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Criteria and signs of lead-zinc mineralization within the Maityubinsky anticlinorium

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ABSTRACT
The paper presents research work to establish genetic characteristics of lead-zinc mineralization in the Ulytau-Arganatinsky structural-facial zone. Expanding the mineral resource base of Central Kazakhstan is one of the most urgent tasks because selecting the criteria and characteristics determines the aspects of prospecting and exploration work, as well as their results, which is the goal. In this regard, the following tasks are being solved: identifying the geodynamic position, the genesis of mineralization, the connection of the rock's physical properties with geophysical anomalies, as well as displaying tectonic disturbances and deep faults in them; establishing the connection of mineralization with the carbonaceous-terrigenous package of deposits of the lower subformation of the Zhilandinsky formation of the Upper Proterozoic; structural confinement of mineralization to large faults along which there was a movement of plutogenic hydrothermal solutions forming mineralization, and areas of metamorphically altered rocks, as well as aureole zones of Pb, Zn, Ag, Cd graphite quartz, phyllites and the other shales of the Zhilandysay and Kumolinsky formations, dispersion zones of Cu, Mo, V, Ag, Sc, Ye and REE near the Kyzymchek fault. The established criteria and features can be used when organizing geological exploration work in the search for polymetallic mineralization within the Maityubinsky anticlinorium in zones adjacent to deep mantle faults.

Keywords: Ulutau-Arganatinsky massif, rift structures, tectonic and magmatic cycles, deep faults, hydrotherms.

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Introduction

The Dyusembay deposit is located within the development of the Ulutau-Arganatinsky meganticlinorium, which is subdivided into the Karsakpai synclinorium, the Maityubinsky anticlinorium, and the Baikonur synclinorium. The structure of the studied area is almost completely determined by the effect of the Proterozoic tectonomagmatic megacycle; its western part is covered with Early Caledonian formations [1].

The Central Dyusembay deposit is located on the eastern flank of the Maityubinsky anticlinorium, 15 km east of the large Maityubinsky granitoid massif (S-120 sq. km), and is confined to the periclinal closure of one of the large anticlinal folds (Dyusembay anticline), complicating the Maityubinsky anticlinorium [[2], [3]].

At the end of the Precambrian - the beginning of the Paleozoic, the Ulytau Arganatinsky sialic massif, in the process of the collapse of the Rodinia continent, simultaneously with the formation and development of the Baikonur SFZ, was dissected by the Karsakpai riftogenic structure (SFZ) into two parts: the western-Maityubinsky, Western-Arganatinsky and Eastern-East-Ulytausky, East Arganatinsky (Figure 1).

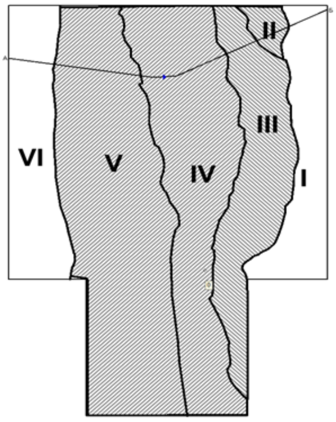
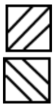


Figure 1 – Scheme of structural and formation complexes of the Baikonur SFZ
I – Zhezkazgan-Sarysu depression; area of rocks of tectonic and magmatic cycles: II-Karelian, III-Gothsky, IV-Baikalsky; V- Isidonsky; VI- Baikonursky synclinorium;



- Area of the Maityubinsky anticlinorium;
- Area of the Karsakpaisky synclinorium

(Perkov I.P. Report on the object “Geological and mineragenic mapping of the Baikonur area, sheets L-42-1,2,13,14; 25-B, G; 26-A,B”)

From the west, the Ulutau-Arganatinsky meganticlinorium is limited by the West-Ulutau, and from the east – by the East-Ulutau deep faults. Numerous massifs of hypermafic rocks are confined to the zone of the latter (Figure 2).

Within both the Maityubinsky anticlinorium and the Karsakpai synclinorium, a system of intrusions of ultrabasic rocks exposed to the surface has been identified (Figure 2). Basically, all isolated hypermafic rocks are subalkaline and even alkaline in nature, which can serve as the basis for identifying zones of platform activation in this area [[4], [5]].

Experimental part

There was carried out the analysis of isotope data on the geochronological age of rocks obtained in different years was performed. So, according to the growth zones of accessory zircons that reflect the feldspathization of porphyroids, it is 666 ± 11 million years.

The geochronological age of the Maityubinsky series is 845±17 Ma (Yermolov, Antonyuk, 2012) determined from accessory zircons U-Pb using the SRIMP-II technology, isolated from subvolcanic porphyroids of the Zhaunkar formation with blastoporphyritic quartz crystals and well-preserved fluidity, subjected to feldspathization by the development of porphyroblasts potassium feldspar.

The analysis of materials from early geological and geophysical works [3] shows that rocks are differentiated according to their physical properties. So, according to their density, they can be divided into two groups: these are rocks that fall within the density range of 2.65-2.70 g/cm^3 (sericite, quartz-sericite, quartzite, conglomerates) and rocks with an average density of 2.58-2.65 g/cm^3 (chlorite schists, porphyroids). The densest and most widespread rocks are greenstone strata, which have an excess density of 0.18-2.70 g/cm^3 in relation to the granitized strata and various shales. The effusive strata of acidic composition (porphyroids from tuffs, liparites) characteristic of the Dyusembay and Zhaunkar formations, the deposit region has an average density in the range of 2.60-2.65 g/cm^3 in relation to the underlying greenstone rocks, they have a density deficiency of up to 0.30 g/cm^3 forming local negative gravity anomalies Δg against the background of significant regional anomalies from greenstone strata.

Changing the magnetic field strength ΔTa within the range of +50 to 200 nTl is typical for non-magnetic metamorphic rocks (various salans, quartzites, phylites, porphyroids) of the Lower and Middle Proterozoic. Positive magnetic field anomalies, mostly isometric with an intensity of 200-300 nTl, are caused by diorites and granitoids of Late Devonian age. Positive elongated anomalies (up to 500 nTl) are characteristic of amphibole shales strata occurring among the sediments of the second member of the Zhilandysay formation; anomalies (ΔTa about 500 nTl) are caused by porphyroids.

Rupture faults are identified by a sharp change in the nature of the magnetic field, displacement of linear anomalies and a large horizontal gradient of the gravitational field.

Results and Discussion

The structure of the Baikonur synclinorium, the Maityubinsky anticlinorium and the Karsakpai synclinorium (Figure 2) is characterized by intense dynamometamorphism of all their constituent rocks. The black-shale Vendian-Cambrian strata of the cover are transformed into various blastosammitic phyllitic and siliceous-carbonaceous shales, micaceous and carbonaceous quartzites. This entire zone is in general characterized by a high degree of schistosity, mainly due to the layering of rocks. Folded forms are quite simple, large in size, most often linear, sometimes brachyform.

In the west, the rocks of the Maityubinsky anticlinorium border on the Baikonur synclinorium (Figure 2). The boundary between them passes along the system of large longitudinal faults that have a long-term and possibly synsedimentary development. It is obvious that this boundary also has paleotectonic significance, delimiting the continental slope and the foot of the Ulytau-Arganatin microcontinent and the Baikonur marginal sea basin of Vendian-Ordovician age [[6], [7]].

The structure of the Maityubinsky anticlinorium is complicated by the presence of large submeridian reverse faults, most likely of Jurassic age, with displacements falling to the north.

The rocks of the Maityubinsky series are feldspatized to varying degrees with the development of potassium spar porphyroblasts, in the zone of maximum development of Riphean and Early Paloezoic intrusive magmatism they were subjected to intense hydrothermal metasomatic transformation and feldspathization with the development of powerful zones of granitization of migmatites and narrow linearly elongated intrusions of porphyroblastic granite-gneisses. The maximum area of their development apparently represents the core of a large lens-shaped swell-shaped granite-gneiss dome.

Figure 2 shows a fragment of the tectonic map of the Ulytau-Arganatinsky meganticlinorium that shows the main faults. The western part of the area (northern part of sheet L-42-VII) covering the Baikonur, Maityubinsky and Karsakpai SFZs, is characterized by discontinuous faults, often grouped into entire systems of close, complexly intertwined, often en echelon-like faults combined with each other, associated with plicative dislocations (Figure 2).

Faults render a significant impact on the overall structure of the region; the largest ones serve as the boundaries of the identified structural-formational zones. Most of the large regional disturbances, especially those associated with the formation and development of rift systems, can be traced to great depths by geophysical methods [[8], [9]].

Almost all the faults are relatively young and formed on newly created continental-type crust. Some of them were updated by the latest tectonic movements, having a significant impact on the development of the hydraulic network.

There are 4 types of discontinuous faults.

The first one is the rift faults of the Proterozoic tectonomagmatic megacycle.

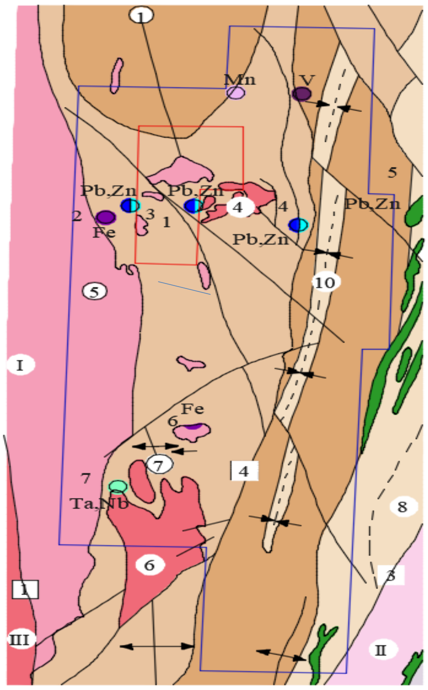


Figure 2 - Geological and tectonic map of the Dyusembay field (Aleksandrov A. E. Detailed exploration project for the Dyusembay Central field (RK)

□ 1-Kulambai fault, 4-Kyzymchek fault, 3-Karsakpai fault;

○ I-Maityubinsky anticlinorium, II-Karsakpai synclinorium, III-Baikonur synclinorium;

○ 1-Dyusembai anticline, 7-Nasymbai anticline, 8-Baizhan syncline, 10-Kyzymchek syncline, 4- Dyusembai massif, 5-Maityubinsky massif, 6-Nasymbai massif

The second one is the orogenic reverse faults of the Proterozoic tectonomagmatic megacycle.

The third one is the faults of the Early Caledonian tectonomagmatic cycle.

The fourth one is the Triassic and Jurassic reverse faults.

The chemical composition of the rocks in Table 1 is characterized by silicate analyses of rocks from the Maytyubinsky massif (Zaitsev, 1970) and the “Explanatory Note to GK-500 (1981)”.

Table 1 - Chemical composition of granitoids of the Late Ordovician Krykkuduk complex (ν1, δ1, qδ1, γδ2, γ2, lγ2O3k) [12]

Massif	Rock name	Phase	Index	SiO_2	TiO_2	CaO	Na_2O	K_2O	P_2O_5
Kantyubinsky	qu. diorite	I	$q\delta_1O_3k$	60.81	0.30	5.07	3.71	2.52	-
-”-	qu. diorite	I	$q\delta_1O_3k$	60.91	0.23	5.11	4.72	1.80	-
-”-	Granodiorite	II	$q\delta_2O_3k$	67.35	0.30	2.38	2.56	2.88	-
Maityubinsky	monzo-gabbro	I	$\mu\nu_1O_3k$	48.94	1.48	7.55	2.84	2.13	0.54
-”-	gabbro	I	ν_1O_3k	50.08	1.87	8.55	2.95	1.16	0.50
-”-	monzogabbro diorite	I	$\mu\nu_1\delta_1O_3k$	50.90	1.44	6.64	3.78	3.12	-
-”-	gabbro-diorite	I	$\nu_1\delta_1O_3k$	54.94	0.50	7.45	4.43	0.80	0.36
-”-	monzo	I	$\mu\delta_1O_3k$	55.59	0.88	2.94	4.18	1.96	-
-”-	diorite	I	δ_1O_3k	57.92	1.18	4.10	2.94	1.89	0.46
-”-	diorite	I	δ_1O_3k	57.72	0.87	7.35	3.29	1.60	0.33

In terms of the SiO_2 content (44-74%), the rocks of the complex form a wide range of differentiation from gabbro to granites. The work by Nurzhanov, 2022, describes these rocks and their connection with intrusions.

The first intrusive phase: quartz diorites (($q\delta_1O_3k$), gabbro (νO_3k), gabbro-diorites ($\nu\delta_1O_3k$), fine- and medium-grained. The composition varies from gabbro to quartz diorites. In diorite massifs, xenoliths are often observed, and more basic rock varieties are associated with areas enriched in xenoliths. The xenoliths are usually small (up to 10 cm), somewhat flattened in shape, and have a uniform hornblende-plagioclase composition, corresponding to melanocratic diorites of blastic structure [[10], [11]].

The second intrusive phase is fine- and medium-grained granodiorites ($\gamma\delta_2O_3k$), granites (γ_2O_3k) and leucogranites ($l\gamma_2O_3k$). Macroscopically, these are pinkish-gray fine- to medium-grained rocks consisting of plagioclase, potassium feldspar, quartz, amphibole, and biotite.

Thus, the rocks of the first intrusive phase are characterized by gabbro, monzogabbro, gabbro-diorites, monzogabbro-diorites, diorites, monzodiorites, diorites, quartz diorites; the second intrusive phase is represented by granodiorites, granites, and leucogranites.

Thus, the rocks of the first intrusive phase are characterized by gabbro, monzogabbro, gabbro-diorites, monzogabbro-diorites, diorites, monzodiorites, diorites, quartz diorites; the second intrusive phase is represented by granodiorites, granites, and leucogranites.

The main rocks are gabbro, monzogabbro and classified as high-alumina (al'>1); medium rocks: gabbro-diorites, monzogabbro-diorites, diorites, monzodiorites, quartz diorites partially belong to high-alumina (al'>1-2) and very high-alumina (al'>2-10) varieties; acidic rocks: granodiorites, granites and leucogranites are very high-alumina (al'>2-10) [[12], [13]].

The main rocks are mesocratic (f'=10-21), and the middle rocks are divided into mesocratic (f'=10-21) and leucocratic (f'<10).

The rocks of the complex have certain differences in alkalinity: for basic rocks Ka = 0.2-0.3; for medium Ka=0.3-0.4, for acidic Ka=0.04-0.5 [14].

The Middle Proterozoic granite-gneiss complex of the Maytyubinsky anticlinorium is represented by blastoclastic gneiss-granites and granite-gneisses and gneisses genetically related to them.

Granite-gneisses are present in close structural unity with the enclosing folded metamorphic complexes. They form folds, taking the place of stratified strata. Granite-gneisses are connected with the enclosing schists and porphyroids by gradual transitions and the boundaries of the massifs are conditional. The internal structure of the massifs is heterogeneous. In the central parts, gneisse layers are single and thin, and towards the periphery of the massifs they increase in number and thickness [[15], [16]].

The characteristic features of the geological structure of the Dyusembay deposit of the geological structure of the Dyusembay Central deposit site are determined by its location in the zone of influence of the West Ulytau deep fault, the presence of which is established within the site by a series of large faults of submeridional strike, the most significant of which is the Kyzymchek fault mapped 4 km to the east from the work site (Figure 2). To the west of the Kyzymchek fault is the Maityubinsky anticlinorium, and to the east is the Karsakpaisky synclinorium [[17], [18], [19]].

Dynamometamorphism is most likely associated with pressure from the Turgaisky paleorift; this is reflected in the presence of large reverse faults of a meridian strike with faults dipping to the west. Most likely, these reverse faults are Triassic in age [20].

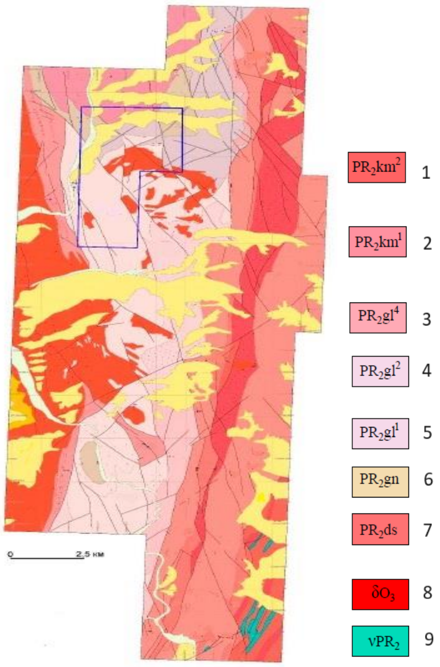


Figure 3 - Geological map (Alexandrov A. E. Detailed exploration project for the Central Dyusembay field (RK)

1-2 Kumolinsky formation: 1-pack of porphyroids, porphyroids on tuffs of rhyolite composition, graphite phyllites, quartzites 2-pack of blastopsammitic quartzite schists and phyllites; 3-5 Zhilandysay formation: 1-pack of porphyroids, partially graphitic and ferruginous, 2-pack of porphyroids and feldspathic shales, 3-pack of conglomerates and porphyroids, graphite quartzites; 6 Zhaunkar formation: porphyroids based on crystalline tuffs; 7 Dyusembai formation: porphyroids based on crystalline tuffs and lavas of liparitic composition; 8 Late Proterozoic intrusions: diorites and granodiorites; 9 Late Proterozoic intrusions: gabbro-diorites.

The internal structure of the Maityubinsky anticlitory is relatively simple: in the axial zone numerous granite-gneiss and granitoid massifs of Paleozoic age are developed, the wings are composed of metamorphic rocks of the Lower-Upper Proterozoic age (packs of sericite-chlorite-albite schists, marbles, ferruginous quartzites, phyllites, rarely graphitic schists, interbedded with packs of porphyritoids), folded into simply constructed brachnoform folds of a submeridional –north-northwest direction.

The core of the Dyusembay anticline is composed of the Dyusembay Formation rocks, which outcrop 30 km northwest of the field. The Zhaunkar and Zhilandysay formations rocks are outcropped in the wings.

Constituting the southern end of the Dyusembay anticline, the rocks of the Zhilandysay formation form a synclinal fold. In the central part of the syncline, porphyroids of the upper pack PR_2gl^4) emerge along the edges of the rocks of the first PR_2gl^1) and second (PR_2gl^2) packs (Figure 3). In general, the deposits of the Zhilandysay formation lying along the eastern flank of the Maityubinsky anticlinorium have a general dip to the east at the angles of 40-60° [21].

Younger Proterozoic rocks are mainly developed far beyond the boundaries of the Central Dyusembay deposit in the western and eastern wings of the Dyusembay anticline (in the contact zone of the Maityubinsky massif and near the Kyzymchek fault.

Conclusions

The considered features of the geological structure and geodynamic processes of the polymetallic mineralization formation in the zone of altered rocks in the vicinity of large tectonic disturbances make it possible to highlight the main criteria and signs of polymetallic type mineralization within the Maityubinsky anticlinorium.

The criteria are as follows:

• Structural: mineralization is confined to large mantle faults with which plutogenic hydrothermal processes are associated.

• Igneous: the presence of intrusions of intermediate composition developed along deep faults that control lead-zinc mineralization, these intrusions are in most cases overlain by more ancient formations.

• Lithological-stratigraphic characteristic of lead-zinc deposits: stratiformity of industrial mineralization corresponding to the hydrothermal-metosomatic stage, the presence of a carbonaceous-terrigenous sediment pack of the lower subformation of the Zhilandinsky formation of the Upper Proterozoic, which is ore-hosting.

The signs are as follows:

• Geophysical: anomalies of gravitational and magnetic fields in the western and northern exocontact of the Dyusembay granitoid massif, coincide with the outcrop of the ore zone of the Dyusembay lead-zinc mineralization to the surface; a set of geophysical methods for identifying ore intervals in wells, assessing the content of main and associated elements is carried out using the methods of GGL-S, GL, RRL and covenometry, inclinometry.

• Geochemical: the presence of aureole zones of Pb, Zn, Ag, Cd associated with mineralization in graphite quartzites, phyllites and other shales of the Zhylandysay and Kumalin formations along the eastern exocontact of the Maityubinsky massif, in the roof of the exocontact zone of the Dyusembay massif in the suture zone of the Kyzymchek fault; dispersion halos of Cu, Mo, V, Ag are confined to graphite schists, quartzites, phyllites of the Kumola formation in the vicinity of the Kyzymchek fault and zones of Sc, Y and REE are confined to graphite schists, quartzites, phyllites of the Zhylandysay and Kumola formations, in the western part of the suture of the Kyzymchek fault and Bestyubinsky strike-slip fault to the north and south of the Dyusembay deposit; specialization of aureole zones in the roof of the Dyusembay massif and along the suture zone of the Kyzymchek fault for polymetallic mineralization, as well as anomalies for copper mineralization (east of the suture zone of the Kyzymchek fault) and anomalies for rare metal mineralization (north of the Dyusembay lead-zinc deposit).

• Geological: mineralization characteristic of the Central Dyusembay deposit is its location in the zone of influence of the West Ulytau deep fault, established along a series of large faults of submeridial strike, with the most significant being the Kyzymchek fault, to the west of which is the Maityubinsky anticlinorium, and to the east the Karsakpai synclinorium.

Conflicts of interest. On behalf of all the authors, the corresponding author states that there is no conflict of interest.

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Майтөбе антиклинорийі шегінде қорғасын-мырыш кенденуінің өлшемшарттары (критерийлері) мен белгілері

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ТҮЙІНДЕМЕ
Жұмыста Ұлытау-Арғанатын құрылымдық-фациалдық аймағы кен орындарының қорғасын-мырыш кенденуінің генетикалық белгілерін анықтау бойынша зерттеу жұмыстары ұсынылған. Орталық Қазақстанның минералдық шикізат базасын кеңейту өзекті болып табылады, өйткені өлшемшарттар мен белгілерді таңдау іздеу-барлау жұмыстарының бағыттарын, сондай-ақ олардың нәтижелерін айқындайды, бұл мақсат болып табылады. Осыған байланысты келесі міндеттер шешіледі: геодинамикалық позицияны, кендеу генезисін, тау жыныстарының физикалық қасиеттерін, аномалиялармен байланыстыру, сондай-ақ олардағы тектоникалық бұзылуларды, терең ақауларды көрсету: кенденудің жоғарғы протерозойдың жыланды формациясының төменгі субсидиясының көміртекті-терригенді шөгінділерімен байланысын орнату; кенденуді қалыптастыратын плутогендік гидротеримaлдық ерітінділердің қозғалысы жүзеге асырылған ірі ақауларға кенденудің құрылымдық орайластырылуы және метаморфтық өзгерген тау жыныстарының учаскелері, сондай-ақ Pb, Zn, Ag, Cd графитті кварцтардың, филлиттердің және жыландысай және кумолин свиттерінің басқа да тақтатастарының ореолдық аймақтары, Қызымшек ақауының жанында орналасқан Cu, Mo, V, Ag, Sc, Ye және РЗЭ шашырау аймақтары. Белгіленген критерийлер мен белгілер терең мантия ақауларына іргелес аймақтарда Майтөбе антиклинорийі шегінде полиметалл кендерін іздеу кезінде геологиялық барлау жұмыстарын ұйымдастыру үшін пайдаланылуы мүмкін.

Түйін сөздер: Ұлытау-Арғанатын массиві, рифт құрылымдары, тектоно-магматикалық циклдар, терең жарықтар, гидротермдар.

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Критерии и признаки свинцово-цинкового оруденения в пределах Майтюбинского антиклинория

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АННОТАЦИЯ

В работе представлены работы исследований по установлению генетических признаков свинцово-цинкового оруденение месторождений Улытау –Арганатинской структурно-фациальной зоны. Расширение минерально – сырьевой базы Центрального Казахстана является одной из актуальных поскольку выбор критериев и признаков определяет направления поисково-разведочных работ, а также их результаты, что и является целью. В этой связи решается задачи: выявление геодинамической позиции, генезиса оруденения, связь физических свойств горных пород, геофизическими аномалиями, а также отображение в них тектонических нарушений, глубинных разломов: установление связи оруденения с углеродисто-терригенной пачкой отложений нижней подсвиты жиландинской свиты верхнего протерозоя; структурная приуроченность оруденения к крупным разломам по которым осуществлялась движение плутогенных гидротеримальных растворов формирующих оруденение, и участки метаморфически измененных пород, а также ореольные зоны Pb, Zn, Ag, Cd графитовых кварцах, филлитах и других сланцах жиландысайской и кумолинских свит, зоны рассеяния Cu, Mo, V, Ag, Sc, Ye и РЗЭ вблизи Кызымчекского разлома. Установленные критерии и признаки могут быть использованы при организации геолого-разведочных работ при поиске полиметаллического оруденения в пределах Майтюбинского антиклинория в зонах прилегающих к глубинным мантийным разломам.

Ключевые слова: Улутау –Арганатинский массив, рифтогенные структуры, тектоно-магматическае циклы, глубинные разломы, гидротермы.

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References

[1] Antonyuk RM, etc. Destruktivnye zony Centralnogo Kazahstana. O teme: Tektonicheskoe stroenie territorii SSSR [Destructive zones of Central Kazakhstan. About the topic: The tectonic structure of the territory of the USSR].M: Nauka. 2018, 12. (in Russ.).

[2] Antonyuk RM, and others. Destruktivnye zony Centralnogo Kazahstana. V: Tektonicheskoe stroenie territorii SSSR [Destructive zones of Central Kazakhstan. In: The tectonic structure of the territory of the USSR]. M:Nauka. 1979, 15. (in Russ.).

[3] Avdonin VE, Boytsov VV. Mestorozhdeniya metalliccheskih poleznyh iskopaemyh [Deposits of metallic minerals]. Moskva: TRIKSTA. 2005, 3. (in Russ.).

[4] Alexandrov AE, and others. Proekt detalnoj razvedki mestorozhdeniya Dyusembaj Centralnyj (Respublika Kazahstan) [The project of detailed exploration of the Dyusembai Central deposit (Republic of Kazakhstan)]. Moskva. 2022, 6. (in Russ.).

[5] Kolesnikov A, Zhanikulov N, Zhakipbayev B, Kolesnikova O, Kuraev R. Thermodynamic modeling of the synthesis of the main minerals of cement clinker from technogenic raw materials. Kompleksnoe Ispolzovanie Mineralnogo Syra = Complex Use of Mineral Resources. 2021; 318(3):24-34. https://doi.org/10.31643/2021/6445.25

[6] Dyussenova GZh, Kryazheva TV, and others. A brief overview of the geological structure of the Ulytau-Karaganda structural formation zone. 2023; 15 https://doi.org:10.17580/gzh.2023.08.09

[7] Zaitsev YuA. Stratigrafiya dokembriya Ulutau v svyazi s razrabotkoj obshej shemy raschleneniya dokembriya Kazahstana [Stratigraphy of the Precambrian of Ulutau in connection with the development of a general scheme for the dismemberment of the Precambrian of Kazakhstan]. M: MGU. 1971,182-225. (in Russ.).

[8] Kogay SG, Iskakov KI. Poiskovye geologo-geofizicheskie raboty masshtaba 1:10 000 v drevnih tolshah centralnoj chasti Karsakpajskogo podnyatiya. Otchet Karsakpajskoj partii za 1989-1996 gg. [Prospecting geological and geophysical work m-ba 1: 10,000 in the ancient strata of the Central part of the Karsakpai uplift]. Zhezkazgan. 1996, 125-212. (in Russ.).

[9] Khamzin BS. Provedenie geologorazvedochnyh rabot na polimetallicheskie rudy na uchastke Dyusembaj v Karagandinskoj oblasti [Conducting exploratory geological exploration for polymetallic ores at the Dyusembai site in the Karaganda region]. Astana. 2018, 138. (in Russ.).

[10] Kovrizhnykh PN. Tehnicheskij otchet o vypolnenii detalnyh gravimetricheskih issledovanij na uchastke Dusembaj [Technical report on the performance of detailed gravity exploration works on Dyusembay Square]. Almaty. 2020, 98-99. (in Russ.).

[11] Sidorenko IS. Mineragraficheskoe issledovanie anshlifov.. (LLP Azimut Geology), Karaganda. 2020, 181-192. (in Russ.).

[12] Zlavdinov LZ. Izuchenie stroeniya zemnoj kory po gravimetricheskim dannym. Nauka Kaz.SSR [Study of the structure of the Earth's crust by gravimetric data]. Almaty. 1974, 18. (in Russ.).

[13] Konkin VD, Donets AI, Ruchkin GV. Central Research Institute of Geological Prospecting for Base and Precious Metals. Mineralogical-geochemical types and regional geological special characteristic of stratiform carbonate-hosted lead-zinc deposits, Domestic Geology. 2018, 4. https:// DOI: 10.24411/0869-7175-2018-10005

[14] Nurzhanov GZh, Nitsenko PA. Too Kazakhmys Barlau. Features of petrologic composition of Pb-Zn ore of the Dyusembay Central deposit (Central Kazakhstan) Regional natural geology and metallogeny. 2022; 92:92-104. https:// https://doi.org: 10.52349/0869-7892_2022_92_92-104

[15] Suleimenov KD. K probleme metallogenii drevnih tolsh Ulytauskogo megantiklinoriya. V knige.: litologiya i osadochnaya geologiya dokembriya [On the problem of metallogeny of ancient strata of the Uluttau meganticlinorium. In the book.: lithology and sedimentary geology of the Precambrian]. Science. A-Ata. 1981, 94-96. (in Russ.).

[16] Suleimenov KD. Zakonomernosti rasprostraneniya stratiformnyh mestorozhdenij cvetnyh metallov v drevnih tolshah Ulutauskogo megantiklinoriya i dalnejshee napravlenie poiskovyh rabot v etom regione. V knige: Usloviya lokalizacii i zakonomernosti razmesheniya stratiformnyh svincovo-cinkovyh i mednyh mestorozhdeni [The regularities of the placement of stratiform deposits of non-ferrous metals in the ancient strata of the Ulutau meganticlinorium and the further direction of prospecting in this region. In: Localization conditions and patterns of placement of stratiform lead-zinc and copper deposits]. A-Ata. 1982, 351-55. (in Russ.).

[17] Suleimenov KD. Effektivnost ispolzovaniya geofizicheskih metodov pri poiske stratiformnyh mestorozhdenij cvetnyh metallov v drevnih tolshah Ulytauskogo megantiklinoriya. V kn.: Usloviya lokalizacii i zakonomernosti razmesheniya stratiformnyh svincovo-cinkovyh mestorozhdeni [The effectiveness of the application of geophysical methods in the search for stratiform deposits of non-ferrous metals in the ancient strata of the Ulytau meganticlinorium. In the book: Localization conditions and patterns of placement of stratiform lead-zinc deposits]. A-Ata. 1982, 52-64. (in Russ.).

[18] Khamzin BS, Perkov IP. Otcheta po obektu Geologo_mineragenicheskoe kartirovanie raiona Baikonura, listi L-42-1,2,13,14; 25-B, G; 26-A,B [Report on the project "Geologo_mineragenic mapping of the Baikonur region", list L-42-1,2,13,14; 25-B, G; 26-A,B]. Astana. 2014; 319. (in Russ.).

[19] Askarova NS, Portnov VS, Kopobayeva AN, Roman AT. Feature space of the Atasu type deposits (Central Kazakhstan). Naukovyi Visnyk Natsionalnoho Hirnychoho Universytet. Dnipro: Dnipro University of Technology. 2021; 5:5-10. https://doi.org/10.33271/nvngu/2021-5/005

[20] Malchenko EG, Roman AT, Portnov VS, Askarova NS. Peculiarities of the formation of the zhailma volcano-tectonic deep. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytet. Dnipro: Dnipro University of Technology. 2023; 1;26-31. https://doi.org/10.33271/nvngu/2023-1/026

[21] Zhumabekov AK, Liu Z, Portnov VS, Wei X, Chen X. Integrating the Geology, Seismic Attributes, and Production of Reservoirs to Adjust Interwell Areas.Russ. Geol. Geophys. 2022; 63(7):856-868. https://doi.org/10.2113/RGG20214343