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PLACEMENT OF WELLBORE NET DURING DRILLING WORKS IN A QUARRY

At the present stage of mining development, most of the minerals that are extracted in an open way are prepared for mining through drilling and blasting works (DBW).

According to academician K. M. Trubetskoy, the destruction of rock masses by explosion energy are still the most versatile and effective way, despite the achievements in the field of non-explosive methods of destruction (mechanical, thermal, electric, magnetic). More than 70 per cent of the minerals are mined by explosion energy. The volumes of fragmented and moved by explosions rock mass reach millions of cubic meters per year.

Drilling and blasting works at mining enterprises are one of the main operations in preparing rocks for mining. An increase of tough rocks in percentage, as well as the influence of the quality of fragmented rock on technological processes such as excavation, transportation and primary shredding, causes an increase of total expense of drilling and blasting works. The quality of a mass explosion in the fields of industrial minerals is characterized by equability of rock fragmentation. First of all, it is necessary to meet the requirements of raw stock quality, lumpiness and the degree of rocks looseness by choosing a set of technical and organizational decisions. Therefore, in order to achieve effective fragmentation and minimum displacement of rock masses, it is necessary to ensure the transfer of the maximum explosion energy to the environment.

Surveying support, which contains a considerable amount of field and camera works, is necessary for drilling works in quarries of industrial minerals. It includes surveying of massif prepared for explosion, carrying out project of drilling works with given parameters of a wellbore net, the control of the actual position of drilled wells and surveying of blasted mountain mass.

Rock blasting on banks occurs in separate blocks. Their sizes depend on the location of wells, the number of well sets of wellbore net parameters, and the need for achieving good technical and economic indicators of drilling and blasting works. The choice of a single or multi-set well placement is determined by the width of the work area, the quality of fragmenting and underworking of banks bottom. With multi-set placement of wells, their net may be rectangular or square, the distance between the sets of wells is equal to the distance between the wells in a set or in a chess order.

Nowadays chess net location of wells for mine blocks during blasting operations is used quite rarely. In spite of the fact that in some cases they are quite good regulators of the effective holding-up depth check, other approaches are used mainly to improve the quality of preparation of rock mass mining. There are several reasons for it.

Drilling using chess net requires precise positioning of the machine on the block surface, as well as a clear sequence of transition between wells. Simultaneous non-compliance with these conditions results in a big amount of refused material in the process of blocks drilling (the distances between wells are not followed), as well as the dumping of wells during transitions from wells to wells.

As a result, if square net is drilled with less amount of refused material, than the preference is given to chess net, although in reality this problem is not technological, but organizational.

Appropriate scientific and theoretical direction has been development.

In short delayed blasting, when adjacent charges in sets explode simultaneously, the energy of blasting pulse often is not enough to allow cracks around the hollows developing to a certain size for the massif to be destructed. This is primarily due to significant output of lump when destructing large blocks of rocks. When initiating charges, it is necessary to create conditions in which they either work independently of each other or grouped at distances which exclude the interaction of tension fields with appropriate delay between groups. In the first case, the problem of the effective value of the delay interval is solved in accordance with the scheme of initiation and properties of rocks; and the scheme of installation of the net surface should ensure the reduction of probable untimely actuation of charges.

In the second case, the task of blasting under uniform energy distribution of charges in massif is solved, which leads to a diagonal scheme with increased distances between simultaneously initiated charges.

The above-mentioned factors give grounds to consider that the use of conditionally chess nets for placing wells provides for the creation of a rational direction for initiating charges to improve the quality of rock fragmentation.

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