Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Short Shock Experiments and Modeling of Initiation in the HMX Based Explosive PBX 9501 RICHARD GUSTAVSEN, DANA DATTELBAUM, Los Alamos National Laboratory, CAROLINE HANDLEY, AWE, Aldermaston, CARL JOHNSON, STEPHEN SHEFFIELD, LEE GIBSON, Los Alamos National Laboratory — We present results from a series of gas-gun driven plate impact experiments designed to measure the initiation response of PBX 9501 (95 wt.% HMX, 2.5 wt.% estane and 2.5 wt.% nitroplasticizer) to short duration shocks. Embedded electromagnetic particle velocity gauges measured the reactive growth and initiation progress. Photonic Doppler Velocimetry (PDV) measured a particle velocity wave profile at the interface of the $\approx$ 23 mm thick PBX 9501 sample and a Lithium Fluoride (LiF) window. Impact stress in all three experiments was 4.4 GPa. Pulse durations of 0.5, 0.36, and 0.25 μs were created using 1.0, 0.75, and 0.5 mm thick Kel-F81 flyers backed by syntactic foam. The 0.5 μs pulse transited to detonation at $t_D = 2.08$ μs, $x_D = 9.32$ mm, considerably beyond the coordinates of $t_D = 1.4$ μs, $x_D = 6.2$ mm, expected for a long pulse. The 0.25 μs pulse failed to transition to detonation while the 0.36 μs pulse transitioned to a detonation at a position slightly less than the sample thickness of 23 mm. These experiments provide a more stringent test for reactive burn models than do the long pulse experiments used to generate the Pop-plot.

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Date submitted: 22 Feb 2011 Electronic form version 1.4