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Roof Collapse When Mining Coal Seams

The physical and mechanical properties of rocks are the main factor determining the nature of rock pressure manifestation, rock stability and propensity to self-destruction. Depending on the ability of individual layers of rock and soil to self-destruction, as well as their location relative to the coal seam - false, immediate and main roofs, as well as immediate and main floors are distinguished.

A false roof is a layer of rock of insignificant thickness (up to 0.2-0.5 m) lying directly above the layer being mined, which easily collapses at the time of coal extraction, or with some lagging behind it. It should be noted that many coal seams do not have a false roof. An immediate roof is called a layer of rock located above the coal seam or false roof, which easily collapses after moving away the individual support or moving the mechanical support along the mining excavation.

A main roof is the thickness of strong stable rock bedding above the immediate roof and collapsing while extracting coal. The main roof can be located above the coal seam. The roof types are divided into the four categories according to the types of collapse. The categories are based on the structure (bedding and fracturing) and the physical and mechanical properties of rocks.

The main feature of the roof rock is stability. Stability is rock's properties to hold back from shifts, deformations or collapses during coal excavation. In addition, roof rocks have different tendency to collapse, which is taken into account when choosing the roof control methods.

The example of roof control is the method when roof is smoothly lowering. The method is used when directly above the coal seam there are rocks that can smoothly descend without visible disturbances or with local disturbances without loss of communication between the individual parts of the roof, with a layer thickness of up to 1-1.2 m and in the presence of a floor heaving. The coal seam at the Krasnolymanska Mine, which is located in geological and industrial area in Donbass region, is worked out using the smooth roof-lowering method. The mine's immediate roof consists of a medium-stable and liable to collapse limestone. The limestone thickness is 0.5-5.7 m. Mudstone's layer is located above the limestone. The main roof (mudstone and siltstone) is hard to collapse and tends to smooth lowering.

Considering the complex structure of roof rocks located above the removing coal seam and the presence of strong, non-fracturing rocks can make a conclusion that there are many reasons for smooth closing of the main roof rock and the floor behind the mining excavation after the immediate roof collapses in case of the Krasnolymanska Mine.