

**AP14869856 “Creation of new technologies of drilling and blasting operations ensuring preservation of the design parameters of mine workings and stability of the contour part of the massif” - p.m. Imashev A.Zh.**

***Relevance:***

The relevance of the problem of creating new technologies for drilling and blasting operations, ensuring the safety of the design parameters of mine workings, taking into account the geomechanical condition and disturbance of rocks by blasting near the contour of the massif has always been an important task in the mining industry.

To date, when carrying out mine workings at mines Akbakai, Beskempir, Zholymbet of Altyntalmas JSC, Bozymchak of Kaz Minerals LLP, Voskhod of Voskhod-Oriel LLP, Abyz of Kazakhmys Corporation LLP, the exceeding of design cross-sections reaches from 10 to 30% and is a problem that requires an unconventional approach.

It is known that excessive cross-section is the main problem of mining excavations, which leads to an increase in the volume of rock mass for transportation, a decrease in the load-bearing capacity of the contour part of the massif, a significant increase in the tunneling cycle and the cost of a running meter of excavation. Despite the fact that there are scientific developments, the results of previous studies do not allow still to solve the problem of preservation of the design parameters of the cross-section of mine workings by optimizing the parameters of drilling and blasting operations.

***The project purpose:***

The project purpose is to create new technologies of drilling and blasting operations ensuring preservation of design parameters of mine workings by minimizing the excess section ratio depending on the disturbance of the rock massif by blasting, seismic impact of the blast force and geomechanical condition of the near-contour part of the rock massif in accordance with the geological strength index.

***Expected and achieved results:***

Based on the results of studies of explosion parameters, it was found that at any charge diameter, an increase in charge density leads to a significant increase in detonation velocity. However, with further increases in density (from 1.45 to 1.7 g/cm<sup>3</sup>), the intensity of the increase in velocity decreases. Based on numerous studies of the detonation ability of explosives, it has been established that detonation characteristics are related to the diameter of charged boreholes and the density of explosives.

In the course of performed pilot tests in various mining and geological conditions, a logarithmic relationship between the geological strength index and the rock disturbance coefficient (D) was established. It was found that the section surplus ratio directly depends on the GSI stability rating.

Zoning of the field areas by rock stability rating based on the geological strength index was performed and the dependencies of the main parameters of drilling and blasting operations were determined. In the course of geotechnical mapping of mine walls and description of geological borehole cores, the rock stability rating was determined. Based on the GSI rating, the GSI rating database was collected and a three-dimensional geomechanical model of the deposit was built. Based on the geomechanical model, the rock massif was divided into domains according to GSI rating, which made it possible to determine the effect of the explosion force on the rock massif and to correct the DBO passports.



**Figure 1 - Internship at “Nazarbayev University”  
School of Mining Engineering, Astana 2023.**



**Figure 2 - Studies in mine conditions**

***List of publications:***

1) A. Imashev, A. Suimbayeva, G. Zhunusbekova, A.C. Adoko, B. Issakov. «Assessing stability of mine workings driven in stratified rock mass» // Mining of Mineral Deposits, 2024, 18(1), p.82-88 <https://doi.org/10.33271/mining18.01.082> (Scopus database percentile 69)

2) A.Zh. Imashev, A.M. Suimbayeva, A.K. Mataev, A.A. Musin “Justification of the use of contour blasting to ensure the safety of the design parameters of excavations” // Mining Journal of Kazakhstan, No. 5, 2024, p. 13-18.

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***Information for potential users:***

Achievement of the design parameters of mine workings will reduce the volume of transportation of excess rock mass, specific consumption of explosives, materials for fastening, stabilize the geomechanical condition of the rock massif and increase the safety of mining operations.

***Scope:***

Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures.

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