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Shock Initiation of Thermally Expanded TATB ROBERTA MULFORD, Los Alamos National Laboratory, DAMIAN SWIFT, Lawrence Livermore National Laboratory — The plastic-bonded explosive PBX-9502 undergoes unusual hysteretic thermal expansion, or "ratchet growth" as a consequence of the uniaxial thermal expansion of the graphitic structure of the major component, TATB explosive. Upon thermal cycling, the density of the material can be reduced by as much as 9%, resulting in a distinct increase in the shock sensitivity of the solid. Run distances to detonation have been measured in thermally expanded samples of PBX-9502, using embedded particle velocity gauges and shock tracker gauges. Uniaxial shocks were generated using a light gas gun, to provide a repeatable stimulus for initiation of detonation. We have applied a porosity model to adjust standard Pop plot data to the reduced density of our samples, to investigate whether the sensitivity of the PBX 9502 increases ideally with the decreasing density, or whether the microscopically non-uniform expansion that occurs during "ratchet growth" leads to abnormal sensitivity, possibly as a result of cracking or debonding from the binder, as observed in micrographs of the sample.

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