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Title: PROSPECTS FOR NOBLE METALS DEPOSIT IN GRAPHITE BEARING METAMORPHIC ROCKS OF THE KHANKA TERRANE, RUSSIAN FAR EAST

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Abstract: Gold and PGEs contents of economic interest were ascertained in high-carbonaceous metamorphic rocks of the northern part of the Khanka terrane for the first time. The graphite saturated metamorphic sequence occurs over a vast territory between the rivers Kabarga, Tamga, Ruzhinka, and Kedrovka, Primorye. This complex involves biotite-feldspar-quartz, garnet-biotite-feldspar crystalline schist, and marbles injected by leucocratic and biotite granite-gneiss and concordant dykes of lamprophyre. The graphite is widespread in all mentioned rocks as dispersed phase, mono-mineralic veins and flattened lenses with high contents up to 36 %. The described Pre-Cambrian rocks occur in the core of a diapir fold structure which is enveloped by black shales, alternating with carbonate and volcanogenic rocks of the Lower Cambrian age.

To define a prospective potential of these rocks for noble metals mineralization, all the rock varieties were analyzed by the ion mass spectrometry, atomic absorption, inductively plasma-atomic emission, and neutron - activation methods. In result, a wide range of noble metals content was measured (ppm): Au - 0.02-40, Pt - 0.04-52, Pd - 0.02-5.67, Rh - 0.002-0.055, Ru - 0.007-0.2, Os - 0.011-0.09, Ir - 0.002-0.055. It is significant that dominant part of metals has been concentrated in graphite.

Only thin flakes of native gold were noted within graphite, while visible mineral PGE forms were not found. Common inclusions of ore and accessory minerals of micron and submicron sizes were revealed within graphite flakes by the high-resolution transmission electron microscopy: Th-bearing monazite, zircon, magnetite, arsenopyrite, apatite, barite, Y-Th-P phases, Cu-Sn, and Cu-Sn-Fe alloys. The elevated contents of rare and trace elements such as Sr, Cu, Zn, Pb, Sn, W, Hg, Ni, V, Cr, Zr, La, Ta, Nb, Re, were noted by X-ray -fluorescent analysis. In addition, these rocks always contain volatile

components- F about 100-400, Cl up to 40 ppm, P₂O₅ up to 0.48, and SO₃ from 0.021 to 0.10 % mass.

Measurement of the carbon isotope composition in graphite of rocks positioned in the core of paleodiapir derived rather uniform values of $\delta^{13}\text{C}$ ranging from -8.5 to 8.7 per mil, indicative of the mantle source. Globular microstructure of graphite detected by the atomic-force microscope may be caused by a gaseous condensation of carbon with lowering temperature. Abundant development of graphite along zones of jointing, dislocations, and deep-seated faults supports an endogenic source of carbon. Thus, fluid-magmatic source of carbon and noble metals may be supposed.

The commercial noble metals content, as well as the terrestrial abundance of graphite-bearing rocks, and their considerable vertical thickness allow the possibility of a major deposit in the region.