

East Kazakhstan Rare Earths Deposits Formation

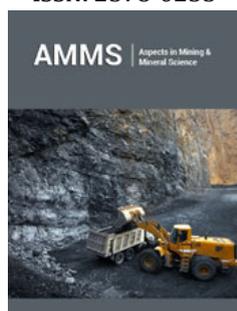
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Abstract

The main rare-metal structure of the region is the Kalba-Narym granitoid belt of the northwestern direction, formed in the Hercynian cycle in a post collisional (orogenic) geodynamic setting. The spatial-genetic relationship of the leading geological-industrial type of deposits of rare-metal pegmatites (Ta, Nb, Be, Li, Cs, Sn) with medium-coarse-grained biotite granites of the 1st phase of the Kalba complex P1 is emphasized. The revealed laws of formation and spatial accommodation of deposits of rare metals in Kalba Narym zone and other geological structures are the important criterion for forecasting and searching the new ores objects on East Kazakhstan territory.

Keywords: Kalba Narym zone; Granitoids; Deposits; Pegmatites; Rare metals

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Introduction

The examined territory is a part of the Central-Asian mobile belt zone and unites geological structures of Great Altai including Rudny Altai, Kalba Narym, Western Kalba both Zharma-Saur and abuted areas of Russia and China. Borders are the northwest deep breaks separating hercine structures of Great Altai from caledonide formations of Mountain Altai (in the northeast) and Chingiz-Tarbagatay (in the southwest). General extent of territory is more than 1000km while 300-400km at width [1]. The formation of geological structures contacts to general geodynamic model of Paleosasiatic ocean evolution and was defined by system of complex cooperating continental lages of the Siberian and Kazakhstan subcontinents. Modern geological structures of region are tectonic enclave of ancient paleocontinents and litospheric blocks (or collage terrains), which drifted in Paleosasiatic ocean and have confronted in the process of hercine collision (C1-C2-3), having formed uniform structure of Great Altai. According to the region's metallogeny we allocate here four ore belts of a belt zone: Rudny Altai (copper-polimetallic), Kalba Narym (rare metals), West Kalba (gold ore) and Zharma-Saur (multimetal). The geological formation development and mineralization occurred in a mode of oceanic riftogene (PR3), then in early (riftogenic, islandarcic), average (collision) and late (post collision) stages of coledanic and hercine cycles and was finished by continental riftogenes and neotectonic orogeny in mesozoic and cainozoic.

Mini Review

Kalba-Narym belt is the largest adjoining to Irtysh shear zone and extends in the northwest direction on 500km and further proceeds in Russia and China [2]. On the geology-geophysical data it is supposed, that this granitoid belt is placed in a head part of huge tectono-magmatic zone, steep fallic on the northeast under Rudny Altai. The centers of magma formation arose, by granite melts structure in metagranite layer or on its border with metadiorite layer. The transit heat mass stream zones have penetrated from the bottom parts of EC and top mantle

on system of deep breaks. The belt is combined with mainly normal granite and leucogranite of the Perm age, to which the deposits of rare metals are generically connected (Ta, Nb, Be, Li, Cs, Sn W).

We allocate the following ore formation types of deposits:

- a. pegmatite rare metals (Ta, Nb, Be, Li, Cs, Sn), submitted by the main industrial deposits (Bakennoe, Belaya Gora, Yubileinoe etc.) [3,4];
- b. pegmatite beryl-microcline in which mineral deposits are blockic microcline and quartz, muscovite, beryl and columbite (Asubulak, Lobaksai, Nizhne-Laibulak etc.);
- c. albite-greisen tin-tantalitic (apogranitic) in the latent granite domes, potentially perspective on revealing Ta, Sn, Be, Li (Karasu);
- d. greisen-quartz vein cassiterite wolframic submitted by ores of wolframite, scheelite and cassiterite (Cherdoyak, Palate, Kaindy, etc.);
- e. fiddgenic tantal-cassiterite-wolframic, forming tantalite loses, cassiterite, wolframite, scheelite and monazite.

The basic model of formation for main industrial rare metal - pegmatite of Kalba-Narym belt deposits is defined by their genetic connection with granite of kalba complex (P1) and spatial accommodation of ores veins mainly in granite files and their ekzokontaktes. The processes of pegmatite formation probably occurred in open or semi-closed magmatic system at rhythmic - pulsating receipt of ore-bearing distillates (H₂O, F, B, Cl, Ta, Nb, Be etc.) from cameral center of granite files (under the conditions of the increased activity of ore-controlling breaks). Pulsating receipt of ore-bearing solutions has determined multi rhythmical zones of ash value pegmatite veins, the color quartz - lepidolite-cleavelandite and spodumene with rich complex ores (Ta, Nb, Li, Cs, Be, Sn) and increasing concentration of mineralization veins stages development of mineral complexes from oligoclase-microcline (vein orig.) up to albite. The carried out research have shown that ore-generating ability of granitoid, alongside with petrologic by the factors, in many respects depends on geodynamic conditions stand of files and scales degasation ore-bearing melts. From these positions, certain ore-magmatic systems differing on the scale miner were planned. The above-intrusive system of active interaction granite intrusion with lateral breeds raised carbonaceous and calcindition in mobile tectonic conditions.

Conclusion

Rare metal mineralization (Ta, Nb, Be and others) concentrated in a frontal part of stratified intrusive bodies, in their apofise and branches, and in lateral breeds of ekzocontacte. The main industrial type is Bakennoe deposit [3]. The inside-intrusive system of cameral corner formation of ore pegmatite veins in granite files complicated by explosive tectonic. Ore-controlling was the regional breaks of sub latitude streamline, opening residua: cameral of ore-bearing melts, and ore-locading were zones raising cracks and zones of increased fissing and independent system of cracks in granite at ore formation rare metal pegmatites of albite sub formation, uniting various mineral complexes (albite-microcline, albite, albite-spodumene etc.) were generated. Ore bodies contain the unique minerals cleavelandite, colored and polychrome tourmalines, lepidolite, spodumene, petalite, pollucite and others. The deposits have industrial values (Yubileinoe, a White Mountain. Werkhnya Baimurza etc.). According to the features of the mineral composition Kalba, pegmatite deposits have similarities with the foreign objects [2,5,6]. The revealed laws of formation and spatial accommodation of deposits of rare metals in Kalba Narym zone and other geological structures are the important criterion for forecasting and searching the new ores objects on East Kazakhstan territory.

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