Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Detonation Performance Analyses for Recent Energetic Molecules LEONARD STIEL, NYU Tandon School oF Engineering (Retired), PHILIP SAMUELS, KIMBERLY SPANGLER, DANIEL IWANIUK, RODGER CORNELL, ERNEST BAKER[1], Picatinny Arsenal, NJ — Detonation performance analyses were conducted for a number of evolving and potential high explosive materials. The calculations were completed for theoretical maximum densities of the explosives using the Jaguar thermo-chemical equation of state computer programs for performance evaluations and JWL/JWLB equations of state parameterizations. A number of recently synthesized materials were investigated for performance characterizations and comparisons to existing explosives, including TNT, RDX, HMX, and Cl-20. The analytic cylinder model was utilized to establish cylinder and Gurney velocities as functions of the radial expansions of the cylinder for each explosive. The densities and heats of formulation utilized in the calculations are primarily experimental values from Picatinny Arsenal and other sources. Several of the new materials considered were predicted to have enhanced detonation characteristics compared to conventional explosives. In order to confirm the accuracy of the Jaguar and analytic cylinder model results, available experimental detonation and Gurney velocities for representative energetic molecules and their formulations were compared with the corresponding calculated values. Close agreement was obtained with most of the data.

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Date submitted: 27 Feb 2017 Electronic form version 1.4