

THE PRE-DIRECT COURSE HEIGHT-OF-BURST EVENT: A PRELIMINARY TECHNICAL ASSESSMENT

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A high explosive test named Pre-DIRECT COURSE (PDC) was conducted by the Defense Nuclear Agency on 7 October 1982. This was the first shot in what is anticipated to be a series of large-yield height-of-burst (HOB) events over the next several years. The PDC explosive charge consists of 23 tons of an ammonium-nitrate/fuel-oil (ANFO) mixture contained in a fiberglass sphere that was skewered on a vertical tower, 57 feet above the ground. Clean and dusty gage radials were prepared to investigate dust lofting in the double Mach reflection regime and to compare the hydrodynamics of clean versus dust-laden flows.

A preliminary assessment of the PDC blast environment is presented. The involvement of charge container and tower debris is shown to cause some significant departures from the blast environment observed on comparable nuclear and small-scale high explosive experiments. The adequacy of several new and innovative dust diagnostics are critiqued. Included are: a holographic technique to capture the post-shock, in-flight particle size distribution; optical and nuclear radiation transmission experiments to infer time-resolved dust density; a modern version of GREG- and SNOB-type gages to establish the relative contribution of dust to the dynamic pressure environment.

The future of large-yield HOB testing is discussed in the context of lessons learned from PDC. Remaining gaps in our HOB diagnostic and simulation capabilities are highlighted.