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Investigation of the effect of fans failure on longwall face gas and oxygen concentration levels

R Balusu[1], K Tanguturi[1], P O'Grady[2], A Lewis[2] and S Winter[2]

1.
Mining Research Team Leader, CSIRO Energy

ABSTRACT

A collaborative research project has been undertaken by Glencore and CSIRO to investigate the effect of main ventilation fans failure on longwall face gas and oxygen concentration levels. The main objective of the research was to obtain an understanding of the effect of power outage and consequent main ventilation fans failure on goaf gas distribution and the time it takes for an irrespirable atmosphere prevailing on the longwall face for different scenarios. Extensive transient CFD modelling investigations have been carried out to investigate the effect of fans failure under different ventilation layouts coupled with different goaf gas emission rate scenarios. CFD simulation of the effect of fans failure have been carried out as transient simulations at one second intervals in initial phases and slowly extending up to 20 second intervals for the first 2 or 5 minutes of fan failure. Later on simulations were continued at one minute intervals up to 20 to 30 minutes after fan failure. The results of transient simulations showing both oxygen and methane gas concentration profiles around the longwall face area and at different sections along the longwall face at various time steps are presented in this paper. Discussions on changes in face gas concentration levels with time under different scenarios are also presented in this paper.

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Safety impact of increased shaft ventilation on rope guided conveyances

M E Greenway[1], S R Grobler[2] and R S Hamilton[3]

1.
Mine Shaft Systems Consultant, Jacobs APAC Industrial West

ABSTRACT

The progressive development of underground mines frequently requires increased ventilation flow rates through mine shafts which were originally designed for lower rates. Where these shafts are equipped with conveyances (eg skips, cages and counterweights) running on rope guides, the higher air flow rates adversely affect the lateral motion of conveyances and could cause conveyances to collide with the shaft walls or with one another. Hence the safety impact of higher flow rates requires proper assessment. This can be undertaken by use of computer simulation models to predict the dynamic motion of the conveyances during hoisting. It can also be undertaken entirely by physical testing, or using a combination of simulation and physical testing. This paper discusses these techniques, makes cautionary remarks about setting an absolute generic maximum flow velocity for all shafts and discusses recent projects where increased ventilation flow rates were required.