PRE-MINE THROW IV--EXPERIMENTS ON SCALING OF SURFACE-BURST CRATERING GROUND MOTION IN ALLUVIUM

SAUER,F.M.

Nine special charges of high explosive (pre-Mine Throw IV), ranging in size from 256 lb to 102 tons, were detonated under controlled conditions in the lake bed playa of the Nevada Test Site to study the yield-scaling of cratering-induced ground motion waveforms. Cratering-induced motions are surface motions, observed out of approximately four crater radii, which result from the dynamic aspects of crater formation. One 256 lb and one 1000 lb half-buried sphere, three 1000 lb above-the-surface tangent spheres, a 7.1 ton tangent sphere and a 102 ton tangent sphere were instrumented at eight radii along three lines spaced 120 degrees apart to measure the horizontal and vertical components of particle velocity. For the 256 lb and 1000 lb charges, instrumentation having a 2000 Hz upper frequency band edge was used; for the larger charges the gage frequency response was approximately one-tenth this value.

Comparison of the cratering induced portions of the ground motion waveforms from the small and large yield events show that the lengths scale as W 1/n, time scales as W 1/nt and particle velocities scale as W 1/mv, where W is explosive yield. These results imply that the cratering motions are gravity controlled which is in agreement with recent work on hypervelocity impact crater growth in sand done at the NASA Ames Research Center. The influence of secondary airblast peaks in altering the scaling of cratering-induced is also illustrated by the Pre-Mine Throw IV results.