

CONTROL OF GROUND VIBRATION FROM SURFACE BLASTING OPERATIONS USING COMPUTER SIMULATIONS TO EVALUATE THE EFFECTS OF CAP SCATTER

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ABSTRACT

A computer program called Seiswise that predicts the character and intensity of ground vibration generated by surface blasting operations was developed and field tested. The program uses the time histories of one or more pilot shots in combination with various initiation sequences to construct synthetic seismograms which are examined to select designs that will produce low levels of ground vibration.

Stepwise simulations are used initially to determine optimum initiation sequences assuming no timing scatter in the initiation system. The simulations are displayed in both time and frequency domains, and the selection of promising sequences is made using the combined (vector sum) peak particle velocity.

Statistical simulations are then made of the promising stepwise solutions to determine the effects of cap scatter using initiator timing statistics stored in a data bank. These simulations frequently reveal flaws in stepwise solutions when most commercially available initiators are used.

Seiswise simulations were used in a case study where the initiation sequences were implemented with accurate pyrotechnic and electronic detonators.