



US DEPARTMENT OF DEFENSE
BLAST INJURY RESEARCH PROGRAM
COORDINATING OFFICE

Studies on Repetitive Blast Exposure

Health Hazard Analysis of an M3E1 Multi-Role-Anti-Armor/Anti-Personnel Weapon System

The M3E1 Multi-Role-Anti-Armor/Anti-Personnel Weapon System (MAAWS) is a lighter weight, more tactically versatile replacement to the currently fielded M3 MAAWS. To attain approval for an urgent materiel release, a Health Hazard analysis was completed to determine the potential health risks that Service members incur operating the system.

An analysis conducted by the U.S. Army Public Health Center (USAPHC; Aberdeen Proving Ground, Maryland) Health Hazard Assessment (HHA) Division estimated the risk of lung injury for Service members exposed to the blast generated by combustion of propellant from rounds fired from the M3E1 MAAWS weapon system (Figure 1). Data were collected in April 2017 from blast test devices located at the gunner and assistant gunner crew positions and for sixty different conditions involving combinations of five types of ammunition, three round conditioning temperatures, and four firing postures. These data were analyzed using the blast overpressure-health hazard assessment (BOP-HHA) software version 2.1. This software was developed by the U.S. Army Medical Research and Materiel Command under a contract with JAYCOR Corporation (now L-3 Corporation). The BOP-HHA software uses an algorithm



FIGURE 1: Gases exiting rear of MAAWS are evidence of blast overpressure to which Service members are exposed. (Figure used with permission from the authors)

based upon a biomechanical model of the thorax that calculates the amount of “push” or mechanical work imparted to the thorax by a blast pressure wave. The BOP-HHA algorithm uses the calculated work value and information about injuries from over 1,000 blast exposed specimens to estimate lung injury risk.

The analysis determined the daily maximum number of rounds that can be fired without incurring significant lung injury risk operating this updated weapon system. It also calculated quantitative probabilities of lung injury for each crew position, for all lung injury severity levels. Analyses will be published by the USAPHC in the HHA Reports used by Safety and Occupational Health professionals during the acquisition process.

The results of blast overpressure analysis are included in standard operating procedures that commanders use to make evidence-based occupational health and safety decisions about blast exposures when planning missions.

