

## DEVELOPMENT OF A THERMAL LAYER SIMULATION TECHNIQUE

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A development program is being sponsored by the Defense Nuclear Agency to produce a thermal layer sound speed simulation technique to be used for precursor shock wave studies. In the present approach, helium or helium/air mixtures are diffused through a porous floor (metal or soil) and allowed to mix with the overhead ambient air. Convection dominated mixing results in a thin layer of helium with a sound speed vertical profile similar to that over a heated surface. Injection of a high sound speed gas removes many of the engineering difficulties associated with attempting to heat the surface and does not require a membrane to contain the gas.

Helium layer characteristics have been determined in a laboratory test program. Aspirating helium concentration probes were used for point measurements, and Schlieren photography was used for flow visualization. Companion experiments are establishing the comparison with heated surfaces, and modeling/data analysis provide the link to field data.

The diffusion layer technique is being installed in the TRW 17 inch shock tube using a porous metal floor. Engineering tests will be performed to shake down and calibrate the system, and precursor shock diagnostic tests will then be carried out. Results from these test programs will be presented at the conference.