

عنوان مقاله:

Risk Assessment of Spontaneous Combustion Coal by using Fuzzy Fault Tree Analysis in Coal Stockpile in Eastern Alborz Coal Mines

محل انتشار:

کنفرانس بین المللی افق های نو در علوم مهندسی (سال: 1396)

تعداد صفحات اصل مقاله: 1

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خلاصه مقاله:

The coal spontaneous combustion is one of the most important problems in in coal mines. The results of spontaneous combustion are serious and negative – damaging economic effects, detrimental environmental consequences and unwanted costs in health problems and, in some cases, human life. To prevent these outcomes, the processes that lead to coal self-heat must be understood and precautions must be taken to avoid fires caused by Spontaneous Combustion. The purpose of the present study was the risk assessment of spontaneous combustion based on Fault Tree Analysis method in fuzzy environment in the coal mines. In this research, according to a review of all the latest, known and credible studies about coal spontaneous combustion from around the world, many important and effective parameters were identified. Afterwards, the causes of spontaneous combustion coal were determined using FTA method. In order to calculate the probability of basic events and eventually reach the rate of occurrence of the top event (risk of spontaneous combustion coal) and regarding this fact that the spontaneous combustion coal behavior is complex and the possibility of achieving precisely the basic events in the fault tree of this event is difficult and with uncertainty, so fuzzy logic and fuzzy numbers were used to assign probability weight to basic events. The Fuzzy process began with the selection of an expertise team of Eastern Alborz Coal Mines and ended with determination of the probability rate for the basic events. The equation recommended by Onisawa was used to determine the probability rate. Then the probability of top event was determined using the appropriate equations. The critical Minimal Cut Sets (MCS) were determined using Fussell-Vesely equation. The results show that the probability of the risk of spontaneous combustion coal in coal stock piles on the ground of Eastern Alborz Coal Mines (Tazareh) is 13%, so that it is the high levels of risk to staff involved in this vital and important industry. Therefore, with respect to determination of Minimal Cut Set, control methods to reduce the negative impacts and prevention of damages and losses of life and financial was proposed and presented.

کلمات کلیدی:

Spontaneous Combustion, Coal Mines, Risk Assessment, Fault Tree Analysis Method (FTA), Fuzzy Logic, Basic

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