USACHPPM
Readiness thru Health

25-016-1003

Just the Facts...

Laser Hazard Evaluation of U.S. Army Fielded Laser Systems

Military Systems

AR 40-10 requires a health hazard assessment (HHA) for each new military laser system. The Nonionizing Radiation Protection Study performed by the Laser/Optical Radiation Program is used to complete this HHA. Normally, the manufacturer certifies each commercial system using the Federal laser standard, 21 CFR 1040, published by the Food and Drug Administration/Center for Devices and Radiological Health. However, due to the unique nature of military equipment used outdoors, primarily certain classified systems or those systems designed for combat or combat training, these devices are not required to comply with all the performance requirements of the Federal laser standard. Since these devices are used outdoors, distance from the operating laser beam is often used to protect personnel.

Laser Operating Characteristics

Laser operating parameters are important in determining the distance required to offer protection. Often the manufactured product exceeds required performance, resulting in a more robust system, but one that could impose additional hazards. Other characteristics of the laser also become important since production is usually limited and anomalies are sometimes noted that would normally be eliminated on systems with a high production rate. These deviations from a normally functioning system may not be noticed by the manufacturer of the system and may not affect performance of the system. Some of these variations in operating characteristics may pose a risk to U.S. military or civilian employees and may sometimes allow hazardous laser beams to exit the restricted access range area.

Past Experience

Over the years, USACHPPM employees of the Laser/Optical Radiation Program have noted extra unwanted beams exiting from the system, double pulsing, lower divergence, higher output power or energy than specified, external beam waists, unwanted frequencies, protective covers that transmit laser energy, electronics that allow the device to fire at unexpected times, mechanical shutter failures, and a host of other problematic behaviors. Also, due to the complexity of some of the laser systems, the correct method of hazard evaluation has not always been implemented by the manufacturer of the system.

Laser Range Use

Many range officers at various DOD facilities require a hazard evaluation by the appropriate military authority before they will allow a laser system to be operated on their range. A standardization of laser safety methodology has also been implemented in a NATO standard, STANAG 3606 for use of lasers developed in one country to be used on the laser ranges of another country. CHPPM remains involved in the continued development of international and national standards for the safe use of lasers, including proper evaluation techniques, setting of laser exposure limits, and range control procedures to prevent injury to soldiers and civilians near operating military lasers.

Advantage to Developers

Having an independent medical assessment of health hazards to the soldier from new military laser systems may protect the developer from future liability. A quick examination of a new military system cannot guarantee that some unforeseen problem with a laser system will not occur at a future date; however, many design flaws that could have affected the safety of U.S. soldiers have been caught in the past and corrected through CHPPM evaluations. Once CHPPM has evaluated a system, a report is written on the unit and recommendations are made on the hazard distances that should be observed when setting up a laser test, the optical density necessary for eye protection, the size of buffer zone required for field tests, and the degree of diffuse reflection or skin hazards. In addition, recommendations are made for labeling the system to be in compliance with accepted laser safety practice and applicable regulations. The system is then brought before the DOD Laser Safety Review Board for acceptance and added to the list of fielded systems in Military Handbook 828.

References –

1. AR 40-5 Preventive Medicine
2. AR 40-10 Health Hazard Assessment Program in Support of the Army Material Acquisition Decision Process
3. Title 21, CFR part 1040, Performance Standards for Light Emitting Products
4. American National Standards Institute, American National Standard for Safe Use of Lasers, ANSI Z136.1 (2000).
5. American National Standards Institute, American National Standard for Safe Use of Lasers Outdoors, ANSI Z136.6 (2000).
6. Military Standard 1425A, Safety Design Requirements for Military Lasers and Associated Support Equipment
7. Military Handbook 828, Laser Safety on Ranges and in other Outdoors Areas
8. DOD Instruction 6050.6 Exemption for Military Laser Products

Laser/Optical Radiation Program
U.S. Army Center for Health Promotion and Preventive Medicine
ATTN: MCHB-TS-OLO, 5158 Blackhawk Road
Aberdeen Proving Ground, MD 21010-5403
Commercial 410-436-3932 or DSN 584-3932
http://chppm-www.apgea.army.mil/