

STATIC EXPERIMENTS OF PARTIALLY BURIED CASED CHARGES AGAINST EARTH AND TIMBER BUNKERS

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ABSTRACT

The US Army Research Laboratory (ARL), in conjunction with the Engineer Research and Development Center (ERDC), performed experiments to assess the effects of a partially buried charge against an earth and timber bunker. The experiments were designed to evaluate the ground shock and airblast environment, as well as the resultant loads on the bunker, produced by a cased charge with a TNT-equivalence of 41.4 Kg. ARL's Model of Earth and Timber Bunkers (METB) code was used to predict ground shock loads produced by the buried charges. The charges were placed at burial depths of 0.50 m or 0.91 m, and at varying distances from the bunker, corresponding to expected levels of no damage, light damage, and collapse as predicted by the code.

Results from the METB code and the experiments are compared. Initial comparisons between the code and experimental results demonstrate good correlation. Both experimental results and code predictions show that the cased charge is capable of producing heavy damage to the earth and timber bunker, provided that the charge is located so that the front wall of the bunker is near or within the crater the charge creates in the soil. The charge produces light damage to the bunker at further distances. The experimental results also show that the charge causes significant damage to the rear bunker wall via airblast loading, and this mechanism is capable of producing damage at greater distances than can the ground shock loading. The key airblast mechanism responsible for the rear wall damage is the positive pressure differential between the inside of the bunker and the exterior. This pressure reached values of 25.5 to 51.7 KPa. Such differential pressures were sufficient to severely damage the rear wall of the bunker.