Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Underwater Laser Plasma with Reactive Fuels JOEL CARNEY, SCOTT PIECUCH, NSWC IHD — This paper discusses the application of a nanosecond laser-shock to induce a cavitation bubble in a suspension of water and aluminum and an underwater ablation event at an aluminum target to generate the conditions under which metal fuels will oxidize with water. The energy deposited into the plasma is varied with laser energy, allowing for a laboratory-scale setting where particle reactivity can be investigated. In the case of suspended aluminum fuel particles, the bubble dynamics (expansion radius and period) are augmented by the presence of the reactive particles. Laser ablation at an aluminum surface is also accompanied by fast oxidation, augmenting the bubble formation. High-speed framing camera images along with time-resolved emission spectra are used to monitor bubble dynamics and reactivity. The critical conditions necessary to promote underwater reactivity of fuels in this laboratory setting will be used to guide future applications of reactive materials.

Joel Carney
NSWC IHD

Date submitted: 28 Feb 2011 Electronic form version 1.4