

SHOCK WAVE CUMULATION EFFECTS FROM SIX SIMULTANEOUS 120-TON ANFO CHARGES

KUHL,A.L.

Strong airblast cumulation effects were measured on a high-explosives (HE) field test, MISERS BLUFF II-2 (six simultaneously detonated 120-T ANFO charges located at the vertices of a regular hexagon with a charge-to-charge separation distance of 328 ft). Pressure measurements near the array center showed that shock propagation proceeded in a series of discontinuous jumps in the pressure-range curve. Shock reflections from adjacent charges formed Mach stems which grew in width as they propagated. Eventually adjacent Mach stems creating second and third Mach stems. These Mach stem interactions were irregular in that the static pressure histories on the ground surface had double peaks. It is believed that this is the first experimental measurement of this phenomenon on multiple charge tests. Near the hexagon center the incident and first Mach stem over-pressures were measured at 44 and 90 psig, while the second and third Mach stem overpressures were found to be 150 and 300 psig, respectively. Shock velocities increased consistent with their pressure enhancements; thus, the shock range-time curves were modified accordingly. Shock arrival time at the center was measured to be 7 msec ahead of the single shock arrival time. Shock convergence at the center was simultaneous within 0.6 msec. Implosion of the third Mach stem created a large pressure at the hexagon center (2260 psig), a main reflected wave and intermediate shocks. The shock interaction analysis described in this report explains all the qualitative features of the airblast cumulation observed on this test, and qualitatively predicts incident peak shock strengths and the peak reflected pressure at the center.