

SEG 2023 Conference: Resourcing the Green Transition

Reassessment of Rare-Metal Potential of the Karagaily-Aktas Deposit (Kazakhstan)

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The Karagaily-Aktas rare-metal deposit is located in the Terskey Alatau mountains at 2,300- to 3100-m altitude, 20 km southwest of Narynkol, Almaty region. Several stages of exploration were carried out during 1956-1983.

The deposit (“Central”), together with occurrences at Noviy, Lesnoy, Vostochny, and Dalniy, forms an ore field of 12-km extension. Tungsten-tin mineralization is associated with a dike of greisenized granite intruding the Lower Paleozoic shale-carbonate package. The main orebodies amount to about 80-90% of all tin reserves, represented by vein and veinlet zones composed of quartz, topaz, feldspar, and mica. Orebodies with complex shapes are concentrated in the foot and hanging walls of the greisenized granite dike. The orebodies stretch along the strike for 300 to 740 m, thickness varies from 1 to 23.8 m, and vertical extension down the dip is steep to the south for up to 250 m at sub-latitudinal strike. Ores have mica-quartz composition. The main commodity is tin contained in cassiterite, accompanied by tungsten, lithium, feldspar, beryllium, rubidium, caesium, and rare earths.

The total ore reserves amount to 16.4 Mt (medium-size deposit); tin reserves are 78.7 Kt—average grade of 0.48%; tungsten reserves are 19.7 Kt—average grade of 0.12%. Apart from tin and tungsten, the deposit has significant credits of lithium dioxide (reserves >28 Kt) and beryllium oxide (reserves ~5,000 t).

Processing tests showed the possibility of obtaining rare metals concentrates. The recoverability of tin was 62-80%, tungsten trioxide 52-68%, and lithium oxide 54-93%.

The ore field around the Karagaily-Aktas deposit is underexplored (total reserves estimated at 50-60 Kt tin; large-size tin deposit). Increase of the reserves of tin ores and accompanying metals can be achieved by exploration of deeper horizons and prospecting in the periphery of the deposit, including thermal waters. Current exploration aims to incorporate new areas and improve the deposit model.