BLAST PROPAGATION MODIFICATIONS CAUSED BY REGULAR AND IRREGULAR MULTIPLE OBJECT ARRAYS

Michael P Kerry, Peter E Riddle, Brian J Bibby, AWE, Aldermaston

Richard Garforth formerly AWE Foulness Trials Group

1.1 For the bursts considered here, from a large high-explosive charge (HE) or any nuclear weapon, the region of influence will usually extend over a significant area. A single weapon could, therefore, create damage in many buildings and the blast loading on any wall could be influenced by adjacent structures. These walls will experience an "ideal" shock loading only if they are sufficiently far from others. This will, however, never strictly be true if energy is absorbed by collapsing walls and distorting structural frames of other buildings. However as a first step this has been ignored and rigid, nonresponding buildings have been used for this experimental and numerical study. Initial results for this simpler case are presented here. Work continues and now includes scenarios with multiple responding structures.

1.2 Static overpressure measurements for two and three block arrangements were Made at AWE, Foulness back in the 1950s, as well as elsewhere then and since. Thus a small set of data was already available and showed typical reflected wave patterns at gauge locations. However, the data were collected for a restricted number of block arrangements and also no accurate computational comparisons could be made at that time. Here, the experimental data have been obtained for a relatively wide range of layouts, and some results have been compared with predictions from hydrocodes such as SHAMRC and AUTODYN, to aid determine their accuracies. Thus the validity of the codes for predicting blast loadings for other building arrays where no experimental data are available, has been investigated. As large detonations were assumed, relatively long duration blast pulses were present, hence static overpressure and dynamic pressure effects have both been considered. From the analysis, rules were sought for generalised regular or irregular building arrays, which could indicate when "ideal" blast loading could be assumed (subject to the rigid body approximation) or when full hydrocode calculations would be needed.