THE EFFECT OF CHARGE ORIENTATION IN THE HUMBLE MAPLE STRUCTURE

C. Watry, C. Needham, M. Brown

Applied Research Associates, Inc.
4300 San Mateo Blvd Suite A220, Albuquerque, NM, 87124, USA

ABSTRACT

SHAMRC calculations have been completed to determine explosive blast environment in the Humble Maple tunnel test structure at Kirtland AFB. This same structure was used in the Discrete Dionysus test series in 2002 and 2003. Recent tests in the test structure have identified an explosive with a significant improvement over the baseline explosive. In addition to having a unique formulation, this test differed from previous tests in that the cylindrical cased charge was oriented with its axis vertical instead of along the length of the tunnel. Some individuals questioned whether the significant enhancement is due to the formulation or the orientation. The expectation is that it might be a little of both, but how much can be attributed to each factor? A portion of aluminum particles (of smaller sizes) reacts prior to significant fireball expansion. Additional reaction takes place when shock waves reflect from the structure walls and reheat the aluminum. In the vertical orientation, some aluminum particles travel in a different direction before the shock reflection; therefore, the amount of aluminum reacting is expected to be different. This report will use the SHAMRC non-ideal explosive model to address the effect of the charge orientation on performance. The SHAMRC non-ideal explosive model includes an ARA proprietary particulate model that contains drag effects, convection, conduction, phase transition, and combustion, as well as an afterburning model for gaseous and solid detonation products.

This work was completed under the Defense Threat Reduction Agency Advanced Energetics program.