AP19677938 “Creation of a method for predicting the shear of host rocks to the earth's surface for modernising the technology of re-development of hollow ore deposits” – p.m. Takhanov D.K.

Relevance

The prediction of the subsidence of the earth's surface during undermining is a pressing problem in the development of minerals, associated with the negative impact of the displacement process on the undermining buildings, structures, utilities and natural objects. The problem has become most important in the last decade due to the involvement of abandoned mineral reserves in supporting pillars in the repeated development.

Despite the large volume of theoretical and experimental studies on the assessment of the influence of the state of the structural elements of the applied development system and the thickness of the host rocks on the parameters of deformation of the earth's surface, there is still no final scientifically based approach to the effective design of technological parameters for the development of ore deposits. The generally accepted method for calculating the displacement parameters is calculations based on the analysis of in-kind observations and the presentation of empirical patterns for specific deposits, which is not always applicable to other similar deposits.

Therefore, the problem of increasing the efficiency of ore deposit development, taking into account the forecast of the displacement of host rocks to the earth's surface to ensure the complete extraction of minerals, is an important task from a practical and scientific point of view, the solution of which allows reducing the costs per unit of extracted mineral.

Based on the conducted analysis and review of the state of the issue, the goal of the scientific and applied work was formulated - improving the technology of re-development of flat ore deposits based on a reliable forecast of the displacement of rocks and the earth's surface by studying the patterns and identifying the factors that determine the limits of the deformation zone limited by sliding surfaces.

Project goal

The aim of the project is to improve the technology of re-development of flat ore deposits based on a reliable forecast of the displacement of rocks and the earth's surface by studying the patterns and identifying the factors that determine the limits of the deformation zone limited by sliding surfaces.

Expected and achieved results

According to the calendar plan:

- A method has been developed for determining displacement parameters, allowing for the prediction of the impact of underground mining operations on the state of the earth's surface during the development of flat ore bodies, taking into account the completeness of the extraction of mineral reserves based on a set of geotechnical studies and multifactorial consideration of the technological parameters of mining operations.

-An improved method for predicting the displacement of host rocks to the earth's surface is being developed to modernize the technology for the repeated development of flat ore deposits. The purpose of this development is to create a more accurate and adaptive geomechanical model that allows for taking into account a set of geological, technological and mining factors that affect the processes of displacement during repeated development. The method includes the integration of geodetic and in-situ observation data, as well as modeling in specialized software products. This will allow not only to predict the shape and depth of the displacement trough, but also to assess the risks for surface and underground infrastructure, increase the completeness of reserve extraction and ensure safety during repeated development of deposits.

The work continues.

List of publications for 2025:

- 1 (one) article published in the Scopus database:

1) A. Zhienbayev, D. Takhanov, M. Zharaspaev, A. Kuttybayev, B. Rakhmetov, D. Ivadilinova “Identifying rational locations for field mine workings in the zone influenced by mined-out space during repeated mining of pillars” Mining of Mineral Deposits, 2024, 18(2), p. 93-103.(percentile 69).https://doi.org/10.33271/mining19.01.001

1 article was submitted to the KOKNVO:

1) D. Takhanov, A. Rymkulova, B. Rakhmetov, M. Balpanova "Complex application of lem and fem methods for assessing geomechanical risks" "Mining Journal of Kazakhstan" No. 6 for 2025.

Patents 2025:

1 application for a utility model has been filed:

1) Takhanov D.K., Balpanova M.Zh., Balabaev O.T. Method of erecting an artificial pillar. No. 2025/0477.2 dated 03/28/2025.

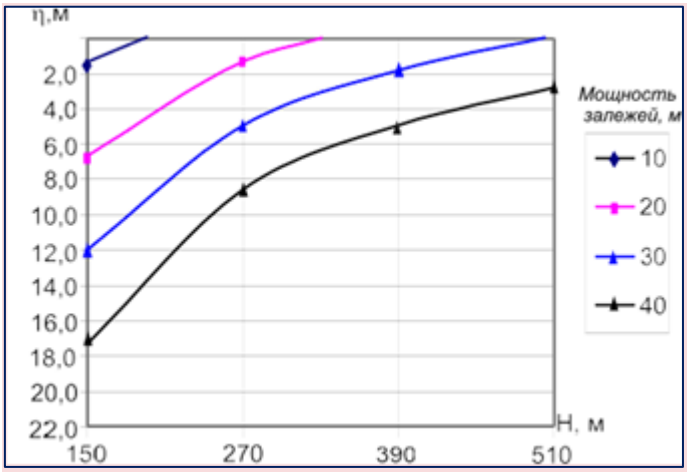

	Figure 1 –Graph of the dependence of the magnitude of subsidence of the earth's surface on the thickness m, depth of development H at Kp=1.03 during the development of flat deposits of the same type of rocks	

	Figure 2 –Measuring the subsidence of the earth's surface using a benchmark	

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Information for potentialusers

The implementation of the project will improve the level of safety of mining operations at mining enterprises developing ore deposits and create the preconditions for an economical technology for developing ore deposits in order to increase the completeness of mineral extraction.

As a result of the project implementation, based on the results of a set of studies (theoretical and natural), including an assessment of the stability and defectiveness of the massifs around the supporting pillars and mined-out spaces, a new technological scheme for the development of ore reserves in the pillars will be developed.

***Scope of application*:**mining industry

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