

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 land surface subsidence during mining is an urgent problem of mineral development associated with the negative impact of the shear process on the buildings, structures, utilities and natural objects being mined. The problem has become the most important in the last decade due to the involvement of abandoned mineral reserves in support pillars in re-mining.

Despite the large amount of theoretical and experimental studies to assess 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, to date, there is no definitive scientifically-based approach to the effective design of technological parameters of mining ore deposits. The generally accepted methodology for calculating shear parameters are calculations based on the analysis of field observations and presentation of empirical regularities for specific deposits, which is not always applicable to other similar deposits.

Therefore, the problem of increasing the efficiency of development of ore deposits, taking into account the prediction of displacement of the host rocks to the earth's surface to ensure the completeness of mineral extraction is an important task from a practical and scientific point of view, the solution of which allows to reduce costs per unit of mined mineral.

Based on the analysis and review of the state of the issue, the goal of the scientific and applied work was formulated - to improve the technology of re-development of hollow ore deposits on the basis of reliable prediction of rock and earth surface shear by studying the regularities and identifying the factors that determine the limits of the deformation zone limited by sliding surfaces.

The project purpose:

The project purpose is to improve the technology of re-development of hollow ore deposits on the basis of reliable prediction of rock and earth surface shear by studying the regularities and identifying the factors determining the limits of the deformation zone bounded by sliding surfaces..

Expected and achieved results:

According to the calendar plan:

- a methodology for determining the stability criteria of the excavated space and the overlying strata was developed;
- the criteria for the collapse of the overlying rock strata during the extinguishment of mined-out spaces were determined, as well as the principles and dependencies determining the processes of inelastic deformation and disintegration of rocks on the basis of mine studies;
- the work done to determine the collapse zones of the overlying strata using seismic technologies helped to understand the idea of the deep structure of the rock massif at the Zhomart mine;
- a geotechnical block model was created to assess the geomechanical condition of the rock mass.

List of publications for 2024:

Takhanov D.K., Zharaspayev M.A., Zhiyenbaev A. “Determining the parameters for the overlying stratum caving zones during re-peated mining of pillars”. Mining of Mineral Deposits (Volume 18 (2024), Issue 2, 93-103) <https://doi.org/10.33271/mining18.02.093>

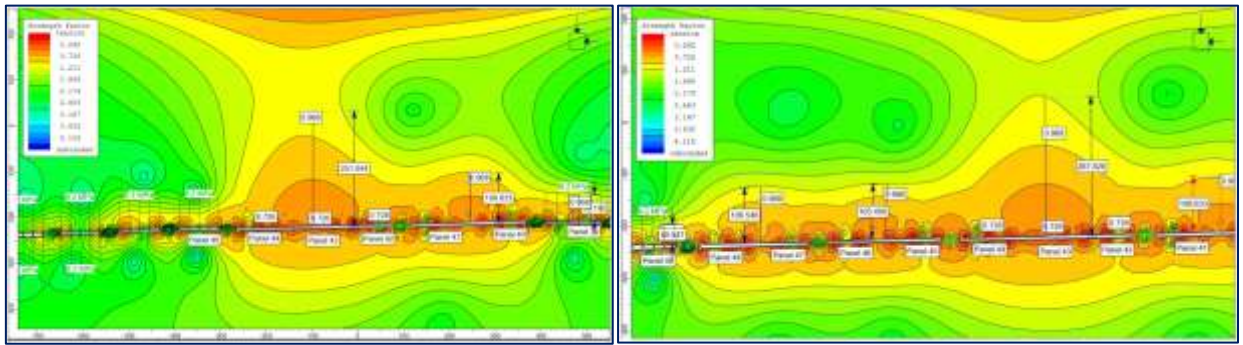


Figure 1 - Modeling of the collapse vault during crushing of massive pillars between panels 40, 41, 45-46 and 47-48



Figure 2 - Survey of mine workings and pillars at mines

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List of publications:

1. Masivtiñ tabiği kerneuli küindegi fizikalyq prosesterdiñ taralu aiasyn bağaladyñ ädisi. Certificate of inclusion of information in the state register of rights to copyrighted objects No. 40115 dated 02.11.2023 Rabatuly M., Takhanov D.K., Balpanova M.Zh., Makasheva A.T.

2. Masivtiñ tabiği kerneuli küindegi fizikalyq prosesterdiñ taralu aiasyn bağaladyñ ädisi. Takhanov D.K., Zhienbaev A.B., Balpanova M.Zh., Mussin R.A. // Mining Journal, No. 11, 2023.

3. Takhanov D.K., Zharaspayev M.A., Zhienbaev A. “Determining the parameters for the overlying stratum caving zones during re-peated mining of pillars”. Mining of Mineral Deposits (Volume 18 (2024), Issue 2, 93-103) <https://doi.org/10.33271/mining18.02.093>

Information for potential users:

The project implementation will make it possible to improve the level of mining safety at mining enterprises developing ore deposits and create prerequisites for an economical technology of ore deposit development in order to increase the completeness of mineral extraction.

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

Scope:

Minerals industry.

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