EFFECT OF STRUCTURAL SETTING ON BLAST-INDUCED AZIMUTHALVELOCITIES AND AMPLITUDE OF GROUND MOTIONS IN PERLITE

Catherine T. Aimone-Martin; New Mexico Institute of Mining and Technology
Susan G. Beattie; Mineral Advisors, Inc.

ABSTRACT

A series of small scale explosive tests were performed at a perlite mine near Socorro, New Mexico. The tests were designed to investigate the azimuthal or directional relationship between small scale geologic structures such as joints and the propagation of explosively-induced ground motions. Three shots were initiated within a single borehole located at ground zero at depths varying from 83 m (272 ft) to 10 m (32 ft). An array of three component velocity and acceleration transducers were placed in two concentric rings at distances of 20 m (66 ft) and 40 m (131 ft) surrounding the single hole at 7.5° , 15° , and 30° azimuths as measured from ground zero. Data from the transducers were then used to determine the average propagation velocity and waveform characteristics of the blast vibration through the rock mass at the various azimuths. The rock mass was mapped to determine the predominate joint orientations (strike and dip) and the average propagation velocities were correlated with this geologic information. The results showed that there is a correlation between the predominate joint orientation and ground motion amplitudes and velocity. The more predominate geologic structures allow the wave to follow along their strike thereby forming a planar path of least resistance and in turn, allowing higher velocities and amplitudes. Secondary joints or structures may act in concert with more prominent features to form a network of channels or paths along which the wave moves more freely than it may when traveling against the structures. The greatest azimuthal variations in velocity and amplitude was observed for the shallow shot at 10 m (32 ft) depth.