Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Taylor Impact Tests on PBX Composites: Imaging and Analysis
DARLA GRAFF THOMPSON, RACCI DELUCA, Los Alamos National Laboratory — A series of Taylor impact tests were performed on three plastic bonded explosive (PBX) formulations: PBX 9501, PBXN-9 and HPP (propellant). The first two formulations are HMX-based, and all three have been characterized quasi-statically in tension and compression. The Taylor impact tests use a 500 psi gas gun to launch PBX projectiles (approximately 30 grams, 16 mm diameter, 76 mm long) at velocities as high as 215 m/s. Tests were performed remotely and no sign of ignition/reaction have been observed to date. High-speed imaging was used to capture the impact of the specimen onto the surface of a steel anvil. Side-view contour images have been analyzed using dynamic stress equations from the literature, and additionally, front-view images have been used to estimate a tensile strain failure criterion for initial specimen fracture. Post-test sieve analysis of specimen debris correlates fragmentation with projectile velocity, and these data show interesting differences between composites. Along with other quasi-static and dynamic measurements, these impact images and fragmentation data provide a useful metric for the calibration or evaluation of intermediate-rate model predictions of PBX constituitive response and failure/fragmentation. Intermediate-rate tests involving other impact configurations are being considered.

Darla Graff Thompson
Los Alamos National Laboratory

Date submitted: 09 Jan 2013 Electronic form version 1.4