Title:

Risk Assessment Of Pillars Stability For Experimental Mining Blocks In Estonian Oil Shale Mines

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This study addresses risk associated with pillars dimension using new room-and-pillar mining technology with modern machines at Estonian oil shale mines. Processes in overburden rocks and pillars have caused unfavourable environmental side effects accompanied by significant subsidence of the ground surface. The aim of this work was to determine damage of new technology on pillars dimension and define the coefficient of blasting influence.

During the period of three last years the oil-shale mining at experimental mining blocks introduced with new blasting technology with great entry advance rates (EAR). With such improved technology the EAR reached 4 m that is two times greater than conventional technology can guarantee, but explosive volume increase up to two times and explosion occurs during 4.5 seconds (~15 times longer than old technology). In places of complicated geological conditions on the mining blocks, deviation of pillars square cross-sectional from project value achieved 16 % on account of pillar parts exfoliation during three weeks after the blasting operations. Observation of two experimental mining blocks showed that pillars square cross-sectional was reduced in average on 7 %.

Received by experimental ways data for different geological condition allow considering influence of blasting operation on pillars dimension. In equation for calculation of pillars dimension were added coefficients for calculation of parameters accuracy for new technology.

Design of pillars parameters for old technology is based on the instruction used in Estonian oil shale mines with possible deviation from project value 2.5 %. Using improved formula is possible reduce disturbance of new mining technology on pillars stability. Importance of pillars correct choice consists of avoidance collapse in a mining block, and guarantees stable parameters and minimal losses of the oil-shale reserves.

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