The relative decrease in the methane content of a degassed source is characterized by the degree of degassing - the ratio of the amount of released (recovered) gas per unit mass or volume of the degassed source to its natural methane content.

The duration of the degassing is usually determined by the mining conditions in accordance with the plan for the preparation and mining of coal. Reducing the gap in time between the end of drilling and connecting the well to the gas pipeline increases the efficiency of degassing by 10 - 12%.

At the extraction site, the accepted degassing parameters are the duration of the degassing period, the preliminary degassing factor and the initial well productivity, and the derived parameters are the distance between the wells, the length of the wells and the number of wells in the degassed field. The duration of the degassing period is determined by the mining and technical conditions in accordance with the calendar schedule for the preparation and mining of coal reserves. The coefficient of preliminary degassing is taken in dependence with the size of coal mining and the gas balance structure of the site, the vacuum depth, the gas permeability of the seam and the initial intensity of gas recovery in the well [1].

Bibliography

1. Drizhd N.A., Akhmatnurov D.R. Zakharov A.M. et al. Evaluation of methane safety methods in the mines of the Karaganda basin: Monograph. - Karaganda: Publishing house of KSTU, 2016. 224 p.

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CONCENTRATED CHARGE BLASTING IN IRON ORE MINING AT KRYVYI RIH IRON ORE BASIN

The research deals with developing and testing the technology of concentrated charge blasting with preliminarily formed shielding layers in block caving of thick iron ore deposits of Kryvyi Rih iron ore basin.

Vertical concentrated charges (VCC) have been used in Kryvyi Rih basin for mining stable and solid ores since 1980.

Specific consumption of explosives varies from 0,265 kg/t to 0,788 kg/t depending on broken ore strength. In secondary breaking, specific consumption of explosives makes 20-50 g/t as compared to 300-400 g/t of conventional breaking.

In VCC blasting, labour efficiency is two-three times higher than in long-hole blasting, sanitary and hygienic conditions are more favourable, average yield of large fractions (exceeding 30 cm) is within 7%.

Yet, for all its advantages, VCC blasting has a disadvantage which is expressed by uncontrolled back-break at depth usually equal to 0,5 of burden of hole. This can be prevented by preliminary stress-wave shielding during VCC blasting. It implies blocking out broken rock mass by shielding layers that divide it into separate blocks blasted by one or two charges. Before VCC blasting, bells are formed besides those at the VCC basement. The formed compensation chamber is a shield for reflecting explosion waves at the base of the blasted ore.

If the blasted block is destroyed by two VCCs located vertically, the upper charge is the first to detonate followed by the lower one (delayed). With thicker deposits, if two or more blasted blocks are across the strike, the ore is blasted from the hanging wall towards the footwall. Before detonating the subsequent block, the previously broken ore is drawn with the rock cushion left at the sill. Blasthole rings are drilled at the distance of 0,7 of burden of hole (W, m) off the VCC at the footwall to form shielding layers at the boundary of blasted blocks.

Concentrated charges are placed either in vertical (raise) or horizontal workings (in crown-pillar caving). To form a 6-7 m high rock cushion, about 9m^3 of rock 2×2 m in cross-section is placed at the raise opening. To reduce the amount of rock broken by the last detonation, the lower part of the raise should be driven to the height of the rock cushion with a smaller cross-section, for example, 1,2×1,2 m. If the raise is driven by long-hole blasting onto the compensation chamber and long holes are not drilled into the upper working, a control long-hole is drilled from the leading working entering the raise to control the cushion height. To place a horizontal concentrated charge (HCC), a 9 m raise is driven crossing the 3×3 m horizontal chamber of the required length.

It is recommended to use high-pressure igdanite (ИВД-5) the production technology of which is set up at the mine of the PJSC Sukha Balka.

Preliminary formation of shielding layers by detonating blasthole rings is an essential element of the VCC blasting technology.

The VCC blasting has been applied to iron ore mining at Kryvyi Rih basin for many years having proven its high efficiency. In spite of the large mass of a single charge (20-30 t and more), there are no visible damages in mine workings after VCC blasting. The crushing quality is typically higher than in long-hole blasting. Preliminary formation of shielding layers enables eliminating the increased seismic effect and out-contour damages, increasing the blasting volume by 60-70%, enhancing labour efficiency and ensuring higher quality of primary crushing.

VCC blasting with shielding layers is one of the most efficient ways to enhance underground mining of strong ores and ferruginous quartzite of Kryvyi Rih iron ore basin.

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THE STUDY OF THE INFLUENCE OF PREPAREDNESS OF THE ORE RESERVES ON THE PLANNING OF UNDERGROUND MINING OPERATIONS

Ensuring the effective operation of the mine and the rational use of mineral wealth is possible with the proper justification of