



## *Hazard Alert for Explosive Training Devices or Diversionary Devices Used in Nonlethal Weapons*



- ◆ Permanent Retinal Injury
- ◆ Corneal Thermal Injury
- ◆ Skin Thermal Injury
- ◆ Temporary Flash Blindness

### **Purpose**

The use of explosive training or diversionary devices is becoming widespread. The optical radiation and thermal insult can be potentially hazardous to personnel from many of these devices at close range. These devices should be used with care to prevent personnel injury.

### **Devices of Concern**

Devices of concern include artillery and mine simulators, and diversionary devices such as those which simulate exploding grenades.

### **Hazard Identification**

The potential health hazards from the radiant flash and the presence of nonradiant thermal energy during detonation of an explosive training or diversionary devices could include:

- Permanent retinal injury from viewing an intense visible infrared radiation (IR) and near-infrared radiation (NIR) source emitting in the wavelength range of 400 to 1400 nanometer (nm). Permanent retinal injury potential has not been observed for any chemically generated flashes previously evaluated.
- Corneal thermal injury (burn) due to overexposure to intense IR and direct contact with hot materials (gases and particulates).
- Skin thermal injury due to overexposure to intense visible IR and infrared radiation and direct contact with hot materials (gases and particulates).
- Temporary flash blindness (afterimages) resulting from viewing a brilliant flash source emitting in the wavelength range of 400 to 700 nm. Such temporary loss of vision may create secondary safety hazards for impaired personnel.

## **Measurement Problems**

The use of delicate optoelectronic instrumentation in harsh measurement environments can cause greater uncertainties, and such measurements could be less reliable than data obtained by using passive detectors with other evaluation techniques. Often it is difficult to separate the actual radiometric or photometric signal from the erroneous signal generated in the presence of intense acoustic or electromagnetic energy which often accompanies a detonating device.

## **Passive Detectors**

Passive detectors and evaluation techniques that can be used in harsh environments have been developed by personnel from the Laser/Optical Radiation Program (LORP), U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM). These include the Lyon Witness Boards (LWBs) and the Lyon Big-Eye detector (LBE) which are useful in evaluating thermal insults and injury to skin and eyes from overexposure to a bright flash with hot gases and particulates. Other detectors and techniques are needed to evaluate temporary flash blindness, e.g., obtained luminance data are compared to published flash blindness studies for nuclear fireballs.

## **Conclusion**

Despite attempts to make explosive training and diversionary devices totally safe, these devices can cause injuries at close range when improperly used. If there is a concern for potential health hazards from exploding devices, the Laser/Optical Radiation staff at USACHPPM, have the technical expertise to evaluate many explosive training and diversionary devices for potential health hazards.