AP22785093 «Research and justification of mine workings supporting technology with increased rock arching zones stability control while thick coal seams mining» - sc.sp. – Khalikova E.R.

Relevance

The increase in mining depth, combined with the relatively low strength of rocks and the use of supports with insufficient load-bearing capacity and structural flexibility, are the main reasons for the unsatisfactory condition of mine workings. An analysis of the operations at production sites in the Karaganda coal basin shows that there are significant reserves for increasing labor productivity and reducing coal production costs. These inefficiencies stem from the mismatch between the mining methods used and the actual geotechnical conditions, the complication of mining and geological conditions with increasing depth (presence of tectonic faults, increased gas content, etc.), and imbalances in the capacities of interconnected technological stages and processes. All of these factors collectively lead to a decrease in the reliability of mining operations and, consequently, to economically unjustified expenses. Utilizing these reserves is especially important when implementing advanced technological schemes for mine workings and designing progressive mining technologies for thick gas-coal seams under complex geological conditions.

The issue of mine stability remains one of the most relevant and decisive factors affecting the efficiency of coal mine operations across various coal basins in the Republic of Kazakhstan. To address this, the following scientific and applied research and activities are required:

- adoption of scientifically justified technological decisions to determine support parameters in zones with increased rock arching potential;
- providing a geomechanical forecast assessment of the deformed state of the surrounding rock mass in thick coal seams;
- development and implementation of technologies and equipment, with substantiated parameters of support systems based on the stress-strain state of the surrounding rocks.

At present, the development prospects of this scientific direction for underground operations in Kazakhstan’s coal industry depend on the use of the results of applied scientific research and the pilot-industrial testing of promising developments at the coal mines of the Karaganda basin.

Project Objective

The objective of the conducted research is to develop an advanced technology for maintaining the boundary pillars of mine workings based on established patterns of rock behavior during the extraction of thick coal seams. This aims to enhance the efficiency and safety of underground mining operations.

Published Results:

- Demin, V., Khalikova, E., Demina, T., Syzdykbaeva, D., Karatayev, A., & Mustafin, M. (2025). Assessment of the stress-strain state of the rock mass surrounding cutting workings during coal seam mining. Mining of Mineral Deposits, 19(2), 38–46. https://doi.org/10.33271/mining19.02.038
- Khalikova E.R., Zhumabekova A.E., Syzdykbaeva D.S., Mustafin M.G. Development of technological schemes for strengthening weakened rock zones. Mining Journal of Kazakhstan, 2025, No. 2, pp. 50–60. https://doi.org/10.48498/minmag.2025.238.2.003
- Syzdykbaeva D.S., Khalikova E.R. Technological conditions for ensuring the stability of the enclosing rock mass during mine support installation. Copyrighted object application. Application No. 53703 dated 21.01.2025.
- Khalikova E.R., Demin V.F. Mountain range geomechanics while developing preparatory mine workings. Monograph – Karaganda: Publishing House of Abylkas Saginov Karaganda Technical University, 2025, 223 pages. ISBN 978-601-355-490-7

Research Work within the Project at the Mines of the Karaganda Coal Basin

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Information for Potential Users

As a result of the project implementation, an advanced technology will be developed for maintaining the boundary pillars of mine workings based on established patterns of rock behavior during the extraction of thick seams, aimed at improving the efficiency and safety of underground mining operations.

Field of Application

Mining enterprises in the coal industry, with the potential to extend the obtained scientific and technical results to underground ore mining enterprises.

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