

## **BLOCKAGE EFFECTS IN A LARGE BLAST SIMULATOR**

ETHRIDGE,N.H.;LOTTERO,R.E.;WORTMAN,J.D.;BERTRAND,B.P.

The confinement of a target by the walls of a blast simulator produces changes in the loading experienced by the target. The changes increase in magnitude with the blockage ratio, the ratio of target area to the simulator cross-sectional area. Studies have been conducted at the Ballistic Research Laboratory (BRL) to explore blockage effects. Calculations were made using the HULL Hydrocode in an axisymmetric configuration for non-decaying waves for different blockage ratios for a cylindrical target.

It was found that the flow was enhanced at the target so that overpressures for rigid body overturning of vehicles were significantly reduced. Similar calculations have been performed for a rapidly decaying wave. Although the flow was enhanced, the effect on net force was found to be small because of the overpressure gradient across the target and the reduced importance of drag loading compared to diffraction phase loading. Experiments recording the trajectory of blocks struck by shock waves in a BRL shock tube were conducted to attempt to verify the predictions of flow enhancement by the HULL hydrocode. The results substantially confirm the HULL predictions. A comparison was also made of the predicted enhancement of dynamic pressure at a gage station in the CEG blast simulator with that recorded. The status of blockage studies and implications for the design of a large blast simulator are presented. The possibility of compensating for the enhanced drag loading for slowly decaying waves by reducing the duration and hence impulse of the simulated blast wave is discussed.