

ABSTRACT

of the dissertation for the degree of Doctor of Philosophy (PhD) in
specialty 6D070700 – Mining

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Study of the influence of drilling and blasting work on the stability of the sides of the Kusmuryan open pit

Relevance. Establishment of patterns of influence of drilling and blasting operations on the stability of the sides of the open pit, taking into account the seismic impact of the explosion.

To achieve the aim, the following tasks were defined:

- to establish the influence of drilling and blasting operations on the nature of the deformation of the edge massifs on the design contours of the open pit;
- develop recommendations on rational parameters of drilling and blasting operations;
- develop a methodology for assessing the quality of drilling and blasting to put the board in the final position;
- to determine the nature of the deformation of the edge massifs on the design contours of the open pit;
- to investigate the process of drilling and blasting and develop a methodology for assessing the explosion using the seismicity coefficient.

The idea of the work: The stability of the sides of the quarry is assessed both by the initial mining and geological conditions of the environment and the parameters of drilling and blasting operations, and by the seismic impact of the explosion, which must be taken into account through the parameters of their influence.

Scientific statement

The value of the seismicity coefficient of the rock mass (overburden rocks), as the degree of elastic response to external dynamic impacts, depends on the ratio of the values of the main strength properties (σ_{co}/σ_T) called the brittleness coefficient.

The coefficient of the reserve stability of rocks inversely linearly depends on the degree of disturbance of the contour array of rocks caused by the influence of blasting operations

In coarse-grained, weakly weathered rocks above average hardness ($f > 10$) and in the absence of cracks dipping towards the mined-out area, breaking of the near-contour band with oblique charges at an angle of inclination of 60–75° to the horizon ensures long-term stability of benches.

The scientific novelty of the calculation results is as follows:

In this work, for the first time, a joint research method was applied, including an analytical calculation of the seismic impact of a shock wave on a rock mass, as a result of which graphs of the dependence of the seismicity coefficient on the strength coefficient of the rocks of the Kusmuryan deposit on the Protodyakonov scale for

various explosives and the method of instrumental measurements were obtained, used to determine the seismic impact of an explosion on a rock mass. This made it possible to substantiate the technology of drilling and blasting operations during contour blasting, which ensure a long-term stable position of the permanent side of the open pit, and to assess the effect of the explosion, the seismicity coefficient of the rock mass was used, which characterizes the degree of elastic response to external dynamic effects and is a parameter that determines the intensity of the elastic seismic wave as you move away from the explosion site.

The practical value of the work

The results of the work will be used to calculate the safe parameters of blasting when the board is placed in the final position at the Kusmurn field. This method of research can be applied at any mining enterprise that conducts open-cast mining of minerals.

Approbation of the work.

The main provisions of the work were reported and approved at: the scientific seminar of the RMPI Department of the Abylka Saginov Karaganda Technical University; the Scientific and Technical Council of the Abylka Saginov Karaganda Technical University

The results of scientific research obtained in the dissertation are introduced into the educational process in the profile disciplines of the bachelor's degree 6B07202 and Master's degree 7M07203 "Mining".

The results of scientific research obtained in the dissertation are included in the workflow of the Interrin LLP company, the Interrin LLP company provides services for drilling blasting operations in open pit mining in the Kushmurn, Kazhikongan, Bapy quarries, etc.

Publications. The basic principles of work are reflected in 15 printed works, including 3 articles published in the journal included in the Scopus database, 3 articles published in journals included in the list of publications submitted by the Committee for Quality Assurance in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan, 5 abstracts at an international conference and 4 certificates of entry of information into the state register of rights to objects protected by copyright.

The structure of the dissertation work. The dissertation consists of an introduction, five chapters and a conclusion, 98 pages of printed text and a list of 79 references.