Summary.

In the Polish hard coal mining industry, natural hazards (rock bursts, methane, coal selfcombustion, coal dust explosion, dust and gas ejections, as well as water or climatic and radiation hazards) may co-occur with each other, and the events resulting from these threats may be violent and mostly increase with the depth of deposition of the exploited seams. Such co-occurrence means that at the same time and in the same place there may be various risks with all its consequences, and these are both manifestations of the occurrence of threats and the use of preventive methods, selected adequately to local conditions, taking into account the aspect of collisions of prevention.

Foci of rock mass shocks generated by mining robots, in particular, the exploitation of deposits, may be located in the deposit, in the surrounding rock mass subject to deformation as a result of currently carried out works, or may be the result of all works carried out in a given area.

This doctoral dissertation is an attempt to define such a way of proceeding that the exploitation of the coal seam in specific, difficult geological and mining conditions is possible and can be carried out while maintaining the safety of the working crew.

In the course of the implementation of this doctoral dissertation, a wide set of data was collected on the formation of the state of threat of rock bursts during the operation of the third layer of coal seam 510 with longwall 16b-S in the northern part of the S field at the level of 900 m in KWK Staszic-Wujek Branch Murcki-Staszic. During the operation of the 16b-S longwall, active prophylaxis was successively selected to the growing rock bursts hazard associated with the drainage of the W-76 (2015) tank, the connection of the 16b-S longwall gob area with the 12b-S and 8b-S longwall gob area, the moving of the longwall front from the Jakub fault with a drop of 60 m as well as the movement of the longwall front under the edges created in the Ruda seams: 402, 405, 407/1 and 407/4, in such a way and to such an extent as to maintain the safety of the crew working in the longwall.

On this basis, an analysis of the development of the rock burst hazard during operation with the 16b-S longwall was performed, at the time of using a properly selected methods of active rock burst prevention. Operation with the 16b-S longwall is divided into 3 stages. Each stage was subjected to a separate analysis, starting with seismic geotomography studies correlating these results with the location of high-energy shocks, then the impact of the applied methods of active rock burst prevention methods on the level of seismicity was analyzed. It was assumed, with a high probability, that active rock burst prophylaxis destroyed the structure of the "near"

overburden so majority of the the hypocenters of high-energy tremors were located high above the 510 and 501 seams, presumably in the Ruda beds seams: between 235 and 350 m above the exploited deck 510. The analysis of the mechanisms of foci of selected high-energy tremors with an energy of $\geq 10^7$J confirmed the effectiveness of the implemented methods of active rock burst prevention due to the location of high-energy shocks.

In addition, an analysis of the active prophylaxis used during the developing of mining openings contouring the 16b-S longwall panel was performed, also dividing it into 3 stages. The increase in seismic activity during the execution of the upper entry dipheading XXVIIb-S was associated with the drainage of the W-76 (2015) tank, as well as the movement of the front under the edges created in the Ruda seams: 402, 405, 407/1 and 407/4. The active rock burst prophylaxis used during the excavation of these excavations was one of the components of the set of rock burst prevention methods during operation with the 16b-S longwall.

The analyses made it possible to determine the impact of the applied complex of active rock burst prevention methods on the state of stress in the coal seam and seismic hazard. These activities significantly contributed to maintaining the safety of the working crew during the operation of the third layer of seam 510 the longwall 16b-S. The result of the observations carried out during the use of the complex of active rock burst prevention methods is the developed algorithm of proceeding in the way leading to a decision to abandon or undertake (continue) exploitation. The algorithm of this method (illustrated with a graph) applies the principles of selecting a set of methods of active rock burst prevention in the conditions of exploitation of a thick coal seam under a tremor-prone layer, as well as in other geological and mining conditions.