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Regularity of formation and criteria of forecasting rare metal deposits in East Kazakhstan

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Currently, Kazakhstan has a problem of recreating its own mineral resource base of rare metals and, above all, tantalum, niobium and beryllium, which are widely used in the field of high technologies [2]. The objects of research are Qalba region, Rudny Altai, Zharma-Saur and Chingiz-Tarbagatay. The main rare metal-bearing structure is orogenic granitoid belt of Late Hercynian (postcollisional) activation ($P_1 - T_1$).

Established spatial confinement of rare metal belt to the tectonically weakened zones in the continental blocks of increased siallitic Earth crust and crustal thickness (45-52 km) [1].

Established the basic regularity of formation and distribution of leading geological and industrial types of rare metal and rare earth deposits: epimagmatic (Nb, Zr, TR), rare metal pegmatite (Ta, Nb, Be, Li, Cs, Sn), albite-greisen (Sn, Ta, Li), greisen-quartz vein (Sn, W, Mo, etc.) and considered the criteria for their forecasting.

Qalba-Naryn granitoids belt formed at the boundary of the Irtysh zone crumple and Western Qalba. This is the main rare-metal structure, in which concentrated deposits of rare-metal pegmatites (Bakennoe, Yubileinoe, Belaya Gora, etc.). The model of formation of pegmatite is determined by their genetic connection with normal granites of Qalba complex P_1 at the rhythmically pulsating admission of ore-bearing distillates (H_2O , F, B, Cl, Ta, Nb, Be, etc.) from the intercameral granite massifs. Pulsatile flow of pegmatite forming fluid defined polyrhythmic zonation of the pegmatite veins and phasic development of unique complex of minerals (cleavelandite, lepidolite, spodumene, petalite, pollucite, amblygonite, colored tourmaline, tantalite-columbite, et al.), which are indicators of the ore process. On these feature pegmatite deposits compared with foreign deposits such as Bernik-Lake, Bikita, Koktogay et al. [3-4]. Ore-forming ability of granitoids, along with petrological and other factors, depends on the geodynamic conditions of formation of massif and scope of degassing of ore-bearing melts. Forecasting criteria of deposits determined by the development of large granitoids belt, becoming massif in tectonically tense atmosphere in unbalanced PT-conditions, ore-controlling role sublatitudinal deep faults of the ancient laying and prolonged activation, intensive processes of metasomatism in pegmatite veins.

A great scientific and practical meanings is attached to the evaluation of extrapegmatite rare metal mineralization (Sn, Li, Ta), associated with albitized and greisenized granites (Qarasu, Novo-Ahmirovskoe, Apogranite, Alakha etc.). The host granites of normal range close to the lithium-fluorine granites (V. I. Kovalenko, 1977). The main ore minerals - cassiterite, tantalite-columbite, tsinvaldit, spodumene, zirconia, etc. Prognostic reserves of these objects are significant. Forecasting criteria consist in the study of albite-greisen metasomatite in endocontact and apical zones of hidden granite massifs, stock-shaped bodies of albite-spodumene granite.

Akbiik-Akzhaylyausky belt in Zharma-Saur, different from rare metal rare earth mineralization profile. The greatest practical interest presented by epimagmatic niobium-zirconium-type of rare earth deposits,

genetically associated with alkaline granites of qeregetas-espinsky complex P₂-T₁ (Verkhnee Espe, Biesimas et al.).

Geological genetic model of deposits due to processes of albite-riebeckite metasomatism with additional supply of Zr, Nb, Ta, Y, TR. Mineralization is represented by impregnation of zircon, pyrochlore, thorite, gagarinite. Verkhnee Espe deposit has commercial value.

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