Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

JAGUAR Procedures for Detonation Behavior of Explosives Containing Boron LEONARD STIEL, Polytechnic Institute of NYU, ERNEST BAKER, CHRISTOS CAPELLOS, US ARMY ARDEC — The JAGUAR product library was expanded to include boron and boron containing products. Relationships of the Murnaghan form for molar volumes and derived properties were implemented in JAGUAR. Available Hugoniot and static volumertic data were analyzed to obtain constants of the Murnaghan relationship for solid boron, boron oxide, boron nitride, boron carbide, and boric acid. Experimental melting points were also utilized with optimization procedures to obtain the constants of the volumetric relationships for liquid boron and boron oxide. Detonation velocities for HMX - boron mixtures calculated with these relationships using JAGUAR are in closer agreement with literature values at high initial densities for inert (unreacted) boron than with the completely reacted metal. These results indicate that boron mixtures may exhibit eigenvalue detonation behavior, as observed by aluminized combined effects explosives, with higher detonation velocities than would be achieved by a classical Chapman-Jouguet detonation. Analyses of calorimetric measurements for RDX - boron mixtures indicate that at high boron contents the formation of side products, including boron nitride and boron carbide, inhibits the energy output obtained from the detonation of the formulation.

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Date submitted: 23 Feb 2009 Electronic form version 1.4