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CUMULATIVE INFLUENCE OF INFORMATIVE FEATURES ON THE ASSESSMENT OF THE CONDITION OF THE FIRE SITUATION IN THE SEALED AREAS OF COAL MINES

Abstract. The analysis of various ways of discernment of low-temperature coal oxidation and possibility of prevention of its transition to self-ignition is made. The feature of determination of a stage of coal self-heating in the isolated volumes of the mined-out spaces of coal mines is noted. The known informative signs of self-ignition, a possibility of their practical application are considered. The cumulative way of determination of oxidation temperature and self-heating of coal on composition of tracer fire gases in the mine atmosphere is offered.

Keywords: coal mine, mined-out spaces, coal oxidation, self-heating, self-ignition, the endogenous fire, tracer gases.

Introduction.One of the serious problems of fight against the endogenous fires is the search of ways and methods of their discernment at early stages that draws attention of scientists and experts not only in the Republic of Kazakhstan, but also in other coal-mining countries. The danger of emergence and development of the endogenous fires at underground coal mining is aggravated with a possibility of explosions of gas-dust-and-air mixture consequences of which, as we know, are catastrophic.

Active processes of coal oxidation in the mined-out spaces of extraction areas of coal mines are the most dangerous and hardly distinguished. At a combination of certain conditions the sources of oxidizing processes can pass into the self-ignition places.

One of the approaches to determination of a stage of coal self-heating in the mined-out and isolated spaces on the basis of results of the laboratory analysis of tests of air-gas mixture in the mine atmosphere is considered in [1]. In basin instructions on prevention and suppression of the underground endogenous fires the content of fire tracer gases – carbon oxide, hydrogen and carbon dioxide – as features of the fire is specified, and the corresponding actions of technical services of coal mines, rescue services of the region are regulated.

Authors [1] recommend to use the feature of active coal self-heating - a steady lack of the assigned value of oxygen in the samples which are selected from the considered isolated area, in comparison with its calculated value in an assumption of simple mechanical replacement with impurities (methane, hydrogen, oxide and carbon dioxide) which are contained in the sample. Calculated assay of oxygen in the sample in an assumption of simple mechanical replacement is determined by a formula

$$C(O_2)_p = \left(100 - \sum of\ gases\right) \cdot 0,209 \quad (1)$$