About capability of prediction microseismic activity at the mines of Verkhnekamskoye potash deposit

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The extraction of Verkhnekamskoye potash deposit (VKPD) has been going for 85 years, the seismological observations at mines have been carried out for more than 25 years. During this period, the great factual material about microseismic activity was accumulated; there are spatial-temporal correlations, the mechanisms of seismic events and the influencing factors. The relations between the seismicity level and influencing factors were calculated, after that the predicted microseismicity parameter P(t) was expressed. The calculation showed that blast activity, teleseismic earthquakes, width and height of chambers are unstable and difficult for using for the prediction of microseismic activity. In another way, openings age, number of mined-out layers and type together with age of backfilling showed the best correlation, which allowed them to be used for prediction. The selected parameter P(t) is calculated for each mine‘s chamber for special year using these relationships. A shorter time interval is inappropriate for prediction due to the plasticity properties of potash salts; seismicity does not appear immediately, but after decades. Therefore, the map of predicted parameter P(t) is simulated result, these is the map of expected density of seismic energy release for the deposit‘s territory of the selected mine. The retrospective analysis showed that the smoothing of calculated field is necessary operation due to small widths of the chambers compared to the mine‘s size, possible error in the mining database and the peculiarities of raster interpolation. Calculation and comparison of registered and calculated maps revealed the best smoothing radius for filtering, which was 750 m. Using this method, the predicted map was calculated for one of the VKPD mines for 2022, the most dangerous area in the mine was identified, where it is necessary to take appropriate measures to reduce the activity level of deformation processes.. The described method for prediction of microseismic activity refers to the conditions of standard mining of potash salts at the VKPD and excludes emergency situations.