Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Equation of state, initiation, and detonation of pure ammonium nitrate D.L. ROBBINS, S.A. SHEFFIELD, D.M. DATTELBAUM, N. VELISAVLJEVIC, D.B. STAHL, Los Alamos National Lab. — Ammonium nitrate (AN) is a widely used fertilizer and mining explosive throughout the world. One of the more common explosives using AN is called ANFO, a mixture of AN prills and fuel oil in a 94:6 ratio by weight. The AN prills are specially made to absorb the fuel oil, forming a mixture that reacts under shock loading through a diffusion-controlled process, resulting in a non-ideal explosive with detonation velocities around 4 km/s. While there are a number of studies on ANFO, there are only a few studies relating to the equation of state (EOS) and detonation properties of pure AN - resulting mainly from studies of accidents that have occurred during transportation of large quantities of AN. We present the results of a series of gas gun-driven plate impact experiments on pressed AN ranging in density from 1.72 to 0.9 g/cm^3. Several of the high density experiments were performed in front surface impact geometry, in which pressed AN disks were built into the projectile front and impacted onto LiF windows. Additional experiments at low density have been done in "half cell" multiple magnetic gauge gun experiments. From this work a complete unreacted EOS has been developed, as well as some initiation and detonation information. Additional high pressure x-ray diffraction experiments in diamond anvil cells have provided a static isotherm for AN.

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Date submitted: 18 Feb 2009 Electronic form version 1.4