AP14972815 "Research of geomechanical situation in conditions of unstable massifs with the choice and justification of technology of fixing of preparatory excavations" – p.m. Matayev A.K.

Relevance:

Relevance at the Chromtau mine zone deposit serpentinites on dunites are widely developed. On pyroxene dunites serpentinite is less widespread. The mentioned types of rocks are spread at a depth of 35÷110 m from the Earth's surface. The maximum value of the degree of desiccation is observed at the depth of 10-20 m. Here the rocks were formed as fine-grained rocks and turned into a clay mass.

The analytical report on the results of the research on selecting an effective scheme of fixing the preparatory excavations is made. Methods of determining the stress-strain state of the rock massif were analyzed and the finite element method was chosen. Numerical analysis of the natural stress field of the rock massif has been performed, according to which the main stresses acting on the excavations have been determined. According to the results of the numerical analysis, STS of the rock massif is close to hydrostatics σ1= σ3= σz=24,8 MPa at the depth of 900 m (mountain -480m). The forecast estimation of the stability reserve of mine workings before and after cleaning works was performed, according to the results of which it should be assumed that the stability reserve of the passed mine workings in the zone of cleaning space is lower than the minimum permissible, therefore, collapses and increase in the load on the support are possible.

At the mining depth of 900 m (elevation -480 m) the bearing pressure on the excavation support was calculated.

Calculation of the parameters of the excavation support laid on the hill. -480 м. Thus, from the results obtained it follows that at the mine DNA fastening of horizontal workings, is made by metal arch support SVP 22 in combination with concrete, chamber workings are fastened with metal arch support SVP 27 in combination with concrete.

Methodological guidelines were created to identify excessive losses during the development of medium-sized ore bodies. In order to optimize the process of development of ore bodies of medium thickness, methodological guidelines for the identification of above-normal losses were created. The main stages of the methodological guidelines are as follows:

1. Study of the geological structure of the deposit and its special features.
2. Analysis of data on the regularities of ore body formation. 2.
3. Calculation of mineral reserves on the basis of reliable data. 4.
4. Determining the extent of exploration of the deposit.

Detailed instructions are provided on the process of identifying excessive losses, as well as recommendations for their minimization.

The project purpose:

The purpose of the work is to predict the stress-strain state (STS) in the rock mass in the boundaries of the influence of cleaning works on the hill. -480 m when using the development system, also to make a calculation of the load-bearing capacity of the types of supports used at the mine of Khromtau deposit.

Expected and achieved results:

1. stress-strain states of the rock massif were determined on the basis of the finite element method. According to the results of numerical analysis, the STS of the rock massif at the depth of 900m (mountain -480m) is close to hydrostatics σ1= σ3= σz=24.8MPa;

2. Predictive assessment of the stability reserve of mine workings before and after cleaning works was performed, according to the results of which it should be assumed that the stability reserve of the passed workings in the zone of cleaning space is lower than the minimum permissible, therefore, collapses and increase in the load on the support are possible;

3. The load-bearing capacity of the types of supports used at the DNA mine was calculated on the basis of numerical analysis in the RS2 program. The safety factors of the rock mass near the mine workings were determined. The results of the numerical analysis show that anchor and cable support do not significantly increase the stability of the mine workings.

For the year 2024 (through June) the following articles were prepared and published according to the calendar plan:

1. 1 article was published in peer-reviewed foreign and domestic editions recommended by SHEQAC A.K. Mataev, *A.Zh. Imashev, B. Husan, N.K.. “Shayke,. Selection of the optimal type of fastening of mine workings on the basis of modeling the stress state of underground structures” // Mining Journal of Kazakhstan 2024 No. 1. P.25-34

2. Accepted for publication 1 article in journals from the first three quartiles on impact factor in the database Web of Science or having percentile on CiteScore in the database Scopus not less than 50; Mataev A., Zeitinova S., Musin R., Shayev D., Doni D., Shayev A., Zeytinova S., Musin R., Doni D., Shayke N., Kuttybaev A., Iskakov R.; "Study of mechanical properties of ore and rocks of ore deposits with assessment of the natural field of stressed state of the array" in the journal Mining of Mineral Deposits

3. For review 1 article in journals from the first three quartiles on impact factor in the database Web of Science or having percentile on CiteScore in the database Scopus not less than 50 Matayev A., Mussin A., Imangazin M, Asanova Zh, Mussin R., Rabatuly M, Abdrashit A., Sarkulova Zh, "Investigation of the geomechanical situation in a rock mass using field measurements at ore deposits", in the journal Helyion.

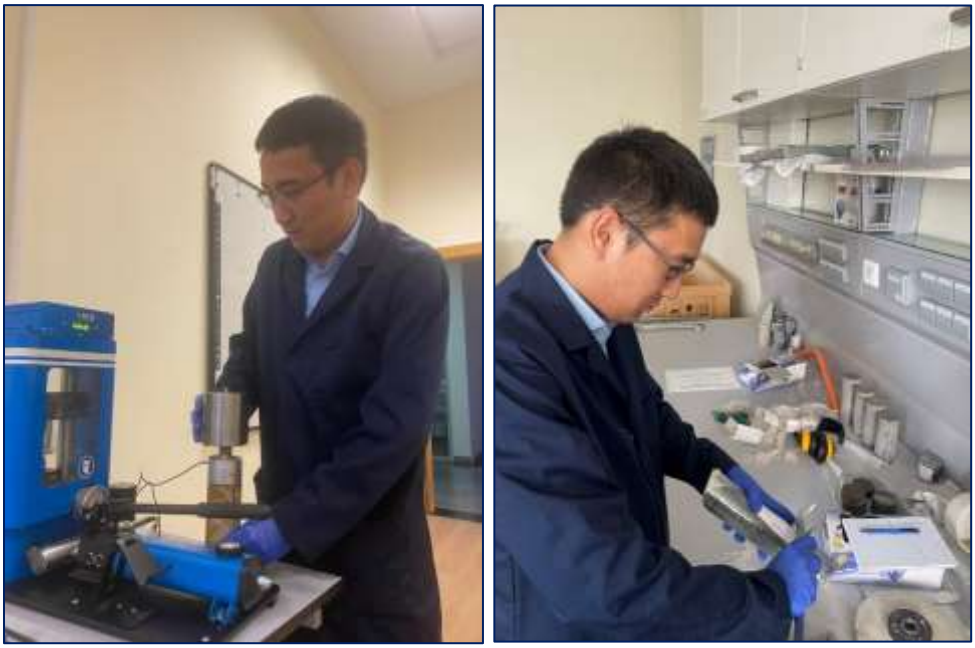

Figure 1 - Conducting research in laboratory conditions

Figure 2 - Core testing of specimens

Figure 3 - Conducting research during the internship in Astana

List of publications:

1. Matayev A.K., Abeuov E.A., Zeitinova S.B., Shayke N.K., Lozynskyi V. Investigation of geomechanical situation in a rock massif in the zone of influence of cleaning works in the conditions of the mine of Khromtau deposit Proceedings of the University. - Karaganda: Karaganda State Technical University, 2023, No. 1, B. 53-57.

2. Method of fixing of mine workings. Patent for utility model No. 8583 A.K. Mataev, A.A. Musin, A.Zh. Mataev, A.A. Musin, A.Zh. Imashev, A.M. Suimbayeva, E.A. Abeuov, G.Zh. Zhunusbekova.

3. A.K. Mataev, *A.Zh. Imashev, B. Husan, N.K.. “Shayke,. Selection of the optimal type of fastening of mine workings on the basis of modeling the stress state of underground structures” // Mining Journal of Kazakhstan 2024 No. 1. P.-25-34

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Information for potential users:

Achievement of the design parameters of mine workings will reduce the volume of transportation of excess rock mass, specific consumption of explosives, materials for fastening, stabilize the geomechanical condition of the rock massif and increase the safety of mining operations.

Scope:

Rock massif of the underground mine Donskoy Ore Mining and Processing Plant - branch of JSC “Transnational Company “Kazchrome” mine “10 Years of Independence of Kazakhstan”. The results of the performed research can be applied in the creation of geomechanical model of the deposit.

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