Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

High pressure deep-release impact experiments on high density and ultra-high molecular weight polyethylene DANIEL HOOKS, JOHN LANG, RICHARD GUSTAVSEN, DANA DATTELBAUM, Los Alamos National Laboratory — The high pressure dynamic response of polymers is important to a wide variety of applications. The details of compressibility and reactivity can have a large effect on overall behaviors of dynamic systems even when polymers are used in small amounts. Polyethylene is of broad interest for a variety of applications, as an ingredient and as a pure material. It is also of significant interest as a model system to understand the correlating effects of polymer dynamics in a material with a relatively simple chemical composition that can have highly varied properties through the alteration of molecular weight and associated crystallinity of the material. Although a variety of Hugoniot and dynamic information is available for polyethylene, it is a challenge to obtain information on the product equation of state at pressures high enough to achieve decomposition. Following recent successes in producing deep release states in compressed epoxy material, a series of plate impact experiments was performed in the same configuration on high density and ultra high molecular weight polyethylene at high pressures. The experiments and the results, intended to calibrate a product equation of state and compare the behaviors of these two varieties of polyethylene, will be described.

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Date submitted: 24 Feb 2017 Electronic form version 1.4