE)

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The polymetallic Pb-Zn mineralization associated with black shales (mostly quartzgraphite) are concentrated in several places in the southern parts of the Balkan peninsula or in the known Besna Kobila-Osogovo-Tassos metallogenic zone. The Sasa-Toranica ore district occupies the central parts of the zone involving several lead-zinc deposits, the mineral potential of which exceeds 150 million tons of ore. The Sasa and Toranica ore deposits are hosted by metamorphic and volcanic rocks. The largest part of mineralization is associated with metasomatic ore bodies and in the Golema Reka site it is associated only with quartzgraphite shales. Ore bodies are located at the contact between quartzgraphite schists and gneisses, limestones, or quartzlatites. Ore bodies have the form of bands, layers, and lenses, distributed in limestones irregularly. Their thickness varies from 1 to 20m. They stretch from SE to NW or S to N according to the general strike of the structural-metallogenic zone. The length of some ore bodies varies from 1500 to 1800m. The mineral association in the ore deposits includes: galena, sphalerite with variable abundances of Ag-minerals, including native silver accompanied by Fe-sulphides, Bi-minerals, sporadically Cu-sulphides. Trace of gold also occurred sporadically. Results from fluid inclusions examined indicated, that ore-bearing fluids were of Na-Cl type in which the concentrations of dissolved salts amounts from 4 to 4.9 eq% in quartz, to 15.6 eq% in sphalerites. The temperature of formation of all parageneses ranges from 450°C to 190°C, the major sphalerite-galenite parageneses were formed at temperatures from 370°C to 320°C. Investigation of S, C, O and etc. isotopes indicated to endogenous origin of ore metals and solutions ensuing the Pb-Zn mineralization in the investigated district.