

Abstract

Blind hydraulic backfilling is a commonly used technique to control subsidence of the strata over unapproachable water-logged underground mines. In this investigation, studies have been carried out in a transparent scaled model of underground mine roadway using simple gravity blind backfilling method. The objectives of the thesis are to investigate effects of flow conditions on different flow parameters through experimental and theoretical studies. Since sudden jamming is a major hurdle in filling-up of a large area from one borehole, an attempt has also been made to evaluate a pre-jamming indication parameter.

The study has revealed that the basic process of filling occurs by sand transportation along one or more self-formed meandering channels. Theoretical relationships have been developed about channel shape, channel area, flow pressure loss etc. for different flow conditions and obtained result has been cross-validated with experimental work. The developed relationships among various parameters have been found to be useful for practical implementation of gravity blind backfilling process.

A pre-jamming indication parameter has also been evaluated using stored pressure-time data. The pre-jamming parameter, so developed, may be used to indicate the arrival of final stage of filling after which not more than 26% filling will be possible with the same flowrate and concentration. In order to prolong the filling process either the concentration needs to be reduced or the flowrate may be increased.