

Development of methods of acoustic-emission (AE) monitoring of geomechanical stability and operational safety of some underground facilities of the FSUE "MINING CHEMICAL PLANT the enterprise of the state Corporation "ROSATOM"

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At present, there were no observed dynamic manifestations of the overburden stress in natural massifs of the FGUP "GKH" (Mining and Chemical Plant), any after effects of which could be detected in mine roadways. This is a result of both rock strength and powerful, continuous concrete lining. However, there are not an assurance that further evolution of the underground space would not result in the appearance of these effects due to the growth and added complexity of the exhausted extent, increasing the area of free surfaces of workings, growing the effect of tectonic disturbance, and increasing local values of stress pattern. The uncovering and control of low-energy destruction of rocks, which under certain condition might result in powerful ($E > 10^3$ J) dynamic phenomena, is justified and longsighted. In view of the foregoing, the scope and problems, on which the suggested method is focused, were formulated.

The scope of the method is the safety precautions of the exploitation of underground constructions through performing the acoustic-emission (AE) monitoring, which would enable to forecast the location, time, and energy of events manifesting itself in an elastic pulse during defect nucleating in rock. The following problems would be resolved in order to execute this purpose.

Development of the procedure of acoustic-emission monitoring encompasses:

- verification of the frequency range of the acoustic-emission monitoring;
- selection of the apparatus for detection acoustic signals (AS);
- development of specific transducers of acoustic emission (TAE) for their application in bores with diameter of 0.76 mm;
- developed mode of fixation of TAE in bores with diameter of 76 mm;
- procedure of AS detection;
- procedure of processing and analysis of the AE monitoring data received by both the actual control system established in the roadway and the newly-developed one;
- criteria of assessment of the controlled objects condition.

In this development, those interconnected factors were considered that must be taken into account both at the stage of projecting the control system (CS) and at the stage of its exploitation

On the base of variance analysis, the effect of technogenic factors on the state of rock massif such as quantity and intensity of mining, preventive actions for the decrease of bearing pressure, etc. are supervised. A specific feature is the necessary to accumulate and use the data base (DB), which would contain the formalized parameters of technogenic factors.

In conclusion, one should note that from the viewpoint of the geological structure, physical and mechanical properties of rocks, tectonic disturbance, practice of mine development etc. almost each mining enterprise is one and only. The problems related to rock-bump hazards are specific, and this situation challenges new problems and modifies well-known ones in the field of controlling the rock massif condition.