Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Cook-off violence mapping and pressure-volume relations with a scaled deflagration cylinder test TIMOTHY PIERCE, DANIEL HOOKS, Los Alamos National Laboratory — There have been significant advances in the scientific understanding of cook-off in explosives, which have led to a generalized mechanistic understanding of the processes involved for certain explosives. Several deflagration cylinder tests (DFCT) tests were recently fielded that alluded to regimes of outcomes depending on the history and state of the system. Importantly, a few of these tests also exhibited steady-wave combustion that enabled, using the method of G. I. Taylor, extraction of a pressure-volume relation for the conditions of the test. Such a relation, dubbed a "pseudo-equation of state" (pEOS), allows one to inform models to simulate the possible outcomes of violent reaction using hydrodynamic codes. Thus, this test was extremely valuable in that it demonstrated the possibility of both mapping outcomes based on system variables and external conditions and provides data to inform predictive models. We describe a scaled version of the DFCT. It delivers pEOS data when steady combustion is observed, and is inexpensive enough to map outcomes by fielding many tests.

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Date submitted: 09 Feb 2009 Electronic form version 1.4