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Performance and Shock Sensitivity Evaluations of Reduced Sensitivity Explosives PATRICK BOWDEN, BRYCE TAPPAN, MATTHEW SCHMITT, JOSEPH LICHTHARDT, LARRY HILL, Los Alamos National Laboratory — Making high explosives that possess insensitivity on par with TATB-based plastic bonded explosives (PBXs), while outperforming them, has proven to be a difficult challenge. Many molecules that have challenged TATB have fallen short in either small-scale sensitivity (impact, friction), thermal stability, or possessing a shock sensitivity that is either too high or too low. Recently, an alternative approach to single-molecule-based PBXs has been blending and/or co-crystallizing explosive molecules to address shortcomings of individual components. With this approach in mind, formulations have been prepared containing 1,1-diamino-2,2-dinitroethene (DADNE or FOX-7) or 3,3'-diamino-4,4'-azoxyfurazan (DAAF) with 3-nitro-1,2,4-triazole-5-one (NTO). Detailed characterization of these mixtures has been described in a concurrent study. Here we focus on in depth performance metrics such as cylinder wall expansion and CJ pressure (via free surface velocity) and shock sensitivity, by small-scale gap-testing, were investigated as a function of weight percentages of the components. Results will be contrasted with known insensitive high explosives.

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