Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Evaluation of XHVRB for Capturing Transition to Detonation as Measured with Embedded Gauges LEAH TUTTLE, JEFF LAJEUNESSE, ROBERT SCHMITT, ERIC HARSTAD, Sandia National Laboratories — The Extended History Variable Reactive Burn model (XHVRB), as proposed by Starkenburg [1], uses shock capturing rather than current pressure for calculating the pseudo-entropy that is used to model the reaction rate of detonating explosives. Using shock capturing offers potential improvement for single shock modeling over the historically used workhorse model HVRB [3] in CTH [2], in addition to its extended capabilities for modeling explosive desensitization in multi-shock environments [4,5]. The detailed transition to detonation of PBX9501, as revealed by embedded gauge data [6], is compared to models with both HVRB and XHVRB. Improvements to the comparison of model to test data are shown with XHVRB, though not all of the details of the transition are captured. The methodology for fitting XHVRB is also presented, and the model fit for PBX9501 is given. Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525. [1] Starkenberg, IDS 15, p. 908 [2] McGlaun et. al, Int. J. Impact Eng., Vol. 10, p. 351 [3] Kerley, G. I., SNL SAND92-0553, 1992 [4] Tuttle et. al, AIP 1979, 100044 (2018) [5] Tuttle et. al, IDS 16 (in progress) [6] Gustavsen, et. al, IDS12, pg. 530

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Date submitted: 27 Feb 2019 Electronic form version 1.4