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Research Article

THE AGE OF MINERALIZATION OF CHADAKS ORE FIELD

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ABSTRACT
The article is devoted to clarifying the age of mineralization deposits Chadak ore field.

INTRODUCTION
The Chadak ore field includes the Pirmirab and Guzaksay gold and silver deposits and a number of smaller areas. The Chadak ore field has been studied by a large number of geologists from the 50s of the last century, beginning with L.G. Lunina and D.P. Lyashkevich, who discovered the Pirmirab and Guzaksai deposits.
At various stages, the ore field was studied by Yu.S. Potapov, F.S. Baibekov, Yu.A.Averin, A.G. Karpov, M.O.Suleimanov, M.Jumakulov, M.I. Smirnova, M.D. Uvadiev, V.P. Korzhaev, R.A. Yusupov and others.

MATERIALS AND METHODS
This article is written about the results of research and development works in the Ministry of Geology of the Republic of Uzbekistan on the study of the dikes of gold deposits in eastern Uzbekistan. Analytical work was carried out by the Central Laboratory of the Ministry of Geology, a petrographic study of thin sections was carried out by the authors.

RESULTS
The geological structure of the ore field is attended by rocks of the Nadak, Kuyundi, Shurabsay, Kyzylnurinsky and Arashanian complexes. The authors conducted work on the study of dyke formations of the Chadak ore field. Conducted research allowed dikes to be divided according to their composition and age into a number of dyke complexes: - Gushsai, Guzaksay, Uryukly and Chadak, previously included in the Canamansur diabase-granophyre formation (Table 1).

Table 1: Diagram of the age sequence of dyke formation in the Chadak ore field

Name of the complexes	Age	Petrographic type of rocks
Chadak	J1-2? 175.8 ± 3 mln	Olivine dolerite
Uryuklinsky	P_2 265±6 mln. $^{86}Sr/^{87}Sr$ – 0,7104	Essexit, trachiriodacy, trachydolerite, mujerite
Guzaksay	P1-2	Granosienite porphyry, orthoclase quartz syenite porphyry, rhyolite, leucogranite porphyry, microsyenite, dolerite
Gushsai	P1	Syenite porphyry, alkali-feldspar rhyolite, granodiorite porphyry
Kuyundi	C3	Quartz rhyolite

The following types of dykes from ancient to young are distinguished in the Uryukly complex: mujerites, trachydolerites, trachiriodacy and Essexites. Dykes of the complex are widely distributed on the left side

of Chadak, where the Mazarsky and Aktash dike belts form. A significant amount of geological relationships indicates the Late Permian age. In the upper Aktash dykes, trachydolerites and Essexites are cut off by granitoids of the Charkasar massif. The age of the Essexite dikes is 265 ± 6 million years old (according to R.T. Dalimov), which corresponds to the early Permian (Table 1). Based on this, the age of the dikes of the complex is dated by us in the framework of the early Perm.

Dikes of mujerite are localized mainly in the North-Guzaksay dike belt, performing cracks of the north-east strike (55º) with a steep (60-70º) fall to the north-west, the length of individual dikes up to 400m with a thickness of 1-2m. The greatest saturation with dykes was noted on the starboard side of Chadaksaya in the area of the Guzaksay deposit, in the interfluve of the Chelpeksay and Chulak-Terek and on the starboard of the Dzhulaisay, in the southern part of the Mazarsky dyke belt.

Mudgierites of the North Guzaksai dyke belt are dark-gray rocks of porphyritic structure, the number of phenocrysts is up to 20-30% with the prevalence of phenocryst, plagioclase over pyroxene. In the area of the Pirmirab deposit, a dark gray dige of mujerite with large phenocrystalline phenocrystals without pyroxene phenocrysts is exposed. Mudgeierites in the Djulaisay dyke belt have a slight distribution. They are characterized by a small capacity of up to 1.0m and a length of 20-50m. Externally, these are dark-gray rocks with porphyritic structure, dense, silicified, porphyritic precipitates are represented by plagioclase, pyroxene, less often secondary quartz.

Mudgerites consist of plagioclase 60%, pyroxene 20%, olivine 5% and potassium-sodium feldspar 5% mixed with ore mineral (1-2%), which are replaced by secondary minerals: chlorite, sericite, serpentine, iddingite and carbonate. The total amount of newly formed minerals is 10-20%.

Plagioclase is represented by elongated prisms 1.0-1.3 mm in size, with characteristic albite twins (‖010). Less commonly, smaller-sized individuals (0.7–0.8mm) are observed, forming crystals with a Bawen twinning type. The composition of elongated prismatic plagioclase corresponds to oligoclase (An22-23), wide-tabular (An27-28). In the porphyry varieties of the mujerite, the phenocrysts of the prismatic plagioclase of 1.0-1.5 mm in size also correspond in composition to oligoclase (An23-24), the plagioclase of the main mass is represented by albite (An5-7).

Pyroxene is present as colorless or xenomorphic grains. The latter perform the gaps between the oligoclase grains. Dimensions of pyroxene range from 0.4-0.6 to 0.8-0.9mm. According to optical constants (C: Ng from 37-38o to 40-42o; 2V = 56-620; Ng-Np 0.028-0.032), pyroxene refers to titanavgite with prevalence of TiO2, Fe2O3, Al2O3 in it.

Olivine forms phenocrysts of subisometric form 1.0-1.5 mm in size. It is fully mixed with a mixture of iding, carbonate or sericite and carbonate.

Potassium-sodium feldspar forms rare tabular grains 0.5-0.6 mm in size and is xenomorphic with respect to pyroxene and plagioclase. More often present in the interstitium of plagioclase prisms. Composition refers to anorticlase (2V = 57-600). There are weak signs of net structure of anorthoclase.

Accessory minerals are represented by idiomorphic magnetite grains, 0.3-0.4mm in size.

Secondary changes are expressed in sericitization of plagioclase, chloritization of pyroxene and late carbonatization and epidotetization of the entire rock.

Trachydoleritis. Their dikes are widespread in the Aktash dyke belt, where they form dikes of the northeast strike, and in the Djulsay belt, dikes of the northwest strike. The angles of incidence are steep with a fall to the northeast or southeast. Trachidolerites compose round cracks, the length of the individual scenes from 100 to 1000 m, the power of dikes rarely exceed 1 m. Externally, the rocks are brownish-gray, small-medium-grained with dark-gray cryptocrystalline tempering zone. On the surface, they form protrusions with a height of 20-30cm. The relationship with the Essexites was established in the upper reaches of the Djulaisay and in the Aktash section (Fig. 1).

Travodolerites consist of plagioclase (70-85%), dark-colored minerals (10-15%), potassium feldspar and quartz (2-3%). They are characterized by an ophitic, diabase structure and a massive texture.

Plagioclase - forms elongated prismatic crystals, with a size of 0.9-1.5 mm, with irregular or blurry crystallographic faces. The composition of plagioclase corresponds to andesine (An31-42). Plagioclase is significantly altered, albitized, it develops an aggregate of epidote, sericite and carbonate.
Pyroxene - is observed in the form of small idiomorphic grains, 0.4-0.6mm in size, filling the gaps between the grains of plagioclase. Most of the grains of pyroxene are heavily altered; in more fresh grains, pyroxene is in composition augit (C: Ng 44o; 2V -580; Ng-Np - 0.025). Pyroxene is replaced by epidote, chlorite and carbonates.
Potassium feldspar - is present in the form of separate xenomorphic grains with tortuous restrictions. According to optical constants, it refers to orthoclase (2V = 570-680).
Quartz - marked extremely rare. It forms small (0.1–0.3mm) xenomorphic grains in the intervals between plagioclase sheets.
Accessory minerals are represented by apatite needle grains.
Trachiriodacites are exposed only in the Mazarsk dike belt, they are found in large numbers on the left side of Chadak, single dikes are noted on the right side of Chadak in the north of the square. Dyke trachiriodatsit form a body length of 200-300m, az. 15-30º stretch with steep dip angles of 50-85º. Rocks are reddish gray in porphyritic structure.
Essexites. The Essex dikes are the most widespread in the Chadak ore field. Their greatest number is on the left side of Chadak, they are part of the Mazarsk dyke belt, stretching from the north to the south. Another range of outcrops refers to the Djulaisai dyke belt, extending parallel to the Djulsayisky fault.
Essexites are the youngest formations of the Uryukly complex, as evidenced by the numerous geological relationships with dykes of this complex. The dikes of the Essexes break through the volcanites of the Kyzylnurin complex, the granitods of the Shaidan complex and are cut off by the granitoids of the Charksar massif of the Arashan complex in the headwaters of the Aktash. In addition, the Essexites are often trimmed with dikes of olivine dolerites of the Chadak complex.
Essexites have a north-west strike close to the meridional (Az.pad. 15-400), with steep dip angles (60-800). For them, as well as for other dikes, the flowering arrangement of bodies is characteristic, the length of the separate wings is 100-200 m, with a total length of dikes 1500-2000 m. Dyke power is often 1-2,0m. Outwardly, these dikes are brownish-gray, dark gray, in powerful dikes the central part is light gray. Tempering dikes, as a rule, dark gray to black with cryptocrystalline main mass and rare grains of plagioclase. Rocks are well crystallized with a fine-grained or microgabbro structure. Mineral composition: plagioclase, pyroxene, Kalishpat, quartz.
Grains perform small voids, sometimes fluorite is found together with them in voids. A characteristic feature of the Essexite dikes is the abundance of granitoids xenoliths in them, ranging in size from a few centimeters to 1.0-1.5 m. Granitoids of a reddish color, very much resemble the granites of the Chulak-Terek massif and the Kyzylnurinsky volcanogenic complex.
Under the microscope, the Essexites have a porphyritic, less commonly an aphyric structure with a gabbro, ophitic, sometimes intersertal base mass.
Porphyry secretions make up 15–20% of the whole rock and are represented by plagioclase, clinopyroxene, and potassium feldspar. Plagioclase forms grains of several generations. Plagioclase of the first generation includes rare, but the largest wide-plate crystals strongly corroded by the main mass. In composition, it refers to the Andesin-Labrador (An45-60). The second generation plagioclase is distinguished by smaller sizes (0.7-0.9 mm). They form prismatic, elongated-prismatic crystals with clear limits. Composition refers to oligoclase (An25-30).
Pyroxen is rare and in composition refers to augite. It forms short prismatic grains, with weak marginization at the edges of the grains. Crystallization of pyroxene occurred simultaneously with the second generation plagioclase.

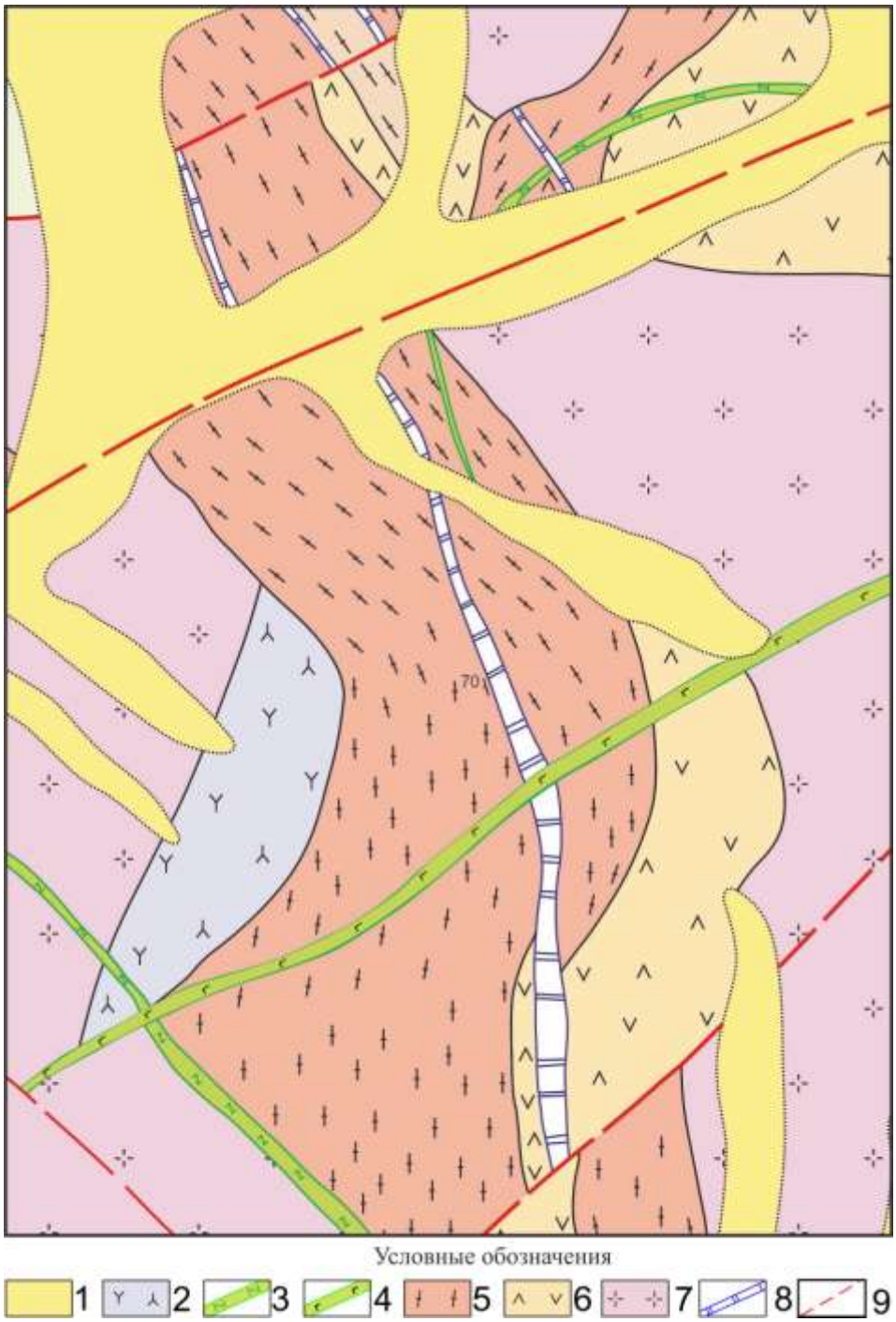

Figure 1. Scheme of the geological structure of the Aktash site.
1. Undifferentiated proluvial-deluvial deposits. Shurabsay complex: 2.Andeside cytes.
Uryuklyn dike complex: 3.Trakhidolerity, 4. Essexites, Kuyundi complex: 5. Dike of basoquartz rhyolites, 6. Sienodiorite porphyrites. Karamazar complex: 7. Granodiorites, 8. Quartz veins, 9. faults.

The bulk is most often folded with elongated microliths or plagioclase sheets, which in composition is related to albite-oligoclase (An5-15). In small quantities there is quartz and potassium feldspar. Quartz -

in small xenomorphic grains, potassium feldspar in "amoebic" secretions with fuzzy vague restrictions. Often, especially in Essexites of the Mazarsky Belt, small tables of biotite are found in the bulk. The gaps between the crystals and the main mass are filled with devitrified glass and chlorite and an ore mineral develop along it.

In general, the formation of the dykes of the Uryukly complex is connected by us with the final stretching processes of the Chadak graben. At the beginning of the formation of the complex, stretchings of the northeastern direction parallel to the North Fergana Fault apparently prevailed, which were filled with dykes of trawdoderolite and mujerite. But along with this deformation plan, the activity of the north-western faults parallel to the Kumbel and Arashan faults begins to revive.

According to researchers of the deposit of the Chadak ore field, they belong to the quartz-gold ore formation. Mineralization was formed in three stages of hydrothermal activity, corresponding to two time periods: 1 - early hydrothermal, Upper Carboniferous-Lower Permian; 2 - skarn-hydrothermal and 3 - late hydrothermal, lower Permian [Anonymous].

The age of gold-silver mineralization was determined by many researchers and did not receive an unequivocal interpretation; According to Yu.A.Averin (1974), two age groups of metasomatites are distinguished (272-253 ± 11 million) - Permian and the second (239-220 ± 9 million) - Triassic [Anonymous].

When working on the Aktash site, which is located south of the Pirmirab deposit, we have documented the relationship of the dikes of the Uryukly complex with residential number 8 (Figure 1). The veins consist of quartz, calcite, with nests of the adulus. Ore pyrite, chalcopyrite, faded ore. The power of the quartz core is from 0.1 to 0.45 m. As can be seen in Figure 1, vein No. 8 pierces the trachydolerite dyke and, in turn, is cut by an Essexite dyke. This confirms the opinion of Averin [1968] “The dykes of diabase porphyrites I and II are of prescarn age, and the diabase porphyrites of III are post-skarn, but dozolotrudny”. The absolute age of the Essexite dikes is determined within the framework of the late Permian 265 ± 6 million years.

Thus, by definition of absolute age and on the basis of geological data, we can confirm the opinion of Yu.A.Averin that part of the mineralization of deposits of the Chadak ore field has an upper age limit within the framework of the late Permian to 256 million years. Taking into account that vein No. 8 was formed in the time interval between the introduction of dikes of trachydolerite and essexite, we can say about the common source of mineralization and dikes of the Uryukly complex. The 86Sr | 87Sr ratio of 0.7104 indicates a crustal melt source from which dykes were formed and, perhaps, ore bodies in the Chadakskoye ore field also arose from a single common source with dyruks of the Uryukly complex.

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