



US DEPARTMENT OF DEFENSE

# BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

## Blast Exposure Research

### Characterizing Exposures Associated with the Multi-Role Anti-Armor/Anti-Personnel Weapon System

The Multi-Role Anti-Armor/Anti-Personnel Weapon System uses ammunition that is filled with propellant that is ignited to produce a controlled combustion that propels a projectile toward a target. The chemical composition of propellants affect combustion rates, intensity of blast emitted from the both ends of the weapon during firing, and injury risk. In a test conducted by Aberdeen Test Center in August 2015, BTDs and noise microphones served as proxy sensors and collected data at two crew positions: gunner and assistant gunner. This test characterized exposures associated with the four firing conditions involving rounds conditioned to "hot" temperature and four different gunner firing postures: standing, kneeling, sitting and prone. USAPHC evaluators analyzed the sensor data using the BOP-HHA version 2.0 software. This software employs an algorithm based upon experimental data collected from more than 1,000 specimens exposed over 20 years of testing. The BOP-HHA software includes a biomechanical model that analyzes the time-pressure data captured by the BTD to calculate the amount of "push" or mechanical work imparted by the blast pressure wave to the thorax and transmitted to the lung. The calculated work value is used to estimate the risk of lung injury and serves as a predictor of injury since air-containing organs are more susceptible to blast injury. BOP-HHA is the primary methodology used by USAPHC to assess injury risk from the non-auditory component of blast. The results of this analysis were used to develop standard operating procedures that will reduce injury risks to Service Members/operators firing the Multi-Role Anti-Armor/Anti-Personnel Weapon System.