

THE SUPERLARGE TIN DEPOSIT SYRYMBET (NORTHERN KAZAKHSTAN): GEOLOGICAL SETTING AND ORE FORMATION CONDITIONS

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The deposit is situated within the Kokchetav central massif of Paleozoic age; it is explored up to depth of 900 m. Ore lode is confined to the deep-seated fault zone directly connected with hypabyssal, evolving for a long time granite chamber and has controlled the emplacement of its later leucogranite Li-F differentiates.

The deposit was formed during intensive pneumatolytic-hydrothermal process divided by the discrete intrusions of leucogranite magmas into skarn, greizen, and hydrothermal stages. Mineral-forming process was accompanied by constant input of Sn and other ore elements, by their re-distribution and re-deposition resulting in generation of high-grade contrast ores. This led to a great variety of mineral forms (more than 80) including properly Sn-minerals and Sn-bearing ones.

Tin-ore mineral associations of skarn and greizen stages were deposited from high-temperature heterogeneous halogen-CO₂ Sn-bearing fluids. The latter during skarn stage were represented by low-density gaseous phase and salt brines, during greizen stage - by aqueous-CO₂ fluid and salt brine. The minerals of hydrothermal stage were formed from aqueous-CO₂ high-saline solutions.

The formation of unique reserves and high-grade complex ores was defined by the following factors: a) the existence of evolving for a long time chamber of granite magmas specialized for Sn and other lithophilic elements; this provided prolonged and steady entering of the powerful fluid-magma-heat flow into the Earth's crust upper part; b) multi-stage character of ore formation; c) extraordinary high salinity of fluids transporting considerable amounts of Sn and other ore elements; d) sharp contrast of geological and physicochemical conditions of ore deposition.

These specific features may be considered as necessary criteria of this type superlarge deposits formation to be mined out in the Third Millennium.