

FORECASTING STABILITY METHOD OF COAL-CONTAINING ROCKS ON THE COMPLEX OF GEOLOGICAL AND GEOPHYSICAL METHODS

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Purpose. Development of a complex methodology for forecasting the stability of coal-bearing rocks, taking into account the whole existing array of geological-geophysical and mining-technological information, which can and should be used in the design of new coal producing enterprises and existing mines.

Methodology. The proposed complex method for forecasting the stability of coal-bearing rocks involves the sequential implementation of three interrelated stages: 1) calculation of the compressive and tensile strength of rocks (layered and in massive) for 20-meter roof interval and 10-meter subsoil coal seams. 2) selection and quantitative assessment of weakened cavernous-fractured zones in well logs according to standard and acoustic logging and geological documentation; 3) characteristics of the active roof of coal seams in terms of stability, load-bearing properties and controllability.

Findings. Research, including the study of physical and mechanical properties and stability of coal seams is mandatory in the geological and economic assessment of coal deposits.

Constructed maps of roof stability of clearing workings containing the information on the area of development of a false roof and cavernous - cracked zones, about stability of a direct roof, about type of the main roof on loading properties, and consequently about a class of controllability of an active roof. There are a source materials that allow to make a choice of ways of to manage the roof, to justify the passports of fastening, substantiate support patterns, ensure workplace safety, improve planning and technical and technological support of mining operations in existing mines, create the most rational schemes and procedures for working coal seams in the design of new coal mining enterprises.

The use of the proposed complex of geological and geophysical methods allows to determine in as much detail and quickly the physical and mechanical properties of coal-bearing rocks in their natural occurrence continuously throughout the geologic cross-section of each well drilled in the field and obtain conditional geological information to predict the behavior of rocks.

The use of the proposed methods allows at least 5-6 times to increase the initial data, which significantly increases the reliability of the forecast. This method meets all the requirements of regulatory documents governing the study of mechanical properties of coal-bearing rocks and coal in the geological and economic assessment of coal deposits and the design of new mine workings at existing enterprises.

Key words: forecasting stability method, coal-bearing rocks, geologic cross-section, tensile strength

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VANADIUM IN THE COAL SEAM C₁₀^B OF THE DNIPROVSKA MINE (WESTERN DONBASS)

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Purpose. The research of peculiarities of vanadium distribution in the coal seam c₁₀^B of the Dniprovskia mine and establishment of connections of its content with the main technological parameters of coal.

Methodology. Peculiarity of the research was the impossibility of direct observation of geological processes. In this case, the consideration of their dynamics is traditionally performed by comparing statistics and analysis of cartographic materials regarding the distribution of chemical elements in the objects under consideration.

Findings. The research of toxic and potentially toxic elements (including vanadium) is a very important component of determining the environmental impact of coal mining companies, as well as coal-fired power plants. The concentration of vanadium in the c₁₀^B coal seam of the Dniprovskia mine varies in the range from 6.08 g/t to 47.84 g/t, with an average value of 21.03 g/t. The vanadium content does not depend on the depth, ash content of coal and total sulfur content. Regionally, its concentration is increasing in the south-western direction.

The obtained results allow to formulate the following main conclusions:

- the average concentration of vanadium in the coal seam c₁₀^B does not exceed the maximum permissible concentrations;
- vanadium has a close reverse relationship with the capacity of the coal seam, ie with increasing contribution of the enrichment zones of this element in the total capacity of the coal seam, its content increases, which is confirmed by the results of previous works.

The practical significance of the obtained results is to construct forecast maps and calculate the regression equations between the vanadium content and the main technological parameters of coal.

Key words: vanadium, toxic elements, coal seam, enrichment zones