Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

Atmospheric Effects on the Combustion of Detonating Aluminized Explosives JOEL CARNEY, SCOTT MILLER, JARED GUMP, GERRY PANGILINAN, NSWC-Indian Head — The detonation and subsequent combustion of aluminized explosive formulations depend heavily on the reactions of aluminum and oxygen. Fuel-rich formulations require oxygen from an external source (nominally an oxygen-containing atmosphere) to burn the fuel to completion. Dynamic spectroscopic measurements were made for two different aluminized explosives (PBXIH-135 and PBXN-111) to investigate the effect of changing atmospheres on the combustion properties of aluminum. Both explosive formulations were tested under normal atmospheric conditions and in an atmosphere of nitrogen. Light emission (from 350-550 nm) from the explosive events was collected in a spectrometer and dispersed temporally in a streak camera. New, nitrogen-containing species (near 387 and 416 nm) arise in the nitrogen atmosphere experiments for both formulations that seem to replace aluminum monoxide as a primary intermediate product for the fuel. The peak assignments and global kinetics of each species will be presented and the implications of these results on atmospheric effects will be discussed.

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Date submitted: 08 Apr 2005 Electronic form version 1.4