

BLAST VIBRATION MEASUREMENTS NEAR AND ON STRUCTURE FOUNDATIONS

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ABSTRACT

Blasting near structures often involves measurement of vibrations for the assessment of damage potential. Several methods of measurement are in use worldwide, but there is no consensus as to which methods are technically sufficient and yet practical for all situations.

This Bureau of Mines study examined five methods of vibration transducer placement to determine the best method for monitoring blasting vibrations. The methods examined were: burial in soil next to the structure; attachment to the foundation at ground level, to the basement floor, or to a surface slab; and burial at a distance from the structure in undisturbed soil. Typical surface mine production blasts were used as vibration sources.

With the exception of the basement floor measurements and some of the distant measurements, waveforms were similar and amplitudes were generally within 10 to 30 pct. The low-frequency part of the wave (5 to 10 Hz) was particularly uniform in measurements obtained by all five methods. Differences in peak values were mostly from the minor shifts in phase of the high-frequency components, which are of less significance to structural response and potential damage than the low frequency waves (5 to 20 Hz).

Shallow surface burial resulted in good signal detection and the least chance of mechanically induced error.