Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Small-Scale Chamber Test for Internal Blast Performance
RICHARD LEE, JOSHUA FELTS, NSWC Indian Head — The data reported here provides a validation of the use of a small-scale internal-blast test to predict the energy release of explosives in larger scale. The small-scale arrangement consisted of a 2-g booster and 10-g sample mounted in a holder attached at one end of a closed chamber. The internal volume of the chamber was 89 liters not including the charge holder. The design of the charge holder served two purposes. One was to provide confinement around the charge to avoid degradation of performance from explosives with critical diameters larger than that of the sample. The second was to provide a separate space from that of the chamber that retained the fragments from the confinement to minimize the absorption of heat from the products. The energy release was determined from measurements of the peak quasi-static overpressure and the ideal gas law. The results from six different explosives were compared to larger scale tests involving a bombproof chamber (180,000 liters) with bare charges between 1 and 16 kg. The energy release between small and large scale compared favorably with regard to relative ranking of each explosive. The energy release measured in the small chamber was lower than the large chamber analogs, possibly due to heat losses to the holder. Despite these differences, the small-scale chamber test appears to provide a ranking of explosives based on their energy release that correlates with larger scale tests. Hence, this test is a viable tool for optimizing compositional variations for internal blast performance in target scenarios of similar form factor.

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Date submitted: 08 Apr 2013 Electronic form version 1.4