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Review Article

PROSPECTS FOR IDENTIFYING AND EVALUATING NEW RARE METAL DEPOSITS IN UZBEKISTAN

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ABSTRACT
Seven elements out of the group of rare, disseminated and rare-earth elements – In, Cd, Se, Te, Y, Re, Sc – are mined in Uzbekistan, mainly in the process of uranium production waste, sulphide ores of copper-molybdenum and polymetallic deposits. The article considers the prospects for identifying new rare metal deposits in Uzbekistan

Keywords: *Rare Metals, Granite, Shale, Mineral, Scandium, Yttrium, Lithium*

INTRODUCTION
The scale of extraction of dispersed elements is considerable - thousands of tons of cadmium and selenium, tens or hundreds of tons of tellurium, germanium, indium and gallium, a few of rhenium, thallium and scandium. Among rare-earth elements only yttrium reaches economic concentrations so far. The list of rare elements has been constantly changing, and, obviously, will not remain constant (Rogovoy, 2000; and Solodov, 1997).

DISCUSSION
Each of the rare elements has its own paragenetic (geochemical) association based on its settings in different rock types. The most typical are: for basic rocks - vanadium, strontium, cadmium, scandium and elements of platinum group; granitoids - lithium, rubidium, yttrium, rare earth group, cesium, beryllium, niobium and tantalum with the ability to concentrate to economic scale; alkaline rock- zirconium, gallium, hafnium, niobium, beryllium, strontium and cerium group elements.
The rocks of transitional series (from granitic to alkaline, and from basic to acidic) have associations of rare elements of intermediate character - rare earths of yttrium group, zirconium, niobium, tantalum. Among the sedimentary rocks, clays and clayish-shales have the highest rare-metal concentration of boron, selenium, cesium, lithium, rubidium, gallium, germanium, scandium. Clayish-shale facies have drastically high concentration of organics, uranium, vanadium, selenium, rare earths, molybdenum, etc., coals are highly enriched with germanium, vanadium, molybdenum, uranium, boron, lithium, gallium, tungsten, rare earths and bismuth.
Uranium, rare earths, boron, strontium, scandium, iodine, zirconium, selenium and others accumulate in phosphorites; strontium, rubidium, selenium; bauxites - gallium, vanadium, niobium, zirconium, strontium, scandium and others accumulate in salts (sulphatolites and halolites); germanium, vanadium, arsenic, scandium, rare earths and others – in hydroxide iron ores. Boron, lithium, tungsten consist a special group contained in highly concentrated brines of complex origin. Today more than 400 minerals of rare elements and their varieties are known, while the minerals-concentrators account for more than 1000.
Though rare elements have been regularly used in industries only since the second half of the XX century, their usage became an indicator of scientific and technical progress, essentially new resource - saving technologies, new high-quality materials with set qualities providing reliability and durability of machines and mechanisms, bioenergetic characteristics, medical research, genetic engineering etc.

The raw materials market of rare elements is characterized by muticomplexity of mineral raw materials, complex technologies of extraction and obtaining of market products under limited production volumes, highly efficient usage of rare elements makes it cost-effective. Rare elements are used in manufacture of high-quality steels, superalloys, composite materials and new ceramics, electronics, optical devices, high - temperature conductors. Cerium, platinum, rhenium are used in oil cracking, in agriculture (microadditives) to cultivate grain, tea, tobacco, sugar beet, cane and other crops.

Production of tantalum capacitors alone has reached 6 billion units in the world and keep increasing on. Niobium, scandium and europium play an exceptional role in production of such new items as magnets, low-temperature superconductors, infrared image converter with germanium basis and other electronics. The importance of secondary production in the total volume of rare elements used in the armament and space industries as ultra-pure metal compounds.

The high demand for rare elements has led to a worldwide increase in expenditures on research and rare-metal exploration which, as an example, has been characterized by the doubling global rare earth metals reserves over the past decade, thus supplying 1,500 years at current demand rate. The State Committee for Geology and Mineral Resources of the Republic of Uzbekistan makes adjustments to the exploration works, especially for tantalum, niobium, beryllium, lithium, etc., which are highly deficient in the world metals market. The demand for tantalum tends to grow annually by 4-5%.

Rare-metal potential of the Republic for heavy and light elements of lithophile group (tantalum, niobium, lithium, beryllium. cesium, etc.) is associated with granite-leucogranite- alaskite formation (apogranites and granite pegmatites). Apogranites and quartz-feldspar-mica pegmatites are characterized by drastically increased content of tantalum-niobates, beryl, fluorite, rare alkalis and rare-earth elements.

In the 70-90's, due to a steady absence of industrial demand for rare metals in Uzbekistan and their certain decline in the world market, geological exploration works almost ceased. The granite manifestation of Bayankara (Ta, Nb, Li, Be, Rb, Sn) with ore bodies of vein-stockwork type was revealed in the Karatyube mountains in South Uzbekistan. That has caused a new approach to evaluating some distinct types of rare-metal mineralization. This is the case of rare-metal localization in both granite massifs, and arc-shaped as well as extended linear-contact zones of the frame, which expands exploration works. The preliminary classification of deposits by ore-formational type, vertical extent of mineralization allowed to determine seven prospective areas, make a list of them and their location scheme.

It was found that a number of rare-metal objects correspond to small and medium deposits of granite formation in different regions of the world (Russia, Kazakhstan, Algeria, Nigeria, Ethiopia, etc.) according to mineralization and concentration of tantalum, niobium, beryllium, lithium and cesium. In recent years several carbonatite deposits of tantalum-niobates have been identified in the territory of Kyrgyzstan in Turkestan-Alay. Among them Tutek and Delbek are sub-angular bodies of carbonatites, hornblende and albitites with pyrochlore, zircon, zirtolite and thorite around dike-like bodies of syenites, nepheline syenites and alkaline granites. The deposits are large, containing (in metal) 0.067% tantalum and 0.031% niobium.

One of the next important geological objectives should be selection of areas with likely prospective fields to identify uncommon carbonate-rare-metal mineralization in Western and Southern Uzbekistan. Calculations made in process of tantalum production from rare-metal pegmatite concentrates indicate the possibility to reduce its cost by 2-3 times by complete processing of non-metallic and rare-metal components.

Thus, a significant resource potential of the Republic of Uzbekistan can be used both to increase the rare-metal mineral resource reserves and to create the industry for mining and processing of the own tantalum-niobium, berillium and rare-alkali (lithium, rubidium, cesium) ores deposits.

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