STUDY OF THE FEATURES OF THE PROPAGATION OF WAVE PROCESSES IN THE MOUNTAIN RANGE TO ENSURE THE SAFETY OF PROTECTED OBJECTS AND THE STABILITY OF SLOPES DURING BLASTING OPERATIONS AT QUARRIES

Kutuev V.A., Zharikov S.N.

Federal State Budgetary Institution of Science Institute of Mining of the Ural Branch of the Russian Academy of Sciences, Yekaterinburg, Russia

e-mail: kutuev88@gmail.com

gradually from horizon to horizon in depth, which means that the consequences of explosions become more dangerous, because they can provoke large landslides, landslides and collapses. To ensure the safety of protected objects, there are three main criteria that significantly limit certain solutions in the production of technological explosions. These are seismic and explosive effects (seismics), the separation of individuals and the degree of possible damage to the protected object by a shock wave. Seismics affect interblock movements and, accordingly, the stable condition of soils and slopes, as well as buildings and structures experiencing harmonic vibrations at their base. The seismic effect on the stability of an object is not always immediately noticeable, but it always leads to a change in the properties of the block structure of the rock mass.

The most dangerous for any structure are the fluctuations of the mountain range exceeding the permissible values according to the stability criterion, therefore, an important issue of industrial safety is the control of such fluctuations during the production of blasting operations that would ensure the safety or at least minimal negative impact on the object during the production of explosions. Considering the above, it should be noted the relevance of research in the direction of studying seismic waves, and linking these studies to the tasks of the mining industry is of high scientific and practical importance.

The purpose of the work is to study the features of the spatio-temporal propagation of seismic waves from technological explosions, in order to increase the level of safety of protected objects, the stability of slopes and more rational use of on-board reserves of mineral deposits developed by the open method.

Research objectives:

The study of the seismic effect of explosions on protected objects and a structured array in various mining and geological conditions of complex-structured deposits, using direct field measurements.

Analysis of deviations of the actual vibrations of the rock mass from the calculated values at different coefficients of soil conditions, and the establishment of clarifying dependencies for calculating the permissible vibration rates based on the physical and mechanical properties of rocks with different structural weakening of the rock mass.

Development of a nomogram that allows to determine the seismic safety parameters of the BVR in the contour zone of the quarry, to ensure the stability of the slopes, as well as to predict the seismic impact of blasting on protected objects.

Research results.

Based on the data on the physical and mechanical properties of rocks and the propagation of seismic vibrations in them during mass explosions, a nomogram was constructed to determine the limits on the mass of charges in the deceleration stage, ensuring the seismic safety of protected objects.