Many homemade explosives (HMEs), e.g. ANFO, don’t release all their energy promptly at the detonation front. In these, loss of energy at edges becomes so significant that it is necessary to use large charges to achieve detonation, i.e. large critical diameter. This does not stop terrorists; they use them in VBIED’s. For the researcher it means he may not observe detonability without using large amounts of material—expensive, time-consuming, & hazardous. A small-scale test is being developed to overcome edge effects so that detonability or lack thereof can be observed without regard to critical diameter. Target materials are those which fail to detonate at the scale of DoT testing but may be threats at large scale, i.e. tons.

With active confinement provided by a detonating annular booster, a convergent, overdriving shock wave is driven into the test material. If it is detonable, the test material will detonate regardless of its critical diameter because the shock is being driven from the edges, not lost at the edges. The goal of this research is to develop a test to observe detonability without requiring large amounts of material. By creating a small test we save time and money and make it possible to test large numbers of potential explosives or industrial hazards with significantly less hazard to the researcher. Hazard to the researcher is reduced because this detonability test uses less material and because less material need be synthesized.

### Accomplishments Through Current Year

Test series 4 involved 42 shots using ~1lb (450g) of booster and 40-100g of acceptor material. The results indicate clear separation of detonable materials from inert materials of both liquids and solids. Intermediate results have not been completely elucidated. Simulations of these tests have agreed with field-test results. The model is now being used to design the next test series.

### Opportunities for Transition to Customer

This research is aimed at determining detonability of substances. Once threats are assessed, regulations can be tailored to fit these materials and emerging threats. The application of this test is not limited to identifying potential terrorist threats. Chemical processing plants will benefit from a test they can afford, in terms of dollars, time, and material. We anticipate it may become a standard hazard test in plant design.

### Publications Acknowledging DHS Support

Oxley, J.C., Smith, J.L., and Bowden, P.R. “Assessing the Detonability of Substances”, in Prep

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