

ESTIMATING UNDERGROUND MINE DAMAGE PRODUCED BY BLASTING

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ABSTRACT

An important part of underground mine planning and operations involves the reclamation of working areas after blasting before the mining cycle can continue. This is especially true for mining that must use large blasting operations in the vicinity of extensive underground workings. In an effort to develop a rational procedure for estimating mine damage produced by blasting, underground rock fall has been assessed for a large-scale blasting operation in oil shale. The amount of mine damage has been quantified in terms of manshifts of effort required to reclaim underground working areas after blasting. This has been further broken down into the three main phases of reclamation, i.e., scaling and excavation, rockbolting, and miscellaneous repairs on ventilation, utilities, etc. Different types of openings have also been assessed including level tunnels, incline drifts and rooms. The effect of repeated blasting on mine damage has also been documented with initial blasts producing more damage than subsequent blasts.

The blast damage has further been correlated to ground motion where it was found to be proportional to peak particle velocity. Thus the blast damage can be determined for any size blasting operation or at any distance from a given blast since seismic amplitude can be scaled in terms of explosive amount and distance. A simple seismic prediction relation is given that provides peak particle velocity in terms of explosive loading density and distance. This allows a preshot blast damage estimate to be calculated for a particular mine layout. This study applies to a wide range of mining operations since it used the results of large-scale blasting that produced mine damage data ranging from very severe to none. The lower end of the data thus represents most mining operations where explosive amounts are generally restricted.

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