ANNOTATION
Dissertation for the degree of Doctor of Philosophy (PhD) in the educational program 8D07202 - «Mining Engineering»

Tanekeyeva Gaukhar Djoshina

«EXPLORATION AND SUBSTANTIATION OF ANCHORING PARAMETERS OF DEVELOPMENT WORKINGS IN ZONE OF INFLUENCE OF MINING OPERATIONS»

Relevance of this study

Creation safety state of conditions opeational excavations is attained by fastening them impactful facilities on calculation base of consideration of dynamics options (temporary measure), zonal disintegration and swallow (rheology) rock samples for mathematical modeling particularities their mining attributes. As the experience of coal seams during cleaning operations in areas of support (high) mountain pressure with maintenance of the work before the tiller, the intensity of stresses and deformations and the duration of long cleaning operations increases sharply, the associated production losses are 20-25% or more, increasing coal soiling and reducing the safety of miners.

In this connection, study of the patterns and features of deformation of the rock mass around the contour of the supported ore mining on the ventilation horizon when the extracted post is below the previously processed tiller (with extraction by stretching) or adjacent (respectively, when working on drop) with the establishment of reliable fastening parameters when working on hollow columns is an actual scientific task for the coal mining industry.

The purpose of experience.

The purpose of dissertation research: research of patterns changing in tension-deformation state of unstable zones, a range of bearing rocks to ensure their stable maintenance depending on mining conditions with improved technology and to justify the parameters of fastening mining excavations.

Tasks of research:

– Analysis of the state of technological schemes for carrying out and maintaining, preserving the mining operations in the t.c sewer, ensuring their stability and reduction of defects; technological and mining solutions for fastening contours and maintaining the supporting array around the workings; principles of fastening of contour rocks taking into account their technological state;

– monitoring of mountain pressure manifestations, displacement of working contours and determination of the characteristics of deformation of rock mass, accommodating preparatory mines with combined frame-Anchor and anchor types of mountain anchorage in the case of a disjointed preparation of counterpointers with their arrangement against a previously worked adjacent counterpounded column;

– research of the geomechanical state taking into account a complex of physical-mechanical, strength and rheological factors to justify the parameters of fastening of mining outcrops with techno-genic manifestations of mining technical

factors; development of effective means and ways of fastening the appropriate mining operations when working with excavation columns;

– Carrying out feasibility studies, conducting technology testing development of means for fastening and strengthening the mountain range in experimental-industrial mining conditions.

Methods of research. The complex research method was used, including: analysis and scientific synthesis of previously published mining literature on the problem of maintaining the site preparatory works at the sites of the mountain support pressure; Mining studies of processes for deformation of the site-specific ventilation preparatory workings; analytical studies of processes for deformation of rocks in the vicinity of site-specific excavation operations; testing of proposed technological developments under mine conditions.

Scientific recency of the experience.

– Fastening system of steel-polymer screw anchors of the first (bridge forming) level for strengthening the concrete concrete roof and deep laying anchors, interconnected by force links, how the roof rock is maintained above the ventilation outlet, in the mountain pressure support area of the front of the lava with distribution of pressure on single and double-level anchor struts;

– Empirical patterns of formation of deformation zones around preparatory workings were identified depending on the change in physical-mechanical properties of rocks, acting mountain pressure (depth of works), the distances from the cutting of the current production and the development of the front of the cleaning excavation;

– The system status parameters «Lateral rock» are set by strengthening the contour set of preparatory work from increased stresses by creating multi-level fastening of the inlaying rocks with an increase in vertical maximum stresses with an increase in the depth of mining operations to 1,7 - 1.9 times and contour offsets - respectively 1,2 - 1,35 times;

– it is determined that the anchor props of deep laying in combination with the basic single-level anchor props of bridge forming protect the direct rock of the roof from the uncontrollable process of deformations and destruction of the roof, Ensuring maintenance-free operation of maintained workloads.

The practical value of the work consists in developing technological diagrams, justification of fastening parameters, when two levels of roof fastening are laid from a double-level anchor fastening (with stable lower layers of roofing) and from a metal arch fastener installed in a way, to maintain the immediate roof, and rope anchors, at an angle of 30o from the vertical plane to cover the width of the output, under the infinite profile connected with metal arch support at a volatile lower level of contour rocks; in the experimental and industrial validation of results of investigations on perfection of technology of carrying out of works with pressure sewer anchors under conditions of mine «Abaya» Karaganda coal basin with determination of parameters of deformation processes (Production results (Act of Experimental and Industrial Tests); creation of progressive means of fastening during the performance and maintenance of the pressure performances; determination of the technical and economic efficiency of technological solutions.

Basic protected provisions:

- Creating a fastening structure by binding the circumferential rock mass, located in the vault of natural equilibrium, with the above rocks using deep-setting anchors, provides suspension of the formed bulkhead beam by pliable metal frame on slabs with low-grade rock, At the height of equal half of the width of the output and single-level mooring anchor on the layers with medium stability and stable lower layers, to a strong topsoil and load distribution between combined types of combined output;

- with increasing depth of mining operations, the displacement near the production contour increases sharply on a linear basis, and the stresses with distance from the production contours decrease on an exponential basis;

- the established stress-deformed state around the supported work with an increase of the depth of mining operations from 500 to 800 m: vertical maximum stresses are increased by 1.7-1.9 times and contour offsets - by 1,2-1.35 times; lateral longitudinal stresses in the roof - decrease by 2.24-2.5 times on the coal pile side, respectively by the counterweight column -1.8-1.9 times; from the side wall of the previous counterweight column - increase by 1.8-1.9 times; the lateral horizontal stresses on the side of the side wall from the previous excavating column are reduced by 1.3-1.4 times, and on the side of the excavating column they increase by 1,3-1.5 times, which allows to form a natural balance and justify the parameters of fastening taking into account the change in strength characteristics of the array when moving the front cleaning works.

The results of the study consist in the development of technological schemes, justification of fastening parameters, when two levels of roof fastening are laid from double-level anchor fastening (with stable bottom layers of roofing) and metal arch fastener, installed in a way, to maintain the immediate roof, and rope anchors, at an angle of 30o from the vertical plane to cover the width of the output, under the infinite profile connected with metal arch support at a volatile lower level of contour rocks; in the experimental and industrial validation of results of investigations on the perfection of technology for carrying out of works with pressure sewers in the conditions of the mine «Abaya» Karaganda coal basin with determination of parameters of deformation processes (Production results (Act of Experimental and Industrial Tests); creation of progressive means of fastening during the performance and maintenance of the pressure performances; determination of the technical and economic efficiency of technological solutions.

Approval of work

The author's personal contribution consists in carrying out the main part of theoretical and experimental-industrial research, presented in the dissertation. The main theoretical and practical results were introduced into the educational process of «Karaganda Technical University named by Abylkas Saginov» for students of the educational program «Technological machines and equipment» in the discipline «Tau-ken Zhovlyablymyashivaniye», «Mining business» on the discipline «Rudalyakah kene oryndaryni geeratsiya kadazu». There is an act of introduction into the educational process**.** The results of research and development were implemented into the production process of «Abaya» mine UD AS «Qarmet». The acts of experimental-industrial tests on perfection of the technology for carrying out

of work with pressure cable anchors in conditions of mine «Abaya» Karaganda coal basin with determination of parameters of deformation processes have been obtained.

The main scientific results of the thesis work are presented in 7 articles, 10 conference reports, and there is a patent on the useful model № 7955 from 14.04.2023. «Cable anchor», № 8679 from 14.04.2023. «Method of combined fastening of ventilation output of the column». In journals included in the list of recommended publications, the Committee for Quality Assurance in the Field of Education of the Ministry of Education of the Republic of Kazakhstan :

1. Abeyov E.A., Tanekeyeva G. D. Geomechanical problems of development of ore deposits in Kazakhstan Mountain Magazine of Kazakhstan, № 3, 2022. – c. 29– 32.https://doi.org/10.48498/minmag.2022.203.3.004.

2 Zhumabekova A.E., Demin V.F., Abeuov E.A., Tanekeyeva G. Д. Mine workings supporting te chnologies on stress and strain state control basis. «Mountain magazine of Kazakhstan», № 1, 2023.- c. 41-47. DOI: https://doi.org/10.48498/minmag.2023.213.1.004

3 V.F. Demin, A.B. Kydrašov, E.A. Abeyov, G.D. Tanekeyeva Massivtsi t.T.- Assessment of geomechanical processes occurring in the rock mass during development preparatory workings, taking into account the technogenic state of the rock mass – «Mountain magazine of Kazakhstan», № 10.- C. 35-41 DOI: https://doi.org/10.48498/minmag.2023.222.10.005

4 Khalikova E.R., Demin V.F., Abdrahman Influence of mining technical conditions on deformation in waste rocks during combined mining fasteners "Universitet Enbekteri – University Proceedings" of Abylkas Saginov Karaganda Technical University NPJSC, Karaganda 2023. – No. 4. – pp. 171-177 DOI: 10.52209/1609-1825_2023_4_171

5A. Zhumabekova, V. Demin, B. Issakov, T. Demina Evaluating the Efficiency of the Mine Workings Supporting Technology Ap plication to Increase Contour Stability University's works. - "Universitet Enbekteri – University Proceedings" of Abylkas Saginov Karaganda Technical University NPJSC, Karaganda 2024. – № 1. – C. 185-195 DOI: 10.52209/1609-1825_2024_1_185

In the international scientific publication, which is part of the company's database Scopus и Wed of Science:

1 Tolovchan B., Demin, V., Amanzholov, Zh., Smagulova, A., Tanekeyeva, G., Zairov Sh., Krukovskyi O. Ref. No.: MMD-22-0203. Ukraine, magazine «Mining of Mineral Deposits» Creation of a geomechanical model of the deposit on the example of the deposit of North Catpar. & Cabana, E. (2022). Substantiating the rock mass control parameters based on the geomechanical model of the Severny Katpar deposit, Kazakhstan. Mining of Mineral Deposits, 16(3), 123 -133. https://doi.org/10.33271/mining16.03.123. Ukrainian School of Mining.

2 Tanekeeva G.., Abeuov E.A., Makhmudov D.R., Mussin R.A., Balabas A.Yu., Stuy of the geomechanical conitions for carrying out an maintaining surface mine workings. «Coal», № 2, 2023. - c. 30-32. DOI: http://dx.doi.org/10.18796/0041-5790-2023-2-00-00.