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 methodology has been developed for determining the criteria for the stability of mined-out spaces and the overlying strata;

- the criterion for the destruction of the overlying rock mass during the elimination of mined-out spaces, as well as the principles and dependencies that determine the processes of inelastic deformation and disintegration of rocks based on mine research, have been determined;

- the work carried out to determine the collapse zones of the overlying strata using seismic exploration technologies helped to understand the concept of the deep structure of the rock mass at Zhomart mine;

- a geotechnical block model was created to assess the geomechanical state of a rock mass;

- patterns of change in the magnitude of vertical displacements of the earth's surface have been established depending on the parameters of the mined-out space and the order of pillar development;

- an original method has been developed for constructing a predicted shape of the displacement trough profile with the expected collapse reaching the earth's surface and in the zone of smooth deformations.

List of publications for 2024:

- Takhanov D.K., Zharaspayev M.A., Zhienbayev 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

- Takhanov D.K., Balpanova M.Zh., Ivadilinova D.T. «Research of patterns of deformation changes depending on technological parameters of the working face for inclined deposits» in the

journal «Bulletin of KazUTB». Bulletin of KazUTB, No. 3, 2024. P. 452-465.https://doi.org/10.58805/kazutb.v.3.24-424

- Ivadilinova D.T, Rymkulova A.B, Makasheva A. Substantiating inter-chamber pillar parameters when developing inclined bedding. Mining journal of Kazakhstan. No. 12, 2024.

Patents for 2024

-Patent for invention of the Republic of Kazakhstan No. 37071 «Method of erecting an artificial whole»

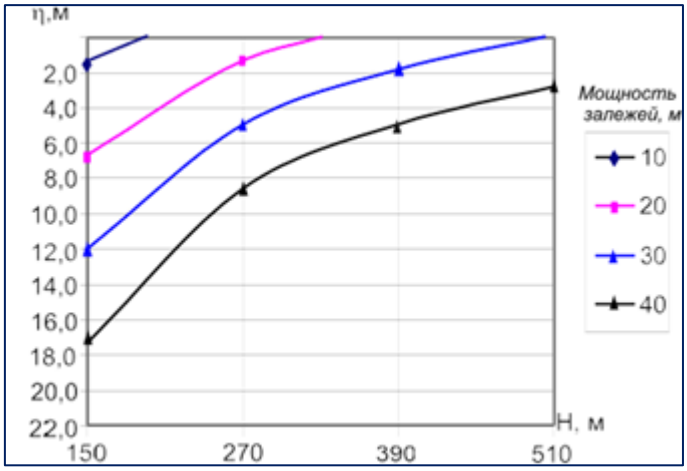

	Figure 1 –Graph of the dependence of the magnitude of subsidence of the earth's surface on the thickness m, depth of development H at Kp=1.03 during the development of flat deposits of the same type of rocks	

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

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8.

List of publications:

1. A method for estimating the volume of propagation of physical processes in the natural stressed state of an array. Certificate of entry of information into the state register of rights to objects protected by copyright No. 40115 dated November 2, 2023. Rabatuly M., Takhanov D.K., Balpanova M.Zh., Makasheva A.T.

2. A method for estimating the volume of propagation of physical processes in the natural stressed state of an array. Takhanov D.K., Zhienbayev A.B., Balpanova M.Zh., Mussin R.A. // Mining Journal, No. 11, 2023

3. Takhanov D.K., Zharaspayev M.A., Zhienbayev 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

4. Takhanov D.K., Balpanova M.Zh., Ivadilinova D.T. «Study of the patterns of deformation changes depending on the technological parameters of the working face for inclined deposits» in the journal «Bulletin of KazUTB». Bulletin of KazUTB, No. 3, 2024. P. 452-465. https://doi.org/10.58805/kazutb.v.3.24-424

5. Ivadilinova D.T., Rymkulova A.B, Makasheva A. Substantiating inter-chamber pillar parameters when developing inclined bedding. Mining Journal of Kazakhstan. No. 12, 2024.

6. Patent for invention of the Republic of Kazakhstan No. 37071 «Method of erecting an artificial whole»

Information for potential users

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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