Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

**Shock initiation of the TATB-based explosive PBX 9502 cooled to 77 Kelvin** B.C. HOLLOWELL, R.L. GUSTAVSEN, D.M. DATTELBAUM, B.D. BARTRAM, Los Alamos National Laboratory — Recently we reported on shock initiation of PBX 9502 (95 wt.% tri-amino-trinitro-benzene, 5 wt.% Kel-F800 binder) cooled to -55°C or 218K (J. Appl. Phys., 112, 74909 (2012)). Shock waves were generated by gas-gun driven plate impacts and reactive flow in the cooled PBX 9502 was measured with embedded electromagnetic gauges. Here we describe methods to cool the explosive below -55°C; down to liquid nitrogen temperature of -196°C or 77K. We start cooling by flowing chilled nitrogen ($N_2$) gas through channels in a sample mounting plate and a copper tubing coil. Temperature in the sample is monitored using type-E thermocouples; samples are cooled at $\approx$ 1-2°C/min. After minimum temperature is reached using $N_2$ gas, we flow liquid nitrogen ($LN_2$) through the channels. Minimum temperatures of 77K were reached. Preliminary results show continued reductions in temperature cause continued reductions in shock sensitivity. Reducing the temperature below -55°C further reduces the sensitivity. Wave profiles were also obtained during the shock-to-detonation transition and will be presented.

R. L. Gustavsen
Los Alamos National Laboratory

Date submitted: 21 Feb 2013 Electronic form version 1.4