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CRITERIA AND SEARCH SIGNS FOR ENDOGENOUS MINERALITY IN NORTHERN BUKANTAU

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Abstract
This paper examines the geological structure and patterns of placement of the copper-gold ore occurrence. For the first time, the industrial significance of Cu mineralization in North Bukantau was shown on the example of the Karamurun ore occurrence, which have great promising potential for expanding the raw material base of the Central Kyzyl Kum.

Keywords: North Bukantau, gold, honey, tungsten, fluxes, search criteria, acid effusive, volcano - plutonic, dark brown color, in halos.

Introduction

In world practice, issues related to the forecast and prospecting of copper-gold deposits are based on the patterns of formation and localization of mineralization. One of the underexplored and promising objects is the North Bukantau copper and gold mineralization.

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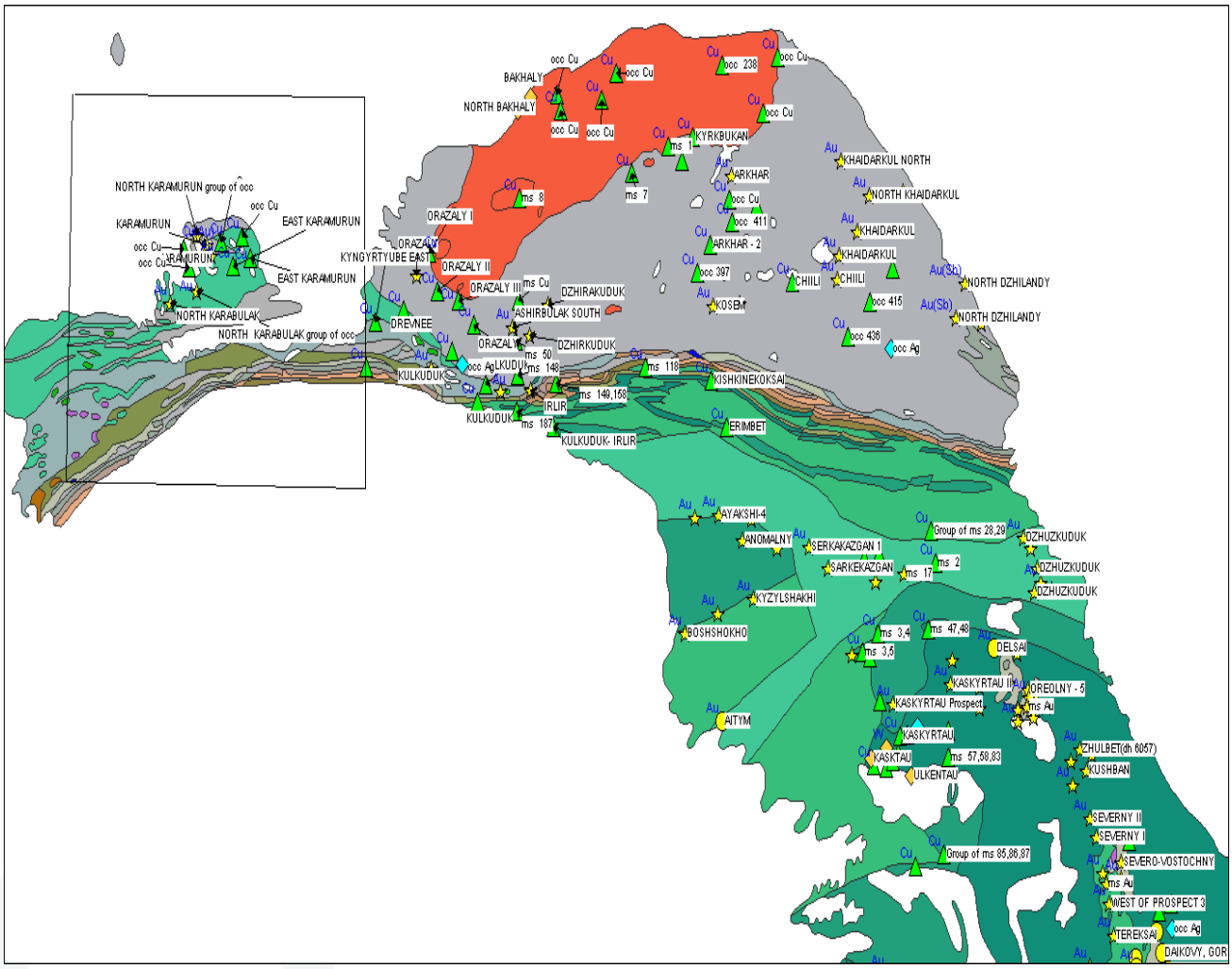

Fig. 1. Schematic geological map of North Bukantau with copper and gold objects

Numerous objects of copper and gold mineralization were found in the study area (Fig. 1) [1].

Copper mineralization has been known in North Bukantau since the 30s of the last century. Since then, numerous manifestations of Cu of various formational affiliation have been established here, including: copper pyrite, skarn, vein, but until recently, more than one object of practical interest has not been found in the region. This led to the absence of developed and tested prospecting criteria and signs of Cu mineralization.

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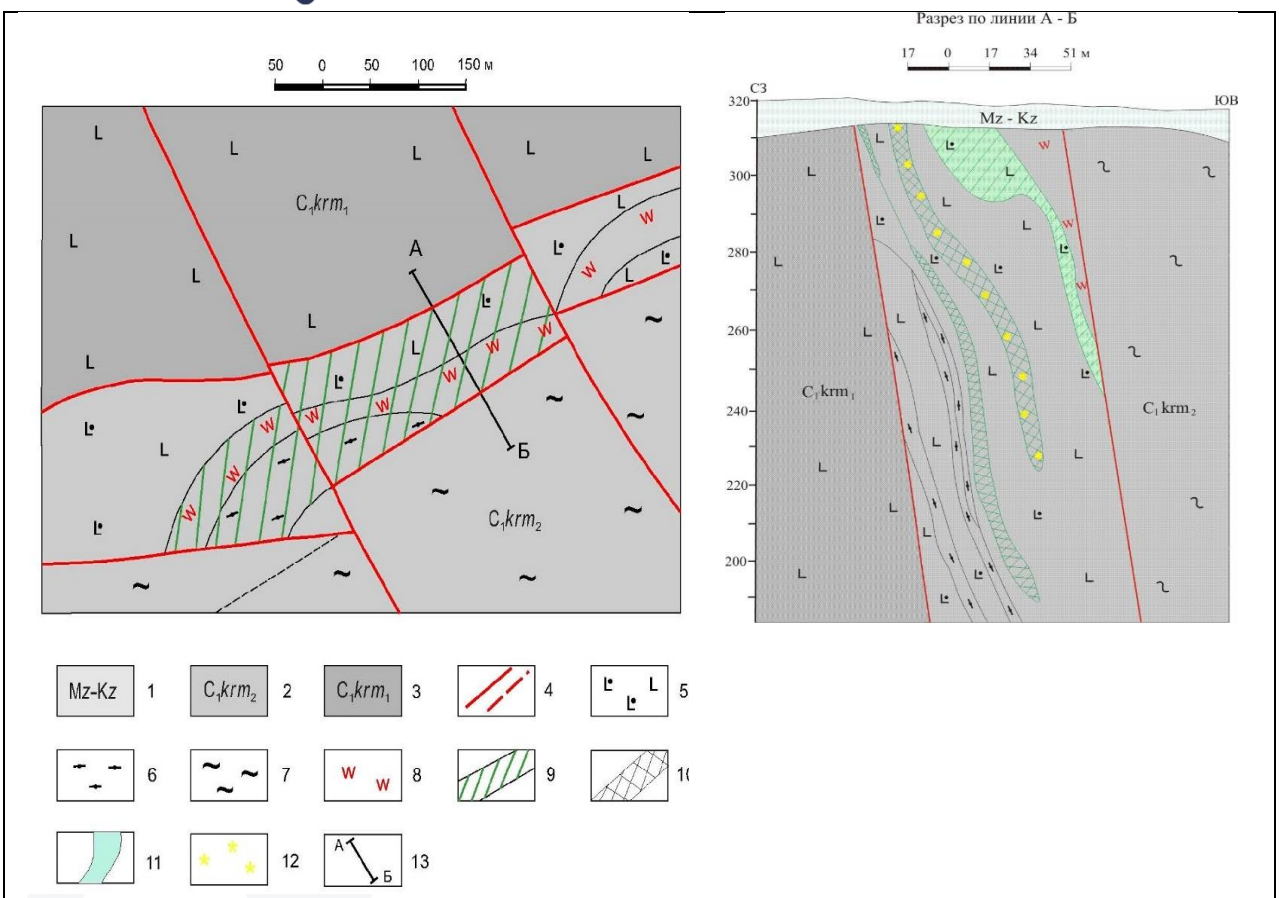

1-Meso-Cenozoic deposits; 2 - Lower Carboniferous, upper part of the Karamurun Formation, cherts, siliceous schists with interlayers of tuffs and lavas; 3 - Lower Carboniferous, lower part of the Karamurun Formation, basalts, andesite-basalts and their tuffs; 4 - tectonic faults; 5 - tuff lava and tuffaceous-terrigenous rocks; 6 - flints; 7 - shale; 8 - secondary quartzite; 9 - zone of development of lenses of massive copper-pyrite ores (diagram); 10 - copper-pyrite ores along the side 0.5% (section); 11-geochem. halos with a Cu content of 0.2%; 12 - Au inclusions in sulfides; 13 - cut line.

Fig. 2. Schematic geological map of the Karamurun deposit (Maripova, 2016) [6]

For the first time, the industrial significance of Cu mineralization in North Bukantau was shown on the example of the Karamurun ore occurrence, discovered during the geological survey (Aisanov, Egorov, 1981) [2] and prospected by the Karamurunskaya GPP (Denezhkin et al., 1984). At present, this ore occurrence has been transferred to the category of small complex copper and gold deposits (Fig. 2) [3].

The Karamurun ore field, with the central block and ore occurrences North-East Karamurun, North Karamurun are located in the conjugation zone of a thick sub-latitudinal shear belt in the main volcanics of the trachybasaltic formation (Tubabergen Formation - C_2) with NW-striking faults. Ore bodies in the zone form a series of en-echelon lenses with a total length of 600 m. [4]

It was statistically established (Usmanov, Maripova et al., 2008) a close spatio-temporal relationship between pyrite mineralization and basaltic magmatism, represented by sodium basalts of the Karamurun Formation, performing a rift-like structure on an essentially basaltic substrate (oceanic crust) [5].

With the development and buildup of the continental crust, the products of subsequent magmatism are enriched with potassium with the appearance of differences passing to the potassium - sodium series (Tubabergen and Kulkuduk formations). The rift-like trough was laid directly in the deeply penetrated fault zone, along which the magmatic material was supplied. Copper geochemical specialization is characteristic of volcanics close to the deep fault zone. With increasing distance from the zone, the later stages of volcanism are characterized by polymetallic specialization, in which Cu plays the role of a by-product. Elements such as tungsten, Sn, As, Sb appear here.

In the created electronic geological map and a map of minerals of the Republic of Uzbekistan at a scale of 1: 500000 Mikhailov, Maripova et al. (2005) in the attributive table [7], compiled on the basis of the materials of Arapov et al., Contains the following information on the Karamurun deposit. The ores are classified as a Zn-Cu-pyrite Au bearing formation. Mineralization is spatially related to the main volcanics of the Tubabergen Formation (C_2), among which a series of ore lenses with vein-disseminated mineralization is traced. In addition to copper, the contents of zinc, gold, cobalt - Cu (Zn, Co, Au) have been established in ores. The content of useful components - Cu - 1.3-2.5%, Zn - 0.7%, Co - 0.1%, Au - 0.9 g/t; morphology of ore bodies - lenses.

Technological studies (Akhmedov et al., 2010) showed that copper-pyrite ore contains rare elements: rhenium 0.08 g/t, selenium 82 g/t, tellurium 3.78 g/t, molybdenum 0.005%, as well as a significant amount of quartz (70%) and a small amount of alumina (up to 3%), a small amount of carbonates (0.3-0.5%), which makes it possible to consider this ore as a raw material for the production of fluxes. Thus, according to the classification of one of the authors of this article, the geological-industrial type of mineralization in North Bukantau, i.e. copper (zinc) pyrite with gold (mineralized zones in volcanic rocks) is most interesting as a type of potentially possible industrial mineralization [8, 9].

The prerequisites and prospecting signs of Cu pyrite mineralization in North Bukantau based on the collection materials are presented below.

Analysis of the data from Kishinskaya et al. (2012) geological and geophysical studies and their comparison with the well-studied pyrite-bearing provinces of the Urals, which is part of the common planetary Ural-Mongolian fold belt, made it possible to conclude that the type of section of the productive formation, their history of development and the nature of mineralization are good are compared with the pyrite-bearing province of the Cyprok-Mugodzhar type, developed in the South Urals. For provinces of this type, as well as for the studied area, the development of basaltoids of a homogeneous and contrasting formation with a very poor acidic component (fraction of a% of the volume of sediments), represented mainly by subvolcanic bodies, is characteristic.

The distribution of mineralization within the development of the productive part of the section is multi-tiered, i.e. placement of pyrite ore bodies at different stratigraphic levels.

One of the most important criteria for prospecting and forecasting is the multi-tiered mineralization, established by analyzing the passports of core drilling wells and geophysical data from the Central block of the Karamurun field (LBD, OFAP, funds of the Geolinformtsentr State Enterprise).

The widest areal development is used by the first, upper level, which coincides with the near-roof part of the essentially basaltic section at the contact with overlying volcanomictic sediments. A transitional member with a thickness of 200-250 m has been identified here, consisting of interbedded tuffaceous material, often transformed into a chloride aggregate, cherts, siliceous schists with interlayers of basaltic lavas. There are interlayers of felsic effusive rocks transformed into quartz - feldspar metasomatites. Ore bodies are localized at the base of the member and in its middle part. The ores at the base are essentially chalcopyrite, while in the middle part there are pyrite - chalcopyrite - sphalerite.

The second level is located within the volcanic section and is confined to the boundaries of individual lava flows, which are fixed by interlayers of silicon, silts and reclaimed volcanic material.

The most productive is the upper level, which is associated with the main deposits of the Karamurun field. The determining factor for the localization of ores at this level is the presence of paleo-depressions associated with zones of ore-conducting faults.

Another exploratory feature is the appearance of colomorphic pyrite, which forms separate clumps, often with single disseminations of chalcopyrite. The combination

of such mineralization with a favorable lithological composition of rocks suggests the presence of pyrite deposits.

An indicator of hidden mineralization is zones of sheared rocks with poor chalcopyrite - sphalerite, pyrite mineralization localized in quartz - carbonate veinlets. Such zones are usually developed in the hanging flank and along the uprising of ore bodies, and it should be noted that in the supra-ore parts the sphalerite is highly ferrous and has a dark brown color. It is lighter at the ore levels.

Geochemical signs, in terms of their informativeness, can also be attributed to direct search signs [10]. The halos corresponding to ore bodies are characterized by stable positive correlations between Cu, Zn, Co, and Au. In the halos, the following zoning was established by the uprising of ore bodies: Co-Cu-Zn-Au, Pb-As-Ag-Sb.

Indirect signs include the data of magnetic prospecting, which can be used to delineate paleo-depression and volcano-plutonic edifices. Local decreases in the magnetic field strength in the contour of positive anomalies in a number of cases can be compared with the areas of ore-conducting channels and the development of metasomatites [11]. The peri-ore alterations near the ore-supply channels are quite

well manifested and zonal in their structure. The central part of the channels is represented by Ser-Q, Ser-Cl-Q metasomatites, which are gradually replaced by Cl-Q, Cl-epidote-Q, and Cl-epidote-carbonate rocks [12].

An additional feature is the presence of well-developed powder hematitization, which always accompanies ore bodies. This feature must be used in conjunction with others, because known zones of hematitization without signs of copper-pyrite mineralization.

The conducted research on the geology, melliferousness and gold content of Northern Bukantau (Southern Tien Shan) determines the main search criteria for copper-pyrite mineralization in the Northern Bukantau mountains, aimed at forming a reliable and objective judgment about the industrial significance of the area and making more detailed, incl. ... deep additional study.

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