Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Effects of confinement conditions on the detonation properties of vapor-deposited hexanitroazobenzene films ROBERT KNEPPER, MICHAEL MARQUEZ, ALEXANDER TAPPAN, Sandia National Laboratories — It is well known that confining an explosive with a high-density inert material can cause substantial changes in its detonation properties. However, the thickness of confinement needed and the magnitude of the effect on quantities such as detonation velocity and critical thickness are largely unknown. In this work, we present vapor-deposited hexanitroazobenzene (HNAB) and copper films as a model system to study the effects of confinement on the detonation properties of secondary explosives. HNAB is chosen for the reproducibility of both its microstructure and detonation velocity when vapor-deposited, as well as for its small critical thickness and the low surface roughness of the deposited films. Both the HNAB and copper confinement layers are vapor-deposited to promote intimate contact between the explosive and confinement and to provide precise control over both layer thicknesses and microstructure. Confinement thickness is varied to determine the minimum necessary to behave as though the confinement was effectively infinite, and the effects on detonation properties are quantified. These experiments may also provide insight into the structure of the detonation reaction zone by using the infinite confinement conditions (thickness and shock speed) to give an indirect measure of the reaction zone length.

Robert Knepper
Sandia National Laboratories

Date submitted: 12 Feb 2013 Electronic form version 1.4