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Table of contents

Section "Mining and processing of useful minerals"

Section "Machine building and automobile transport"

Section "Economics of natural resources use"

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S.M. CHUKHAREV, Candidate of Sciences (Engineering), Associate Professor, Department of Development of Deposits and Mining, National University of Water and Environmental Engineering (NUWEE), Ukraine
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A NEW TECHNOLOGY FOR EXTRACTING ORE UNDER A PROTECTIVE SLAB

Rational use of subsoil in the development of deposits, complete and high-quality extraction of mineral reserves largely determine the effective operation of mining enterprises.

The use of high-performance mechanical equipment that intensify the production and transportation of ore in underground mining only partially resolves the issue of reducing losses and dilution, since the use of powerful technical means is limited by the parameters of mine workings.

Thus, the need for seeking new technological solutions to reduce ore loss and dilution in underground mining comes into the foreground.

Ukrainian and foreign scientists have and continue to address reducing loss and dilution of minerals by applying new technological improvements to existing development systems.

Most of the iron ore deposits in the Kryvyi Rih iron ore basin are of weak and medium hardness. This predetermines their development by systems with caving of ore and host rocks. Considering the physical properties of the broken ore and the processes in ore released from the blocks, dilution occurs long before the broken ore is completely excavated. The dilution process can be suspended a little by observing the planogram for extracting ore from the outlet workings. However, this does not completely solve the problem.

The main dilution occurs along the upper contact of the collapsed ore - rock. Therefore, scientists are considering the possibility of reducing the direct contact of broken ore and collapsed overburden waste rocks.

In [1-3], it is proposed to mine a layer of minerals and then lay a slab (made of wood, metal mesh, concrete) on the soil of the layer; under its protection the underlying mineral is to be mined out.

In [4-6], the separation along the perimeter of the collapsed rock and ore can be achieved by using a "floating" ceiling or a flexible slab. In this case, the block is to be processed in two stages. At the first stage, a protective slab is formed as a "floating" ceiling or a flexible metal ceiling made of strip iron. At the second stage, all cutting workings and cleaning operations are carried out. These options for development systems can significantly reduce losses and dilution of collapsed ore, however, the cost of mining minerals increases significantly. In addition, a large amount of ore remains in the ridges between the outlets at the bottom of the block. Thus, it is necessary to find the best

option to reduce material and labour costs for loading and supplying workings, to reduce the loss and dilution of minerals when extracting ores of weak and medium hardness.

The technology [7] provides for the preparation of horizontal and rising loading and supplying workings in the block and forms a "floating" ceiling in the ore or rock mass. When forming a "floating" ceiling, loading and supplying workings pass in it. In the lower part of the ceiling under each working, longitudinal niches are formed between which longitudinal pillars with inclined side walls are formed, forming them at an angle of internal friction of the collapsed mineral. Ore is excavated under a uniformly descending "floating" ceiling. At the same time, the overlying waste rocks ensure the constant lowering of this ceiling.

After the ore is extracted in the block, an ore "floating" ceiling is mined using an ore end outlet.

Laboratory studies of ore release technology under the "floating" ceiling with loading and supplying workings located in it confirmed a significant reduction in loss and dilution rates and the need for further research into the parameters and functions of the "floating" ceiling.

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EFFICIENCY OF FUZZY CONTROL IN RESOURCE-SAVING ELECTROMECHANICAL SYSTEMS WITH ELASTIC CONNECTIONS IN MINING ENTERPRISES IN UKRAINE

Improved technical characteristics and found solutions to technological problems in the areas of power electronics, digital control systems and advances in the theory of automated electric drives make it possible to widely use in industrial production resource and energy-saving frequency-controlled transistor electric drives with asynchronous motors with a squirrel-cage rotor instead of thyristor DC drives [1].

Scientific edition

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