

The analysis of conditions of activation of geodynamic processes and manifestation of technogenic seismicity on underground mines of the Far East region

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Intensive development of mineral deposits, growth of depth of the development, increase of volumes and rates of mining lead to the activation of geodynamic processes in areas of development of large-scale mining. Activation is followed by technogenic (mine) seismicity and other destructive geodynamic phenomena on underground mines of the Dalnegorsk and Streltsovsk ore districts of the Far East. All range of dynamic manifestations of rock pressure is registered here including strong ones followed by serious consequences of rock and rock-tectonic bursts.

Unequal-component fields of tension are presented in rock massifs of burst hazard fields of the region. Horizontal (caused by the tectonic forces action) the squeezing tension exceeds vertical (gravitational) component in 2-2.5 and more times. It is defined in large extent by a geodynamic position of mineral deposit within tectonic active Amur plate. The Amur plate is characterized by high structural heterogeneity, tectonic dissociation and by the areas of the increased tension. Geodynamic processes in the natural and technogenic field of tension are presented in the form of reorganization and self-organization of the block massif of rocks and are followed by shifts and motions along tectonic destructions of various scale level, release of the considerable elastic energy and manifestation of technogenic seismicity. These processes are observed on the Nikolaev polymetallic field, the field of uranium ores Antaeus and some other mineral deposits where mining operations reached 700-800 m depths and more.

By results of complex geomechanical monitoring, influence of seismic waves from technological explosions and remote earthquakes to the deformation field of the rock massif influenced by mining operations is established. The quantity of seismoacoustic impulses in a zone of reference pressure with simultaneous growth of their energy is increases in more than by 2.5 times. Seismic waves act as the trigger and initiate process of redistribution of tension in the block massif of rocks and its restructuring. The example is the earthquake (4 points seismic magnitude, coast of the Sea of Japan, 30 km distanced from the Nikolaev mineral deposit) which provoked the strong geodynamic phenomenon which caused destruction of mining excavations on 4 horizons of the underground mine on March 25, 2016.