BY ORDER OF THE SECRETARY OF THE AIR FORCE

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Aerospace Medicine

LASER AND OPTICAL RADIATION PROTECTION PROGRAM

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This instruction incorporates guidance and criteria for the safe use of lasers and laser systems as defined in the American National Standards Institute (ANSI) Z136.1.

This instruction implements requirements from Department of Defense Instruction (DoDI) 6055.15, *DoD Laser Protection Program*, Air Force Policy Directive (AFPD) 48-1, *Aerospace Medicine Enterprise*, the Department of Labor, Occupational Safety and Health Administration (OSHA) Standard, Title 29, Code of Federal Regulations (CFR) and specific requirements from the Food and Drug Administration (FDA) Standard, Title 21, CFR, Part 1040.10, *Laser Products*, and Part 1040.11, *Specific Purpose Laser Products*. The basic elements of the program emulate those of American National Standards Institute (ANSI) Standard Z136.1, *American National Standard for Safe Use of Lasers* and any other standard in the ANSI Z136 series, as applicable. This instruction applies to all Air Force (AF) personnel, AF Reserves, Air National

Guard, direct reporting units (DRU) and field operating agencies (FOA). Major commands (MAJCOM), DRU, and FOA may supplement this instruction when additional or more stringent safety and health criteria are required, but all direct supplements must be routed to the Office of Primary Responsibility (OPR) of this publication for coordination prior to certification and approval. This instruction does not apply to employees working under government contract or private contractors performing work under government contracts, or State employees with traditional Guard positions, who are covered under their organizational standards. Contractors are responsible for compliance with Occupational Safety and Health Administration (OSHA) standards and the protection of their employees unless otherwise specified in their contract. Send comments and suggested improvements on AF Form 847, *Recommendation for Change of Publication*, through channels, to Surgeon General of the AF, AF Medical Support Agency, Bioenvironmental Engineering Division (AFMSA/SG3PB), 7700 Arlington Blvd Ste 5151, Falls Church, VA 22042-5151. Requests for waivers must be submitted through the chain of command to the appropriate Tier waiver approval authority. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the Publication OPR for non-tiered compliance items. This publication requires the collection and or maintenance of information protected by the Privacy Act (PA) of 1974. Forms affected by the Privacy Act have the appropriate Privacy Act statement. The authority to collect and/or maintain the records prescribed in this publication is Executive Order 12196, *Occupational Safety and Health Programs for Federal Employees*, February 26, 1980. Forms affected by the PA have an appropriate PA statement. System of records notice F044 AF SGE Medical Record System applies. This is authorized by 10 U.S.C., Chapter 55, Medical and Dental Care, 10 U.S.C., Sec 8013, Power and Duties of the Secretary of the AF, and Executive Order 9397. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of IAW Air Force Records Disposition Schedule (RDS) maintained in the Air Force Records Information Management System (AFRIMS) located from the portal at **https://www.my.af.mil//gss-af61a/afrims/afrims/**. Field activities must send implementing publications to the higher headquarters functional OPR for review and coordination before publishing. The use of the name or mark of any specific manufacturer, commercial product, commodity, or service in this publication does not imply endorsement by the Air Force.

(Added-DYESS) AFI 48-139, *Laser and Optical Radiation Protection Program*, is supplemented as follows: It establishes policy and procedures unique for Dyess AFB in accordance with AFI 48-139. It increases awareness of the Installation Laser and Optical Radiation Safety Program, and the Installation Laser Safety Officer, as well as establishing the Laser Safety Council. It authorizes the Installation Laser Safety Officer to execute this supplement in the interests of occupational and public safety. This supplement applies to all Dyess units, tenants, and contractors. Ensure that all records created as a result of processes prescribed in this supplement are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records* and dispose of them In Accordance With (IAW) the Air Force Records Disposition Schedule (RDS), available by linking to the Air Force Portal (**https://www.my.af.mil**). Contact supporting records managers as required. Send comments and

suggested improvements to this publication on Air Force (AF) Form 847, Recommendation for Change of Publication, to 7 AMDS/SGPB.

SUMMARY OF CHANGES

This document is substantially revised and must be completely reviewed. Tiers have been added to wing-level and below directives and are designated with a "(T-x)", where x ranges from 0 to 3 to indicate waiver authority. This tiering results from changes to the inspection process outlined in AFI 90-201, *The Air Force Inspection System*. Refer to AFI 90-201 for details.

(Added-DYESS) This supplement is new to Dyess AFB and must be completely reviewed. It delegates authority to the Installation Laser Safety Officer, and provides direction on implementation of this AFI at Dyess AFB. It increases awareness of the Installation Laser and Optical Radiation Safety Program, and the Installation Laser Safety Officer, as well as establishing the Laser Safety Council. It authorizes the Installation Laser Safety Officer to execute this supplement in the interests of occupational and public safety to include the authority to stop unsafe operations and the authority to approve FDA-compliant laser system acquisitions.

Chapter 1

PROGRAM OVERVIEW

1.1. Overview. This instruction incorporates guidance and criteria for the safe use of lasers and laser systems as defined in the American National Standards Institute (ANSI) Z136.1.

1.1.1. ANSI Z136.1 classifies lasers according to the type of hazards they present and according to the extent of safety controls required. Classes range from the least hazardous, Class 1, through the most hazardous, Class 4. For Class 1 and Class 2 lasers, the letter M after the number refers to viewing the laser with optical aids so that the laser is magnified. Class 3 is divided into subcategories of Class 3R and Class 3B. The older ANSI designation for Class 3 was Class 3A and Class 3B. ANSI changed Class 3A to Class 3R with the R designating reduced risk. For reference, **Table 1.1** below provides a general, but not all encompassing, description of the classes. All mandatory requirements are in this AFI. For a non-mandatory guide describing best force health protection management practices and information when working with lasers and laser systems use refer to the PHA Guide found on the Knowledge Exchange (Kx) website.

Table 1.1. Class Description.

Class	Description
1	Not recognized as hazardous
1M	Could be hazardous if viewed with optical aids (telescopes, binoculars or loupes)
2	Could be hazardous if viewed for > 0.25 seconds, on-axis
2M	Increased hazard if viewed with optical aids
3R	Potential direct and diffuse hazard if eye focused
3B	Direct eye or skin exposure hazard
4	Hazardous for direct or scattered exposure

1.1.2. Military specific lasers that employ coherent radiation are lasers and laser systems used for combat, combat training, or classified in the interest of national security, and require AF Laser System Safety Review Board (LSSRB) approval prior to acquisition and/or employment. Examples include, but are not limited to: laser illuminators, designators, range finders, tactical pointers, tactical lasers, and lasers employed to augment explosive ordnance disposal. For lasers categorized as directed energy weapons (DEWs), AFI 91-401 shall be followed. The DoD, or its components, are authorized to exempt these lasers from portions or the entirety of Title 21, Code of Federal Regulations (CFR), Parts 1010 and/or 1040 IAW with FDA Exemption No. 76EL-01. Hereafter, FDA Exemption No. 76EL-01will be referred to as simply FDA Exemption. This exemption applies only to the laser procurement process but not to laser safety. (T-0)

1.1.3. FDA compliant lasers and laser systems are fully compliant with Title 21, CFR, Parts 1010 and/or 1040 and do not fall under any category defined as military specific lasers. Examples include medical, industrial, laboratory, and communication lasers and laser

systems. FDA Compliant Lasers must have a FDA accession number issued to the manufacturer by the FDA or at least have compliance paperwork on file with the FDA for verification.

1.1.4. For other optical radiation hazards, this instruction is based on the current Threshold Limit Values (TLVs®) for Physical Agents (Non-ionizing Radiation and Fields - Light and Near-Infrared Radiation and Ultraviolet Radiation) published by the American Conference of Governmental Industrial Hygienists (ACGIH®). Optical radiation hazards and controls for welding, cutting, and brazing are delineated in AFI 91-203, *Air Force Consolidated Occupational Safety Instruction*.

1.1.5. Optical radiation includes incoherent, multi-wavelength (non-laser) sources of radiation in ultraviolet (UV)(180-400 nm), visible (400-700 nm), and infrared (700 nm-1000 µm) wavelength regions. Examples of potentially hazardous broadband optical radiation sources include: intense radiant flashes and thermal energy from pyrotechnics or explosives, arcs, gas and vapor discharges, unshielded fluorescent or incandescent light sources, and UV exposures. Measurement equipment to assess these hazards, generally, is not available at base level; risk assessment and associated controls are typically based on manufacturer discussions and consultation with the USAF School of Aerospace Medicine (USAFSAM) Environmental, Safety, Occupational Health (ESOH) Service Center. To contact the ESOH Service Center, call (toll free) 1-888-232-ESOH (3764), 937-938-3764 or DSN 798-3764, or send emails to **esoh.service.center@us.af.mil.**

1.1.6. This instruction prescribes the use of an AF approved Occupational and Environmental Health - Management Information System (OEH-MIS) to standardize and enhance data entry, management, and reporting. The Defense Occupational and Environmental Health Readiness System-Industrial Hygiene (DOEHRS-IH) is a DoD software program designed to provide a web-based information management system that will store and manage personal OEH exposure information and monitoring data, personal protective equipment (PPE) usage data, and employee health hazard education data.

1.2. Purpose. The purpose of the laser and optical radiation protection program is to protect health and prevent injury that could have a debilitating effect on human performance. The program is designed to define and mitigate laser related risks. This program is a key component of the AF ESOH management system as directed in Air Force Policy Directive (AFPD) 90-8, *Environment, Safety, and Occupational Health*. Effective identification and control of laser and other optical radiation hazards is a force multiplier. Supervisors and commanders must: (T-0)

1.2.1. Implement controls to mitigate risks for identified laser and other optical radiation hazards to an acceptable level;

1.2.2. Ensure risk mitigation will be effected through engineering controls first. If research efforts show that engineering controls are not feasible then administrative controls can be considered, with SQ/CC, or higher, approval;

1.2.3. Individual Protective Equipment (IPE) or PPE shall be considered a last resort for controlling a hazard. If engineering or administrative controls are not feasible, then the appropriate IPE/PPE must be made available and used to:

1.2.3.1. Enhance workforce and mission capability;

1.2.3.2. Reduce harmful laser and other optical radiation impacts from AF operations.

Chapter 2

ROLES AND RESPONSIBILITIES

2.1. Assistant Secretary of the Air Force for Installations & Environment (SAF/IE).

2.1.1. Delegates the responsibility to implement DoDI 6055.15 to USAFSAM to establish, administer, and maintain the Tri-Service Laser Injury Hotline (1-800-473-3549) to provide a reporting function for laser and optical radiation accidents and incidents, as well as coordinate immediate expert medical advice in the event of an injury or suspected injury to DoD personnel from lasers.

2.2. Assistant Secretary of the Air Force for Acquisition (SAF/AQ).

2.2.1. Ensures Program Managers (PMs) and Program Execution Officers (PEOs) address laser and other optical radiation health and safety early in development and throughout Integrated Life Cycle Management (ILCM). Further responsibilities of System Program Offices (SPOs), PMs and PEOs are outlined in **Paragraph 2.14.**

2.2.2. Ensures AF acquisition programs incorporate requirements of federal regulations and this instruction into all stages of system procurement IAW Department of Defense Instruction (DoDI) 5000.1, *Operation of the Defense Acquisition System* (Supplemented by USD(AT&L) Safety Memo (21 Nov 06), Reducing Preventable Accidents). For military specific lasers, when full compliance with 21 CFR 1040.10 and 1040.11 is not operationally feasible, ensure manufacturers request DoD exemption notifications IAW FDA Exemption and DoDI 6055.15.

2.3. Deputy Assistant Secretary of the Air Force, Environment, Safety, and Occupational Health (SAF/IEE). Approves and provides policy guidance to the AF Surgeon General's ESOH protection policy and guidance for lasers and optical radiation.

2.4. The Office of the Air Force Surgeon General (AF/SG).

2.4.1. Formulates, publishes, reviews, and executes plans, policies, programs, and budgets for medical support of the occupational and environmental health program.

2.4.2. Establishes AF policy for control of laser and other optical radiation health hazards.

2.4.3. Designates AF Medical Service voting members to the DoD Laser Systems Safety Working Group (LSSWG). The AF-represented voting members are currently AF/SG, 711 HPW and AFSEC.

2.4.4. Designates a voting member to the AF LSSRB from AFMSA/SG3PB to evaluate control measures and risks from military specific lasers seeking AF LSSRB approval for purchase/employment and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11.

2.5. Air Force Medical Support Agency, Bioenvironmental Engineering Division (AFMSA/SG3PB). Proposes and interprets guidance and policy to ensure the effective implementation of the AF OEH protection program for lasers and other optical radiation systems and sources.

2.6. Headquarters Air Force Safety Center (HQ AFSEC).

2.6.1. Develops guidance for the AF Directed Energy Weapons safety program.

2.6.2. Implements safety standards for programs associated with potentially hazardous exposures related to lasers, laser systems, and other optical sources.

2.6.3. AFSEC Weapons Safety Division (HQ AFSEC/SEW).

2.6.3.1. Designates a voting member to the DoD LSSWG.

2.6.3.2. Chairs the AF LSSRB.

2.6.3.3. With coordination with the AF LSSRB, approves/disapproves new or modified military specific lasers reviewed by the AF LSSRB.

2.6.3.4. Issues DoD exemption notifications to manufacturers of military specific lasers that cannot meet the federal laser specification requirements in 21 CFR 1040.10 and 1040.11. Ensures DoD exemption notification requests are reviewed by the Air Force Legal Operations Agency (AFLOA/JACE).

2.6.3.5. Maintains a repository of all military specific lasers approved/disapproved for acquisition/fielding through the AF LSSRB.

2.6.3.6. Identifies and prioritizes systems requiring independent laser hazard evaluations and review by the AF LSSRB prior to acquisition/fielding.

2.7. HQ Air Force Inspection Agency (HQ AFIA). Supplements MAJCOM medical inspectors with required specialties to MAJCOM IGs to support Unit Effectiveness Inspections (UEI) as needed.

2.8. HQ Air Force International and Operations Law Directorate (HQ AF/JAO). Reviews submissions for LSSRB approval for the limited purpose of determining whether the proposed laser in question requires a weapon legal review in accordance with AFI 51-402, Legal Reviews of Weapons and Cyber Capabilities, to ensure compliance with the law of armed conflict.

2.9. Air Force Legal Operations Agency (AFLOA/JACE). Reviews requests for DoD exemption notifications and provides recommendations to HQ AFSEC/SEW.

2.10. Air Force Civil Engineer Center, Fire Emergency Services (AFCEC/CXF). Establishes criteria for fire protection and life safety in laser facilities and laser system support facilities.

2.11. MAJCOM, FOA and DRU.

2.11.1. Conducts inspection of lasers and other optical radiation systems as part of the Occupational Health Programs portion of the UEI. Coordinate with AFIA/SG, if necessary, to obtain required medical inspector specialties.

2.11.2. Ensures safety and health assessments are accomplished as necessary in support of the AF LSSRB. Implements programs to monitor laser safety compliance with this instruction and applicable federal regulations concerning the safe use of lasers and other optical radiation systems. (T-0)

2.11.3. Through coordination with acquisition personnel and HQ AFSEC/SEW, ensures military specific lasers have a written AF LSSRB approval prior to fielding. (T-0)

2.12. Air Combat Command (ACC). Through coordination with 77 AESG System Program Office (SPO), issues overall Safe-to-Fly approval of Laser Eye Protection (LEP) for aircrew.

2.13. Air Force Materiel Command (AFMC).

2.13.1. Plans, programs, and budgets for RDT&E related to AF lasers and laser systems, to include laser protective devices, laser technologies, and laser control measures based on priorities provided by AFMSA/SG3PB and HQ AFSEC/SEW.

2.13.2. Ensures a system safety program consistent with MIL-STD-882E, *Standard Practice for System Safety*, and AFI 91-202, *The US Air Force Mishap Prevention Program*, Chapter 9, *System Safety*, is established to support development or modification of systems including lasers and laser systems or other optical radiation sources. Initiates the system safety program as early as possible to ensure effective total life cycle risk. In consultation with HQ AFSEC/SEW, ensures contracts for operation, modification, and repair of laser systems incorporate safety controls IAW the ANSI Z136 Series and MIL-STD-1425A.

2.13.2.1. Establishes life-cycle controls on military specific lasers to comply with accountability and disposal requirements IAW FDA Laser Notice No. 52 and DoDI4160.21- M, *Defense Material Disposition Manual*. Ensures controls and warnings are in place to prevent sale, surplusing, or distribution of military specific lasers outside of DoD. Military specific lasers must be disposed of IAW DoDI 4160.21-M.

2.13.3. 711th Human Performance Wing.

2.13.3.1. Provides operational consultation services.

2.13.3.2. Designates a voting member to the DoD Laser Systems Safety Working Group (LSSWG).

2.13.3.3. 711th Human Performance Wing, Human Effectiveness Directorate, Directed Energy Bioeffects Division, Optical Radiation Branch (711 HPW/RHDO).

2.13.3.3.1. Conducts research on biological effects of lasers, broadband, and other forms optical radiation. Provides subject matter expertise for national and international standards-setting bodies such as ANSI, Institute of Electrical and Electronics Engineers (IEEE), International Commission on Non-Ionizing Radiation Protection (ICNIRP), and Standardization Agreement (STANAG). (T-1)

2.13.3.3.2. Evaluates and recommends LEP technologies for use against threats and hazardous lasers. Coordinates development and approval of LEP for transition to AF operational use, and provides guidance during Safe-to-Fly evaluation processes for aircrew LEP. (T-1)

2.13.3.3.3. Designates a voting member to the AF LSSRB to evaluate control measures and risks from military specific lasers seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11. (T-0)

2.13.3.3.4. Maintains the capability to conduct independent laser hazard evaluations of laser and laser systems seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11. Maintains a repository of hazard evaluations conducted for AF LSSRB approved/disapproved

lasers and laser systems. Provides evaluation information to USAFSAM Occupational/Environmental Health Division (USAFSAM/OE) for health risk assessment and accident/incident investigations and for distribution to laser safety officers. (T-1)

2.13.3.4. USAFSAM Occupational/Environmental Health Division (USAFSAM/OE).

2.13.3.4.1. Provides AF-wide consultation services on the adequacy of laser and other optical radiation protection devices, materials, hazard assessments, exposure control, medical surveillance, and control measures. (T-1)

2.13.3.4.2. Serves as AF/SG technical center for all issues concerning laser and other optical radiation health and safety. Coordinates with other services and agencies to evaluate, assess, and resolve laser safety issues. Publishes the *Bioenvironmental Engineers Guide for Lasers and Optical Radiation*. (T-2)

2.13.3.4.3. Designates a voting member to the AF LSSRB to evaluate control measures and risks from lasers and laser systems seeking AF LSSRB approval for acquisition/fielding and/or DoD exemption notifications from 21 CFR 1040.10 and 1040.11. (T-0)

2.13.3.4.4. Maintains the Tri-Service Laser Injury Hotline (1-800-473-3549) to coordinate investigating/reporting/documenting DoD accidents/incidents involving laser or laser systems with the DoD Laser Accident/Incident Response Group, as necessary, IAW DoDI 6055.15. (T-0)

2.13.3.4.5. Maintains the capability to perform exposure re-creations to evaluate suspected overexposures from lasers and other optical radiation sources. Forwards exposure investigation reports to the Army Institute of Public Health, Tri-Service Vision Conservation and Readiness Program (TVCRP) for addition to the DoD official repository. (T-0)

2.13.3.4.6. Maintains a repository on the hazard characteristics of military specific lasers, FDA-Compliant Lasers, laser radiation protective devices, and optical radiation sources used within the AF and makes this repository available to installation personnel. (T-0)

2.13.3.4.7. Develops formal training for AF personnel on laser and optical radiation safety through the USAFSAM Department of Bioenvironmental Engineering (USAFSAM/OED). (T-0)

2.13.3.5. USAFSAM, Aeromedical Consultation Service, Aerospace Medicine Consultation Division (USAFSAM/FEC).

2.13.3.5.1. Provides consultative examinations in ophthalmology and dermatology for AF personnel. All other consultations must have approval from the 711 HPW/CC. (T-1)

2.13.3.5.2. Develops methods to evaluate injuries or suspected overexposures associated with lasers and optical radiation. (T-0)

2.13.3.5.3. Recommends medical surveillance requirements for active aircrew members, in addition to those stipulated in this AFI or the ANSI Z136 Series. (T-1)

2.13.4. 77th Aeronautical Systems Group (77 AESG/CC).

2.13.4.1. Conducts acquisition and sustainment of aircrew LEP. (T-1)

2.13.4.2. Assists 711 HPW/RHDO, test organizations, and MAJCOMs with assessments of LEP and other protective technologies/devices under development for aircrew. (T-1)

2.13.4.3. Manages the Safe-to-Fly health and safety approval processes for aircrew LEP throughout acquisition and fielding process. Safe-to-Fly recommendations are used by the MAJCOM, CCMD, ANG, FOA, or equivalent, to authorize fielding of aircrew LEP or developmental LEP used by aircrew. (T-1)

2.14. SPOs, PMs, and PEOs.

2.14.1. Coordinate projected laser and other optical radiation system acquisitions, performance specifications, and measurements with HQ AFSEC/SEW as early as practical in the procurement process. Notify HQ AFSEC/SEW if the system has a potential to be used by other services so measurements and evaluations can be jointly coordinated. Note: Most military specific lasers are likely to be used jointly.

2.14.2. Initiate the system safety program as early as possible in the development or modification cycle to ensure effective total life cycle risk and cost management.

2.14.3. Evaluate and recommend LEP and other protective technologies for complex lasers/laser systems technologies, i.e. for non-military or threatening lasers. Evaluations shall occur early within development of new systems to ensure safe operations of the systems.

2.14.4. Where full compliance with 21 CFR 1040.10 and 1040.11 conflicts with operational requirements, ensure manufacturers request DoD exemption notifications from the AF LSSRB IAW FDA Exemption No. 76EL-01 and DoDI 6055.15.

2.14.4.1. Coordinate through HQ AFSEC/SEW to have an independent evaluation conducted of any laser or optical radiation system seeking approval for acquisition/fielding from the AF LSSRB once the system is in final configuration and ready for fielding.

2.14.5. Include health and safety information, cautions, and warnings in Standard Operating Procedures (SOPs), Technical Orders (TOs), or equivalent.

2.15. Installation Commander.

2.15.1. Establishes policies, procedures, and/or instructions to implement this instruction at the installation level. (T-0)

2.15.2. Establishes an installation laser and optical radiation protection program that conforms to this instruction. (T-1)

2.15.3. Designates, in writing, a qualified Bioenvironmental Engineer (AF Specialty Code (AFSC): 43E3X) or equivalent civilian to serve as the Installation Laser Safety Officer (ILSO). If a qualified 43E3X or equivalent civilian is not assigned, a 7-level or higher Bioenvironmental Engineering Technician (AFSC: 4B0X1) may be designated to serve as the ILSO with approval from the Command Bioenvironmental Engineer. If the base wing is located on a non-AF led joint base, overall ILSO responsibilities would fall to the host unit per the host service's guidelines. If the host does not assign an ILSO, the AF Wing

commander must designate a Wing LSO to execute ILSO responsibilities for Wing-owned personnel and operations. If the host assigns one, designation of an AF Wing LSO is optional. (T-2)

2.15.3.1. Delegates authority to the ILSO to suspend installation operations involving the operation of laser or other optical radiation sources that pose a significant health risk to personnel, are in clear violation of regulations or requirements, or can negatively impact AF operations, materiel, or real estate. (T-1)

2.16. Installation Staff Judge Advocate. The Base Staff Judge Advocate in collaboration with the ILSO and in consultation with AF/JAO and AFLOA/JACE, reviews all investigations conducted for legal sufficiency.

2.17. Installation Laser Safety Officer (ILSO).

2.17.1. Adheres to the LSO duties and responsibilities IAW ANSI Z136.1, those detailed below, and those specified in Chapter 3. (T-0)

2.17.2. Develops and manages an installation laser and optical radiation safety program. (T-0)

2.17.3. Assists the installation commander in developing and maintaining policies, procedures, and instructions to meet this instruction's requirements. (T-2)

2.17.4. Incorporates laser and optical radiation hazard evaluations into the special surveillance processes described in AFI 48-145, *Occupational Health Program*. (T-2)

2.17.5. Establishes a Laser Safety Committee (LSC) at installations with three or more units using Class 3B and/or Class 4 FDA-Compliant Lasers or military specific lasers, if deemed necessary based on a hazard assessment. Suggested LSC composition can include pertinent unit LSOs, Installation Safety, Flight Medicine, and Public Health. Potential discussion items include best safe practices, hazard assessments and controls, etc. The ILSO has the option to include this topic/meeting in conjunction with already existing ESOH structure. (T-3)

2.17.6. Coordinates suspected laser accidents/incidents. Refer to **Paragraph 3.6** of this guide and the *Bioenvironmental Engineers Guide for Lasers and Optical Radiation*. (T-0)

2.17.7. Ensures the outdoor use of lasers adheres to federal, military, state, and local regulations. (See **Chapter 3**.)(T-0)

2.17.8. Ensures each unit employing military specific lasers maintains a copy of the AF LSSRB approval letter and hazard evaluation or safety summary for each system type. (T-3)

2.17.9. Either provides or ensures the Unit LSO (ULSO) training is IAW this instruction. Assists ULSOs in creating SOPs and any review of controlling documents prior to startup of new laser operations. (T-0)

2.17.10. Exercises authority granted by the installation commander to suspend installation operations according to **Paragraph 2.15.3**. Reports deviations from this instruction to the unit commander and, AFMSA/SG3PB, as appropriate. (T-2)

2.17.11. Maintains evaluations of hazardous laser and optical radiation equipment. Depending on the equipment, a list of evaluated hazardous Class 3B and 4 lasers could include nomenclature, classification, wavelength, unit of assignment, or other hazard

descriptors. Obtains a consolidated list of potentially hazardous lasers consisting of evaluated Class 3B and 4 of un-embedded/unenclosed lasers and laser systems. This consolidated list may come from lists provided by ULSOs or unit safety representatives. Enters information on laser hazards and exposures in DOEHRS for all activities as part of routine occupational and environmental health threat surveillance. Provides a consolidated listing or listings provided by ULSOs to the MAJCOM/FOA/DRU upon request. (T-1)

2.17.12. Accomplishes and documents completion of required training. (T-0)

2.17.13. Consults with USAFSAM/OE or the ESOH Service Center, as needed, on issues such as hazard evaluations, controls, investigations and/or FDA exemptions. (T-2)

2.18. Medical Treatment Facility (MTF) Commander or Equivalent.

2.18.1. Develops procedures, and/or instructions to implement safety and occupational health aspects of this instruction. (T-2)

2.18.1.1. Establishes Installation Occupational & Environmental Health Working Group (IOEHWG) that reviews and approves recommended medical surveillance examination (MSE) requirements IAW AFI 48-145 and AFMAN 48-146, *Occupational and Environmental Health Program Management*, and the ANSI Z136 Series. (T-0)

2.18.2. Aerospace Medicine.

2.18.2.1. Ensures aircrew only use LEP certified Safe-to-Fly by the applicable MAJCOM, CCMD, ANG, or equivalent IAW AFI 11-301 Volume 4 "Aircrew Laser Eye Protection (ALEP)." (T-1)

2.18.2.2. Ensures examinations and care are provided immediately for all suspected overexposures involving lasers or other optical radiation sources. Ensures coordination with MTF Optometrist for further investigation of any abnormal findings. (T-0)

2.18.2.3. Assists the ILSO with investigations of all suspected overexposures involving lasers or other optical radiation sources. (T-2)

2.18.2.4. Ensures medical follow-up examinations are conducted for persons identified as having been potentially overexposed to lasers or other optical radiation. Further guidance is provided in AFI 10-203, *Duty Limiting Conditions*, Paragraph 2.10.2, the *USAFSAM Laser Injury Guidebook* and the *Bioenvironmental Engineers Guide for Lasers and Optical Radiation*. (T-3)

2.18.3. Public Health (PH).

2.18.3.1. Initiates and completes, with ILSO/Bioenvironmental Engineering (BE) and Installation Occupational and Environmental Medicine Consultant (IOEMC), an occupational illness investigation in the AF Safety Automated System for persons identified as having been potentially overexposed to lasers or other optical radiation. (T-0)

2.18.3.2. Administratively supports the IOEMC to ensure MSEs are conducted according to the approved IOEHWG recommendations and IAW AFI 48-123, *Medical Examination and Standards*. (T-3)

2.19. Installation Safety (SEG).

2.19.1. Reviews and recommends policies and procedures to prevent mishaps from ancillary safety hazards such as electrocution, fire hazards, etc. Periodically evaluates procedures and inspects facilities to ensure compliance with federal, military, state, and local safety requirements. (T-1)

2.19.2. Investigates accidents/incidents related to exposures causing operational impacts, causing damage to systems and/or sensors, or ancillary safety hazards associated with a laser or any optical radiation system IAW AFI 91-204, *Investigation and Reporting US Air Force Mishaps*. (T-0)

2.19.3. Reports known laser accidents/incidents involving aircrew to the local MTF/MDG to ensure medical screening and exposure documentation, as appropriate. Report the illumination of military aircraft from lasers or high intensity lights as specified in **Paragraph 3.7.2.3**. (T-1)

2.20. Installation Civil Engineer Fire Emergency Services.

2.20.1. Evaluates procedures and facilities IAW National Fire Protection Association (NFPA) 115, *Standard for Laser Fire Protection*. (T-3)

2.20.2. Develops emergency response plans, procedures and training lesson plans for firefighting operations involving facilities and systems utilizing Class 3B or Class 4 lasers which have the potential to be a fire hazard (e.g., laboratory/research lasers, EOD, or tactical lasers). (T-3)

2.20.3. Firefighters assigned to locations with lasers or any optical radiation systems having the potential to be a fire hazard should receive initial and annual training on emergency response to accidents/incidents involving those systems. In addition to fire hazard training, this training should include laser safety training developed by USAFSAM/OED, as noted in **Paragraph 2.13.3.4.7**. (T-2)

2.21. Installation Contracting Office.

2.21.1. Ensures government contractors implement this instruction pursuant to the terms of their governing contract for any purchase of Class 1M, 2M, 3R, 3B, or 4 FDA-Compliant Lasers or military specific lasers that impact AF property or personnel. (T-0)

2.21.2. Informs contractors to notify the ILSO, at least 30 days in advance of a contractor performing operations using military specific lasers, or Class 3B or 4 FDA-Compliant Laser systems that impact AF property or personnel. Notifies ILSO prior to a contractor bringing Class 3B or 4 lasers on the installation, and provides laser hazard and control information to the ILSO and/or ULSO for authorization prior to use. (T-2)

2.21.3. All solicitations for goods or services that use or contain Class 1M, 2M, 3R, 3B, or 4 FDA-Compliant lasers or military-specific lasers to include commercial-off-the-shelf (COTS) lasers must be approved by the ILSO prior to award and procurement. (T-2)

2.22. Unit Commander.

2.22.1. For those units that operate or maintain lasers: develops and maintains policies, procedures, and/or instructions to implement this instruction at the unit level. (T-2)

2.22.2. Designates a qualified ULSO. Consult the ILSO for guidance on ULSO qualifications. The ILSO could fulfill this role if agreed upon between the Unit Commander and the ILSO's Squadron Commander. (T-0)

2.22.3. Implement controls to mitigate risks for identified laser and other optical radiation hazards to an acceptable level. (T-0)

2.23. Unit Laser Safety Officer (ULSO).

2.23.1. Adheres to the LSO duties and responsibilities detailed below and those specified in **Chapter 3**. (T-2)

2.23.2. Is knowledgeable on the skill sets required to perform specific duties as an Aircrew LSO, Industrial LSO, Medical LSO, Range LSO, Research LSO, or Tactical LSO, as applicable. Confer with ILSO and/or *Bioenvironmental Engineers Guide for Lasers and Optical Radiation* for delineation of skill sets. (T-0)

2.23.3. Develops and manages a unit laser and optical radiation safety program. (T-0)

2.23.4. Assists the unit commander in developing policies, procedures and/or instructions to meet this instruction. (T-3)

2.23.5. Coordinates suspected laser accidents/incidents with the ILSO/BE, SEG, etc. (T-0)

2.23.6. Acts as a POC for the unit on laser and other optical radiation safety matters and maintains lines of communication with the ILSO, BE, SEG, and PH personnel. (T-3)

2.23.7. Ensures supervisors and workers are aware of and follow laser and other optical radiation safety procedures in this instruction, Concepts of Operations/Employment (CONOPS/CONEMPS), Tactics, Techniques, and Procedures (TTPs), SOPs, TOs, manuals, unit instructions and other applicable guidance documents. (T-3)

2.23.8. Coordinates laser and other optical radiation evaluation activities with unit command, supervisory personnel, and the ILSO. (T-2)

2.23.9. In coordination with unit commander, suspends unit operations involving the operation of laser or any optical radiation sources that pose a significant health risk to personnel, are in clear violation of regulations or requirements, or can negatively impact AF operations, materiel, or real estate. Coordinates with the ILSO as needed to maintain safe operation and to create SOPs and any review of controlling documents prior to startup of new laser operations. (T-2)

2.23.10. Ensures the outdoor use of unit lasers adheres to federal, military, state, and local regulations. (See **Chapter 3**)(T-0)

2.23.11. Maintains a copy of the AF LSSRB approval letter and hazard evaluation for each type of military specific laser acquired by the unit (if applicable). (T-0)

2.23.12. Prior to any COTS laser purchases such as laser etchers, coordinates with workplace supervisor and ILSO to determine any safety requirements and to ensure compliance with 21 CFR 1040. (T-0)

2.23.13. Maintains accountability in coordination with the unit's equipment and logistics sections for all Class 3B and 4 lasers and laser systems and all military specific lasers, regardless of class, possessed by the unit. (T-0)

2.23.14. Ensures that no military specific laser is released outside of the AF unless it is transferred to another DoD Service that has approved the use of the system, has been brought into full compliance with 21 CFR 1040.10 & 1040.11, and has the compliance paperwork filed with the FDA; or has been destroyed IAW DODI 4160.21-M. (T-0)

2.24. Workplace Supervisor.

2.24.1. Adheres to the laser supervisor duties and responsibilities detailed below and those specified in **Chapter 3**.

2.24.2. Assists the ULSO in implementing this instruction by developing unit procedures and provides training for workers and visitors, as applicable, for any laser or optical radiation system. (T-2)

2.24.3. Ensures lasers and optical radiation systems are either FDA compliant, or in the case of military specific lasers, have been approved by the AF LSSRB prior to acquisition/fielding. When necessary, requests approval from the AF LSSRB through HQ AFSEC/SEW for military specific lasers. (T-0)

2.24.4. Prior to using laser or optical radiation emitters to include COTS systems, implements controls specified by ILSO to mitigate risks for identified laser and other optical radiation hazards to an acceptable level. (T-0)

2.24.5. Ensures risk mitigation will be effected through engineering controls first. If research efforts show that engineering controls are not feasible then administrative controls can be considered, with SQ/CC, or higher, approval. (T-0)

2.24.6. Individual Protective Equipment (IPE) or PPE shall be considered a last resort for controlling a hazard. If engineering or administrative controls are not feasible, then the appropriate IPE/PPE must be made available and used to: (T-0)

2.24.6.1. Enhance workforce and mission capability;

2.24.6.2. Address laser and other optical radiation impacts from AF operations.

2.24.7. In the event of a suspected laser accident/incident, ensures medical treatment is sought immediately. (T-1)

2.24.8. Ensures the unit commander, ILSO, ULSO, BE, SEG and PH are notified immediately of suspected overexposures and investigations are appropriately coordinated. (T-0)

2.24.9. Immediately reports to the ULSO any suspected laser or optical radiation overexposure, unsafe conditions, and/or change in usage that could change the hazard assessment. (T-2)

2.24.10. Ensures users of any Class 1M, 2M, 3R, 3B or 4 FDA-Compliant Laser, military specific laser, or optical radiation sources are trained upon initial assignment to the unit and annually thereafter. This extends to those individuals that conduct routine maintenance on any Class 3B or Class 4 embedded lasers. (T-0)

2.24.11. Ensures incidental personnel (e.g., personnel, such as housekeepers, who are not allowed to work around the laser when it is “on”) are adequately trained in procedures and policies in areas with active lasers or other optical radiation systems. As a minimum,

personnel shall be trained on safe work practices and descriptions of warning signs and hazard zones. (T-2)

2.24.12. Ensures visitors receive training, PPE such as LEP or skin protection (when required), and permission to enter a laser controlled area. As a minimum, visitors shall be trained on safe work practices, specific hazards, and procedures to follow in the event of a suspected overexposure to laser or other optical radiation. (T-2)

2.24.13. Documents training regarding safe use and hazards from lasers and optical radiation sources, e.g. Form 55 or electronic equivalent. Verifies the individual user's annual safety training IAW Paragraph 2.24.2 of this instruction. (T-2)

2.24.14. Ensures the outdoor use of lasers and optical radiation systems adheres to federal, military, state, and local regulations. (See **Chapter 3**)(T-0)

2.25. Individual.

2.25.1. Controls laser and optical radiation hazards by following procedures in this instruction, CONOPs, TTPs, SOPs, TOs, manuals, and unit instructions. (T-2)

2.25.2. Ensures warning signs, safety devices, and PPE are functional and in place before operating lasers or optical radiation systems. (T-2)

2.25.3. Immediately reports to the workplace supervisor and the ULSO any suspected laser or optical radiation overexposure, unsafe conditions, and/or change in usage that could change the hazard assessment. (T-2)

2.25.4. Ensures the outdoor use of lasers adheres to applicable federal, military, state, and local regulations. (See **Chapter 3**)(T-0)

Chapter 3

INSTALLATION PROGRAM

3.1. General Guidelines.

3.1.1. The program elements of this instruction augment those of the ANSI Z136 Series and are shared among workplace supervisors and other functional areas such as BE, PH, SEG, and healthcare providers. However, the ILSO has overall responsibility to the installation commander for the installation laser safety program, and as such shall be designated in writing, by the installation commander, as the final authority on all laser operations conducted within the installation's areas of responsibility. (T-3)

3.1.2. The fundamental aspects of a laser and optical radiation protection program shall include training, evaluation and control of direct and ancillary laser hazards, medical surveillance/examinations, and accident/incident investigation. (T-0)

3.1.2.1. (DYESS)(Added) For Class 3B and Class 4 lasers, accident/incident planning and preparation through written emergency procedures and notifications will also be included.

3.1.3. Personnel will not be intentionally exposed to laser radiation in excess of the maximum permissible exposure (MPE) levels (IAW ANSI Z136.1) and unnecessary exposures to laser radiation below the MPE will be avoided. This does not apply to patients receiving medical or dental treatment. (T-2)

3.1.4. If an organization uses Class 3B or Class 4 lasers, the LSO at each level (ILSO and ULSO) shall be appointed by the commander at the appropriate level. (T-3)

3.1.4.1. (DYESS)(Added) Lower hazard lasers (i.e., Class 1 or Class 2, or Class I or Class II) do not require formal programs. Class 3B and Class 4 lasers will require formal programs. All other lasers must be evaluated prior to making a determination (e.g., Class 1M, Class 2M, Class 3R, Class IIA, Class IIIA, Military Specific Lasers, or any lasers with any Class not listed in this paragraph to include those with foreign, or no Class labeling). All machines with lasers used to etch or cut materials will be initially evaluated by the ILSO regardless of whole device categorization; this includes systems with embedded lasers.

3.1.5. In addition to the ILSO, specialized ULSOs will be appointed based on the primary mission of the unit. ULSOs will consist of aircrew, industrial, medical, range, research, or tactical LSOs. (T-3)

3.2. LSO and User Training Criteria.

3.2.1. Laser safety training shall be provided initially and annually to users of any Class 3B or 4 FDA-Compliant Lasers or military specific lasers, IAW with the training requirements/topics listed in the ANSI Z136 Series, military directives and requirements, and training specific to the laser(s) and laser system(s) used by the unit. Consult with USAFSAM for training requirements/topics. (T-0)

3.2.2. AF LSO training requirements are based upon the primary mission of the unit to which the LSO is assigned and require varying levels of knowledge and training for each

area. In consultation with the ILSO, the ULSO shall determine what, if any, training is commensurate with the laser hazards accessible at the unit level. Further definitions and the recommended training requirements for each type of LSO are provided in *Bioenvironmental Engineers Guide for Lasers and Optical Radiation*. (T-0)

3.3. Hazard Evaluations.

3.3.1. The ILSO will conduct a hazard evaluation and establish controls prior to use or maintenance of all Class 3B or 4 FDA-Compliant Lasers or military specific lasers. This requirement shall include embedded Class 3B and Class 4 lasers if the use or maintenance could potentially expose personnel. Additionally, this requirement applies for the equivalent lasers and laser systems classified under prior ANSI, International Electrotechnical Commission (IEC), or FDA classification schemes. (T-0)

3.3.1.1. (DYESS)(Added) All machines with lasers used to etch or cut materials will be initially evaluated by the ILSO regardless of whole device categorization. This includes systems with embedded lasers.

3.3.2. The most recent versions of the ANSI Z136 Series shall be adopted to determine classification of military specific lasers, calculate/identify beam and non-beam hazards, calculate nominal ocular hazard distances (NOHD), nominal skin hazard distance (NSHD), nominal hazard zones (NHZ), optical density (OD) and determine controls. The MPE values from ANSI Z136.1 shall not be exceeded unless part of an approved human-use protocol or medical procedure. (T-0)

3.3.2.1. (DYESS)2 (Added) Embedded laser devices exempt from this requirement: laser printers and optical disc readers/writers (e.g., DVD, CD). Devices must be used in whole and as intended.

3.3.3. If an ILSO or ULSO suspects and validates that re-classification of a laser may result in a lower hazard class, then the classification and labeling should be updated IAW ANSI Z136 Series. (T-2)

3.3.3.1. (DYESS)3 (Added) Laser pointers such as those used in a conference room do not require a hazard evaluation unless a need exceeds the special considerations in paragraph 3.7.3.

3.3.4. For safe use of lasers in health care facilities, consult with USAFSAM to conduct a hazard evaluation IAW ANSI Z136.3. (T-0)

3.3.4.1. (DYESS)(Added) At minimum, for safe use of lasers in health care facilities the ILSO must be consulted concurrently with USAFSAM, but preferably, the ILSO will conduct the evaluation with USAFSAM guidance.

3.3.5. For visible lasers used in an outdoor environment, the hazard evaluation should include determining ranges associated with visual interference levels IAW MIL-HDBK-828A, MIL-HDBK-828B, and ANSI Z136.6. (T-0)

3.3.5.1. (DYESS)(Added) At minimum, for safe use of lasers in research environments the ILSO must be consulted concurrently with USAFSAM, but preferably, the ILSO will conduct the evaluation with USAFSAM guidance.

3.3.6. For the safe use of lasers in research environments, consult with USAFSAM to conduct a hazard evaluation IAW ANSI Z136.8. (T-0)

3.3.6.1. (DYESS)(Added) To contact the Dyess AFB ILSO, call, 325-696-2325, or email **7MDG.Bioenvironmental@us.af.mil**.

3.3.7. For broadband optical radiation hazards, TLV®s as listed in the ACGIH® TLV® guidebook shall not be exceeded. (T-2)

3.3.8. For directed energy weapons (DEWs), refer to AFI 91-401. (T-1)

3.3.9. Additional information concerning hazards evaluations may be obtained by contacting the ILSO, BE, or the ESOH Hotline. To contact the ESOH Service Center, call (toll free) at 1-888-232-ESOH (3764), DSN 798-3764, or send emails to **esoh.service.center@us.af.mil.**

3.4. Laser Hazard Controls. The purpose of controls is to reduce the risk of exposure to the skin and eyes even with the presence of PPE, and to prevent exposure to visible laser radiation at levels that interfere with critical tasks. For purposes of this instruction, exposure is defined as "unprotected exposure," i.e. exposure without PPE. PPE shall be considered a tertiary control, to be used in the event primary engineering or administrative controls fail or cannot be implemented due to a negative mission impact. (T-0)

3.5. Medical Surveillance for Laser Users and Some Broadband Optical Sources.

3.5.1. General. Any medical examination requirements are limited to personnel who routinely work in a laser environment with potential exposure to Class 3B or Class 4 lasers as either defined within the job description or on a greater than once a month basis. Users include operators, technicians, engineers, and maintenance/service personnel, etc., working with or around these lasers. Specific personnel working in a laser-operating environment, who may be exposed to laser emissions, include, but are not limited to, laboratory, aircrew, combat control teams, special operations forces and laser range personnel. Personnel who work with lasers that are embedded or encased limiting the potential exposure hazard to that of a lower class laser are not subject to a higher level of medical surveillance. Personnel who do not routinely operate in a laser environment may be considered incidental personnel not requiring examination.

3.5.1. **(Added-DYESS)** Broadband optical sources includes ultra-violet, high intensity infra-red, blue light (photochemical), or high intensity visible light (i.e., arc lamps). These specialized light sources are not uncommon but easily controlled. Sources are from quality inspection labs such as NDI and fuels labs, and medical applications (sterilizing devices). All such optical radiation sources shall receive a hazard evaluation by the ILSO.

3.5.2. Medical Examination Requirements and Frequency for Lasers and Laser Systems. Refer to DOD 6055.05M, "*Occupational Medical Examinations and Surveillance Manual*," the *USAFSAM Laser Injury Guidebook,* and/or the *Bioenvironmental Engineers Guide for Lasers and Optical Radiation* for guidance on topic.

3.5.3. Documentation. Results of all examinations shall be recorded on an AF Form 600, *Chronological Record of Medical Care***,** or equivalent, and filed in the individual's medical record. Records should be retained for the individual's working lifetime plus 30 years. (T-3)

3.5.4. An Installation Occupational and Environmental Medicine Consultant in consultation with an optometrist shall determine medical examination requirements and frequency for users of optical radiation sources and shall reflect requirements in local regulations. (T-2)

3.6. Accidents/Incidents. Any accident/incident involving a suspected laser, broadband or other optical radiation overexposure, visible laser illumination that negatively impacts mission operations or a laser exposure causing personal injury to personnel and material damage to AF equipment, systems or sensors shall be investigated and documented. If accidents/incidents occur while personnel are on an expeditionary or contingency operation, an investigation should occur as soon as possible. If an event should be the result of enemy/adversary activity, then these personnel need to report the event through their chain of command. Refer to the *USAFSAM Laser Injury Guidebook,* and/or the *Bioenvironmental Engineers Guide for Lasers and Optical Radiation* for guidance on conducting an investigation and its documentation. (T-0)

3.6.1. **(Added-DYESS)** Units with Class 3B or Class 4 laser shall have a written reporting procedure in the event of an accident/incident. At the least, includes: notification of supervisor, workplace or Unit LSO, Safety Office, and the ILSO.

3.7. Special Considerations.

3.7.1. Medical and Dental Lasers. A medical and/or dental laser assessment may require additional expertise. USAFSAM/OE shall provide additional guidance if a health/medical physicist is not assigned to the installation. Guidance to assess medical lasers is provided in ANSI Z136.3, *American National Standard for Safe Use of Lasers in Health Care Facilities* and American Association of Physicists in Medicine (AAPM) Report No. 73, *Medical Lasers: Quality Control, Safety Standards, and Regulations*. (T-2)

3.7.1.1. (DYESS)(Added) Reporting procedures for such incidents shall be through 7 BW Flight Safety. If the laser is owned and operated by Dyess AFB Units, Safety will notify the ILSO to re-assess the Laser Safety Hazard Evaluation in conjunction with the incident investigation. Exposed personnel should report to Flight Medicine at earliest convenience unless there are signs of eye injury. Eye injuries report directly to the nearest urgent care center.

3.7.2. Range Operations and Other Outdoor Laser or High Intensity Light Use.

3.7.2.1. Requirements for the use of lasers on AF ranges can be found in AFI 13-212, *Range Planning and Operations*, AFI 11-214, *Air Operations Rules and Procedures*, ANSI Z136.6, *American National Standard for Safe Use of Lasers Outdoors*. Additional guidance can be found in Military Handbook 828B, *Range Laser Safety*.

3.7.2.2. Range operations involving the use of lasers shall comply with AFI 13-212 and AFI 36-2226, *Combat Arms Program*, as applicable. (T-0)

3.7.2.3. Lasers and high intensity lights may adversely impact military aircraft operations by temporarily flash-blinding or distracting aircrew during critical phases of flight. Guidance to control hazards associated with these operations on a range can be found in United States Department of Transportation, FAA Order 7400.2J, AC No: 70-1 and 70-2 and ANSI Z136.6. The illumination of military aircraft from lasers or high intensity lights is a mandatory reportable event, and requires notification to the applicable MAJCOM,

CCMD, ANG Operations Directorate or equivalent and also requires coordination with local and federal investigators. (T-0)

3.7.2.4. Comply with policies and procedures in DoDI 3100.11 (O), *Illumination of Objects in Space by Lasers*, for laser devices potentially directed at targets above the horizon. Contact other federal agencies as required (e.g. Federal Aviation Administration (FAA) Order 7400.2J, *Procedures for Handling Airspace Matters*, Chapter 29: Outdoor Laser Operations). Refer to the current MIL-HDBK-828B for specifics on conducting laser testing. For information on coordination or submission of a LCH Laser Registration Form for approval or waiver, the LCH can be contacted via VOICE: (U) 805-606-1075/1282, DSN 276-1075/1282; FAX: (U) 805-606-1610, DSN 276-1610. (T-0)

3.7.3. **(Added-DYESS)** Laser Pointers. Laser pointers for conference room use shall be restricted to Class 1, Class 2, Class 3R, or Class IIIA; and shall have a power output level no greater than 5 milliWatts (mW). There are many devices that look like laser pointers but are powerful enough to cause damage to human tissue. Hand-held lasers rated at Class 3B, Class 4, or with power output levels greater than 5 mW shall not be used for presentations in conference rooms or instructional rooms; consult the ILSO on these devices.

3.8. Combat Simulation Laser Systems.

3.8.1. The output power of lasers or laser systems used in force-on-force training shall be limited to those systems whose hazard classification is equal to or lower than Class 3R (or equivalent), and may require LEP as determined by the ILSO. Examples would include lasers and laser systems such as MILES and Havis-Shield. (T-2)

3.8.2. Contact the ILSO to determine hazards and controls prior to fielding combat simulation laser systems. (T-3)

3.8.3. Users of these systems shall be trained initially (prior to first use) and annually on hazards and controls. (T-3)

3.8.4. As with other military specific lasers, units possessing these systems shall maintain accountability and ensure that no combat simulation laser system is released outside of the AF unless it is going to another service that has approved the use of the system, has been brought into full compliance with 21 CFR 1040.10 & 1040.11 and the compliance paperwork filed with the FDA, or destroyed IAW with DODI 4160.21-M. (T-0)

3.9. Military Specific Lasers.

3.9.1. (DYESS)(Added) For on-ground use, users shall also adhere to the ILSO's Laser Safety Evaluation, and contact the ILSO for any proposed deviations.

3.9.2. Military specific lasers may be exempt from 21 CFR, Part 1040.10, and Part 1040.11 requirements, and lack certain safety controls if necessary. It is therefore critical that users of these systems understand the hazards of the devices they are using and the alternate control measures approved by the AF LSSRB.

3.9.2.1. Military specific lasers shall adhere to approved user OIs, TTPs, SOPs, and CONOPs/CONEMPs. (T-2)

3.9.2.2. Military specific lasers shall only be used by individuals who are trained in the safe use of the device. (T-2)

3.9.2.3. Targets shall be positively identified and situational awareness maintained during military specific laser operations and training to avoid unintended exposures to personnel. (T-2)

3.9.2.4. LEP, appropriate for the military specific lasers, shall be worn IAW the AF LSSRB approval letter. (T-2)

Chapter 4

AIR FORCE APPROVAL OF LASERS AND LASER SYSTEMS

4.1. Establishment of Laser Safety Review Requirements. Under DoDI 6055.15, each DoD component shall establish a service specific laser safety review process to provide a system's safety review of all lasers used in combat, combat training, or classified in the interest of national security. This chapter outlines the process by which the AF shall meet this requirement. (T-0)

4.1.1. Acquisition/Fielding Requirements for Military Specific Lasers. Any laser or laser system which meets the description of a military specific laser, as defined in **Paragraph 1.1.2** of this instruction, regardless of whether the laser is FDA Compliant, shall meet the following criteria, prior to acquisition or fielding: (T-0)

4.1.1.1. The requesting organization shall obtain a letter of approval from the AF LSSRB through HQ AFSEC/SEW. If a laser is considered a DEW per AFI 91-401, then the requesting organization shall obtain a letter of approval from the AF DEW Safety Board (DEWSB) per AFI 91-401. (T-0)

4.1.1.2. The manufacturer shall obtain, through the requesting organization, a DoD exemption notification from the AF LSSRB (or from the DEWSB with AF/JAO concurrence if the laser is a DEW, per AFI 91-401) through HQ AFSEC/SEW if the laser or laser system does not fully comply with the 21 CFR, Part 1040.10 and Part 1040.11. This same process shall be followed prior to selling, distributing, lending, or turning over the device to the AF for RDT&E, IAW FDA Exemption. (T-0)

4.1.1.3. The laser design shall meet the requirements of MIL-STD-1425A. (T-0)

4.1.1.4. The requesting organization shall apply Risk Management (RM) to develop CONOPS/CONEMPS, TTPs or equivalent and other written instructions to prevent overexposures from lasers to DoD personnel and the public. Written procedures shall clearly spell out controls, employment conditions, and procedures in the event of an accident/incident. (T-0)

4.1.2. Acquisition Requirements for FDA-Compliant Lasers. Any Class 1M, 2M, 3R, 3B, 4 laser, or laser system (or equivalent) which meets the description of a FDA-Compliant Laser as defined in **Paragraph 1.1.2** of this instruction is subject to the following criteria: (T-0)

4.1.2.1. The Installation Commander shall serve as the final approval authority for the acquisition of all FDA-Compliant Lasers (or equivalent), unless otherwise delegated. (T-0)

4.1.2.2. The Installation Commander and ILSO shall develop guidelines governing the acquisition, review, and use of FDA-compliant lasers on the installation. (T-0)

4.1.2.3. The unit should coordinate with the ILSO, prior to acquiring any FDA-compliant lasers (or equivalent), to ensure compliance with local guidelines and determine if the device is safe for use on the installation. (T-0)

4.1.2.4. The ILSO should make recommendations for approval/disapproval to the Installation Commander regarding all FDA-Compliant Lasers. (T-0)

4.2. AF LSSRB. The AF LSSRB serves as the AF body authorized to certify that military specific lasers procured by the AF meet all federal, DoD, and AF laser safety regulations and design requirements prior to acquisition and fielding. (T-0)

4.2.1. Chair. HQ AFSEC/SEW shall chair or appoint a chair, and coordinate the review of a military specific laser with the AF LSSRB members. (T-0)

4.2.2. Voting Members. In addition to a LSSRB Executive Secretary designated by the Chair, representatives from AFMSA/SG3PB, 711 HPW/RHDO, Air Force Operational Test and Evaluation Center - Safety (AFOTEC/SE), USAFSAM/OE, USAFSAM/FEC, Air Combat Command, Director of Requirements, Electronic Warfare, Information Operations, Directed Energy Division (ACC/A8I), AFRL Directed Energy Directorate, Laser Division (AFRL/RDL), and HQ AFMC Safety (AFMC/SES) shall serve as voting members to the AF LSSRB. Representatives from 648th Aeronautical Systems Squadron (648 AESS/CC) and AFRL Hardened Materials Branch (AFRL/RXPJ) shall participate as voting members when the military specific laser requires upgrades to existing LEP capabilities or otherwise requires integration with existing Life Support Equipment. (T-2)

4.2.3. For lasers (other than DEW) intended for joint use, the AF LSSRB shall collaborate with the other services' laser safety review boards and authorities under the Joint Service Laser Safety Review Process to harmonize test requirements, increase efficiency, and ensure that laser safety reviews result in one set of joint service findings. The AF LSSRB shall serve as the single AF point of official communication to the FDA for all issues associated with laser approvals and the FDA exemption process. The AF DEWSB shall perform the same roles for DEW intended for joint use as part of the Joint Service Weapon Safety Review Process. (T-0)

4.3. AF LSSRB Approval and DoD Exemption Process. To obtain a letter of approval and a DoD exemption notification (if applicable) from the AF LSSRB for any military specific laser the following criteria shall be met prior to acquisition, fielding, or the manufacturer’s sale of the device to the AF: (T-0)

4.3.1. The requesting organization shall submit on behalf of the manufacturer, through their MAJCOM (or equivalent), a request to HQ AFSEC/SEW for a letter of approval and DoD exemption notification (if applicable). The most likely requesting organization will be the MAJCOM Director of Operations (or equivalent). (T-0)

4.3.2. For military specific lasers in development, early interface with the HQ AFSEC/SEW is recommended to ensure appropriate safety input into system designs and operations to meet federal regulations and DoD requirements. HQ AFSEC/SEW should be involved prior to a Milestone C or COTS purchase review of the system to ensure no safety issues prevent Low- Rate Initial Production (LRIP). (T-0)

4.3.3. The requesting SPO, PEO or PM organization shall coordinate with an HQ AFSEC/SEW designated organization to have an independent laser system hazard evaluation conducted prior to submission to the AF LSSRB. (T-0)

4.3.4. The requesting organization shall provide the following to HQ AFSEC/SEW a minimum of 60 days prior to submission to the AF LSSRB: (T-0)

4.3.4.1. The independent laser system hazard evaluation;

4.3.4.2. CONOPs, CONEMPs, or TTPs;

4.3.4.3. System Technical Orders or manufacturer's use & maintenance instructions;

4.3.4.4. SOPs;

4.3.4.5. Description of system specific user training identifying primary and ancillary hazards associated with the military specific laser;

4.3.4.6. Justification for each design requirement for which a military specific laser cannot meet MIL-STD-1425A requirements;

4.3.4.7. Legal review. See **Paragraph 2.9**. (if necessary IAW AFI 51-402, Weapons Review);

4.3.4.8. Test results of development and/or operational testing (if applicable);

4.3.4.9. Additional health and safety data not included in the laser system hazard evaluation.

4.3.5. Once the AF LSSRB review is complete, the AF LSSRB Chair shall provide an approval or disapproval letter to the requesting organization. The AF LSSRB approval letter shall state whether a DoD exemption notification was issued. (T-0)

4.3.6. If a DoD exemption notification is issued for a military specific laser, a copy shall be provided to the manufacturer, and it is recommended the requesting organization maintain a copy. The AF LSSRB executive secretary will maintain records of all issued approvals for use and DoD exemption notifications. (T-0)

4.4. Laser Temporary Approval for Emergency Operational Capability (EOC).

4.4.1. If an EOC is requested by combatant commands, the requesting organization shall submit a laser temporary approval package to HQ AFSEC/SEW for expedited review by the AF LSSRB. The AF LSSRB will consider the urgency of the request and the completeness of technical review and documentation in its consideration of whether and for how long to grant temporary approval. (T-1)

4.4.2. The laser temporary approval package submitted to HQ AFSEC/SEW shall include as many of the following documents as practical: (T-1)

4.4.2.1. An HQ AFSEC/SEW approved Preliminary Hazard Analysis and MIL-STD-1425A Checklist;

4.4.2.2. CONOPs, CONEMPs, or TTPs for the intended use of the military specific laser;

4.4.2.3. SOPs;

4.4.2.4. Description of system specific user training identifying primary and ancillary hazards associated with the laser;

4.4.2.5. A Letter of Intended Evaluation by an HQ AFSEC/SEW approved organization, to document the requesting organization has scheduled an independent laser system hazard evaluation to ensure efforts are made to meet AF LSSRB approval requirements in conjunction with fielding the system under a waiver;

4.4.2.6. A letter from the requesting organization outlining the operational necessity, the scope of intended use, and period of time required for the temporary laser approval;

4.4.2.7. A copy of manufacturer's DoD exemption notification, issued by the AF LSSRB, granting the manufacturer the legal right to sell the military specific laser to the AF. If the device is FDA compliant, the requesting organization must provide the FDA accession number as proof that compliance has been certified by the FDA.

4.4.3. If approved, HQ AFSEC/SEW shall provide a temporary approval, with a termination date, to the requesting organization. After that date, if permanent approval or extended temporary approval has not been granted, AF personnel shall cease use of the laser. (T-1)

Chapter 4 (DYESS)

AIR FORCE APPROVAL OF LASERS AND LASER SYSTEMS

4.1. (DYESS) Establishment of Laser Safety Review Requirements.

4.1.2.1. (DYESS)(Added) Approval authority for the acquisition of all FDA-Compliant lasers or equivalent has been delegated to the appointed ILSO.

4.1.2.2. (DYESS)(Added) The Dyess AFB guidelines for acquisition of FDA-compliant (non-military specific) lasers and/or laser-containing products are as follows:

4.1.2.2.1. (DYESS)(Added) **Exemptions**: Certain general consumer FDA-compliant Class 1 or Class 2 lasers/laser-containing products used as intended by the manufacturer is exempt from the acquisition, review and use guidelines as stated in this supplement. Such exemptions include general laser pointers and products with embedded lasers such as laser printers and optical drive readers/writers (e.g., DVD burners). Industrial Class 1 or Class 2 laser-containing products with embedded Class 3B or Class 4 lasers used for cutting or etching surface materials are NOT exempt and will follow the guidelines. Consult the ILSO for other exemptions.

4.1.2.2.2. (DYESS)(Added) **Acquisitions**: the Resource Advisor shall ensure the potential purchase of lasers and laser-containing products will be submitted to the ILSO prior to authorizing purchase to ensure that safety and compliance are factored into the financial and operational planning. Units shall provide product information and anticipated operational procedures of the laser product to the ILSO as well as other information needed by the ILSO to properly evaluate the hazards. Expect 15 calendar days to process each request.

4.1.2.2.3. (DYESS)(Added) **Review**: the ILSO will review the information and, if needed, discuss the laser purchase with the Laser Safety Committee. Depending on the information at hand, the committee may instigate a number of safety/compliance measures including, but not limited to: initial and annual occupational health medical eye exams, prescribing laser eye protection, and may even recommend less hazardous systems if warranted. Per para 4.1.2.1.1, the ILSO is the approval authority for laser acquisitions for Dyess AFB.

4.1.2.2.4. (DYESS)(Added) **Use**: if approved, workplace supervisors and ULSO (if required) shall abide by the Laser Safety Evaluation provided by the ILSO, and shall coordinate a new evaluation if operational conditions change (e.g., power settings, laser system repairs/replacements, relocation, etc).

4.2. (DYESS)(Added) Approval authority has been delegated to the ILSO. Units must demonstrate how the benefits of the specific laser product outweigh the potential hazards to personnel.

4.3. (Added-DYESS) AF LSSRB Approval and DoD Exemption Process.

4.3.1. (DYESS)(Added) Ensure the ILSO is kept aware of the progress to acquire and use military specific laser on the installation. The ILSO will require a ULSO be appointed, if none exists, to coordinate safety and compliance efforts for the new system unless the ILSO

deems the system is inherently safe. Other specialized LSOs will be required which require specific training depending on the laser system.

THOMAS W. TRAVIS, Lt Gen, USAF, MC, CFS
Surgeon General

BRANDON D. PARKER, Col, USAF
Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

5 USC 552a (Public Law 93-579) – *Privacy Act of 1974*

AAPM Report No. 73, *Medical Lasers: Quality Control, Safety Standards, and Regulations*, Oct 2001

AFI 10-203, *Duty Limiting Conditions*, 15 Jan 2013

AFI 10-206, *Operational Reporting*, 6 Sep 2011

AFI 11-214, *Air Operations Rules and Procedures*

AFI 11-301, Volume 4, *Aircrew Laser Eye Protection (ALEP)*, 21 Feb 2008

AFI 13-112V1, *Joint Terminal Attack Controller (JTAC) Training Program*, 15 Feb 2008

AFI 13-112V2, *Joint Terminal Attack Controller (JTAC) Standardization/Evaluation Program*, 21 Feb 2008

AFI 13-212, *Range Planning and Operations*, 16 Nov 2007

AFI 33-360, *Communications and Information*, 25 Sep 2013

AFI 36-2226, *Combat Arms Program*, 24 Feb 2009

AFI 48-101, *Aerospace Medicine Operations*, 19 Oct 2011

AFI 48-123, *Medical Examinations and Standards*, 24 Sep 2009

AFI 48-145, *Occupational and Environmental Health Program*, 15 Sep 2011

AFI 63-101/20-101, *Integrated Life Cycle Management*, 7 Mar 2013

AFI 90-201, *The Air Force Inspection System*, 2 Aug 2013

AFI 90-801, *Environment, Safety, and Occupational Health Councils*, 25 Mar 2005

AFI 91-202, *The US Air Force Mishap Prevention Program*, 5 Aug 2011

AFI 91-203, *Air Force Consolidated Occupational Safety Instruction*, 15 Jun 2012

AFI 91-204, *Safety Investigations and Reports*, 12 Feb 2014

AFI 91-401, *Directed Energy Weapons Safety*, 5 Sep 2013

AFMAN 33-363, *Management of Records*, 1 Mar 2008

AFPD 48-1, *Aerospace Medicine Enterprise*, 23Aug 2011

AFPD 90-8, *Environment, Safety, and Occupational Health*, 2 Feb 2012

AFPD 91-4, *Directed Energy Weapons (DEW) Safety*, 21 Oct 2011

AFRL-SA-BR-SR-2008-0002, *USAFSAM Laser Injury Guidebook*

ANSI Z136.1-2014, *American National Standard for Safe Use of Lasers*

ANSI Z136.3-2011, *Safe Use of Lasers in Health Care Facilities*

ANSI Z136.4-2010, *Recommended Practice for Laser Safety Measurements for Hazard Evaluation*

ANSI Z136.6-2005, *Safe Use of Lasers Outdoors*

ANSI Z136.8 -2012, *American National Standard for Safe Use of Lasers in Research, Development, or Testing*

ANSI/NEMA Z535.4:2011, *Product Safety Signs and Labels*

DOD Directive 5400.11, *DoD Privacy Program*, 8 May 2007

DoDI 3216.02, Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research, 8 Nov 2011

DoDI 4160.21-M, *Defense Material Disposition Manual*, 18Aug 1997

DoDI 5000.02, *Operation of the Defense Acquisition System*, 8 Dec 2008

DoDI 5000.69, *DoD Joint Services Weapon and Laser System Safety Review Processes*, 9 Nov 2011

DoDI 6055.01, *DoD Safety and Occupational Health (SOH) Program*, 19 Aug 1998

DoDI 6055.05-M, *DoD Occupational Medical Examinations and Surveillance Manual*, 2 May 2007

DoDI 6055.15, *DoD Laser Protection Program*, 4 May 2007

DoDI 6490.03, *Deployment Health*, 11 Aug 2006

FAA Advisory Circular 70-1, *Outdoor Laser Operations*, 30 Dec 2004

FAA Advisory Circular 70-2A, *Reporting of Laser Illumination of Aircraft*, 8 Feb 2013

FDA Exemption No. 76EL-01, *Department of Defense Exemption from the FDA Performance Standard for Laser Products*, 1976

FDA Laser Notice No. 52, *Guidance on the Department of Defense Exemption from the FDA Performance Standard for Laser Products*, 12 Jul 2002

FAA Order JO 7400.2J, *Procedures for Handling Airspace Matters*, 22 Aug 2013

HAF Mission Directive (MD) 1-18, *Assistant Secretary of the Air Force (Installations, Environment and Logistics)*, 4 Mar 2009

IEC 60825–1 Edition 2.0, *Safety of Laser Products - Part 1: Equipment Classification and Requirements*, Mar 2007

IEC 60825–2-am1 Edition 3.0, *Safety of Laser Products - Part 2: Safety of Optical Fiber Communication Systems (OFCS)*, 9 Nov 2006

Joint Pub 1-02, *Department of Defense Dictionary of Military and Associated Terms*, 8 Nov 2010

Joint Pub 3-09, *Joint Fire Support*, 30 Jun 2010

Joint Pub 3-09.3, *Close Air Support*, 8 Jul 2009

Joint Space Operations Center, *Laser Clearinghouse Reports Handbook*,**(Contact LCH via VOICE: (U)** 805-606-1075/1282, DSN 276-1075/1282; FAX: (U) 805-606-1610, DSN 276-1610)

Mil Hdbk 828B, *Range Laser Safety*, 9 Mar 2011

MIL-STD-882E, *Department of Defense Standard Practice for System Safety*, 11 May 2012

MIL-STD-1425A, *Safety Design Requirements for Military Lasers and Associated Support Equipment*, 30 Aug 1991

NFPA Std 115, *Standard for Laser Fire Protection*, 2012

Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®), *American Conference of Governmental Industrial Hygienists (ACGIH®)*, 2014 Edition

Title 21, Code of Federal Regulations (21 CFR), *Food and Drugs, Subchapter J--Radiological Health, Part 1040 - Performance Standards for Light-Emitting Products*

Part 1040.10, *Laser Products*

Part 1040.11, *Specific Purpose Laser Products*

Uniform Code of Military Justice (UCMJ)

United States Air Force School of Aerospace Medicine (USAFSAM), *Bioenvironmental Engineers Guide for Lasers and Optical Radiation*

US Army TB Med 524, *Control of Hazards to Health from Laser Radiation*, Jan 2006

Adopted Forms

AF Form 55, *Employee Safety and Health Record*

AF Form 600, *Chronological Record of Medical Care*

AF Form 847, *Recommendation for Change of Publication*

Abbreviations andAcronyms

AAPM—American Association of Physicists in Medicine

ACC—Air Combat Command

ACGIH®—American Conference of Governmental Industrial Hygienists

AESG—Aeronautical Systems Group

AF—Air Force

AFIA—Air Force inspection Agency

AFLSSRB—Air Force Laser Systems Safety Review Board

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFMC—Air Force Materiel Command

AFMSA—Air Force Medical Support Agency

AFOSH—Air Force Occupational Safety and Health

AFPD—Air Force Policy Directive

AFRC—Air Force Reserve Command

AFSAS—Air Force Safety Automated System

AFSC—Air Force Specialty Code

AFSEC—Air Force Safety Center

ANG—Air National Guard

ANSI—American National Standard Institute

BE—Bioenvironmental Engineering

CFR—Code of Federal Regulation

CCMD—Combat Command

CONEMPS—Concepts of Employment

CONOPS—Concepts of Operations

COTS—Commercial Off the Shelf

DEW—Directed Energy Weapon

DEWSB—Directed Energy Weapon Safety Board

DOD—Department of Defense

DODI—Department of Defense Instruction

DRU—Direct Reporting Units

EOC—Emergency Operational Capability

ESOH—Environmental, Safety, and Occupational Health

FAA—Federal Aviation Agency

FDA—Food and Drug Administration

FOA—Field Operating Agency

FSO—Flight Surgeon's Office

HAF—Headquarters Air Force

HQ—Headquarters

IAW—In Accordance With

ICNIRP—International Commission on Non-Ionizing Radiation Protection

IEC—International Electrotechnical Commission

IEEE—Institute of Electrical and Electronics Engineers

ILSO—Industrial Laser Safety Officer

IPE—Individual Protective Equipment

JA—Judge Advocate

LCH—Laser Clearinghouse

LEP—Laser Eye Protection

LRIP—Low-Rate Initial Production

LSO—Laser Safety Officer

MAJCOM—Major Command

MD—Mission Directive

MILES—Multiple Integrated Laser Engagement System

MIL-HDBK—Military Handbook

MIL-STD—Military Standard

MPE—Maximum Permissible Exposure

MTF—Military Treatment Facility

NDI—Non-Developmental Item

NFPA—National Fire Protection Association

NHZ—Nominal Hazard Zone

nm—Nanometer

NOHD—Nominal Ocular Hazard Distance

NSHD—Nominal Skin Hazard Distance

OD—Optical Density

OEH—Occupational and Environmental Health

OEHWG—Occupational and Environmental Health Working Group

OI—Operational Instruction

OJT—On the Job Training

ORM—Operational Risk Management

OSHA—Occupational Safety and Health Administration

PEO—Program Executive Officer

PH—Public Health

PHA—Preliminary Hazard Analysis

PM—Program Manager

PPE—Personal Protective Equipment

PTR—Primary Training Range

RDS—Records Disposition Schedule

RDT&E—Research, Development, Test & Evaluation

ROA—Range Operating Authority

SAF—Secretary of the Air Force

SEG—Safety

SOP—Standard Operating Procedure

SPO—System Program Office

SSN—Social Security Number

STANAG—Standardization Agreement

STD—Standard

TLV®—Threshold Limit Value

TO—Technical Order

TTP—Tactics, Techniques, and Procedures

USAF—United States Air Force

USAFSAM—United States Air Force School of Aerospace Medicine

USD (AT&L)—Under Secretary of Defense for Acquisition, Technology, and Logistics

USSTRATCOM—United States Strategic Command

Terms

Critical Zone—Volume of airspace where visual interference by a visible laser beam would compromise safety due to interruption of necessary performance of critical tasks.

Directed Energy Weapon—A weapon system using directed energy primarily as a direct means to deny, disrupt, degrade (damage), or destroy enemy equipment, facilities, or personnel. Note that this differs slightly from the Joint definition by including deny and disrupt in order to cover additional systems and capabilities.

Glare—Obscuration of an object in a person's field of vision due to a bright light source located near the same line of sight.

High Energy Laser—For this instruction, a laser that have output power greater than 1 kilowatt (kW) for longer than a second or output energy greater than 1 kilojoule (kJ) per pulse.

Laser—An acronym for Light Amplification by Stimulated Emission of Radiation. Any device that can be made to produce or amplify electromagnetic radiation in the x-ray, UV, visible, and infrared or other portions of the spectrum by the process of controlled stimulated emission of photons.

Laser Free Zone—A designated area or volume of airspace where any extraneous visible optical radiation could interfere with safety.

Laser Safety Officer—An individual designated in writing whom is responsible for implementing a laser safety program and enforcing control of laser hazards within their area of responsibility.

Maximum Permissible Exposure (MPE)—The level of laser radiation to which a person may be exposed without hazardous effect or adverse biological changes in the eye or skin.

Military Specific Lasers—Lasers designed for actual combat, combat training operations, or classified in the interest of national security. Exempted from FDA requirements of 21 CFR, Parts 1040.10 and 1040.11.

Nominal Hazard Zone (NHZ)—The space in which laser radiation during operations exceeds the applicable MPE including direct beam and reflected beams. Personnel within this zone shall be provided PPE (e.g., LEP) and training for its use.

Nominal Ocular Hazard Distance (NOHD)—The distance from the output aperture along beam propagation beyond which irradiance or radiant exposure is not expected to exceed the appropriate MPE for unobstructed viewing by the human eye. The NOHD may increase with the use of aided viewing.

Nominal Skin Hazard Distance (NSHD)—The distance from the output aperture along beam propagation beyond which irradiance or radiant exposure is not expected to exceed the appropriate MPE for unobstructed exposure to the skin.

Shall—The word *shall* is to be understood as mandatory.

Should—The word *should* is to be understood as advisory.

Sensitive Zone—All areas outside the critical zone(s) that flight or range operations have identified as needing protection due to high visual workload. The sensitive zone may or may not be contiguous or concentric with a critical zone.

Threshold Limit Value (TLV®)—For visible, near-infrared, and UV radiation, TLVs® represent conditions under which it is believed that nearly all workers may be exposed without adverse health effects. Values should be used only as guides in the control of exposures and should not be regarded as fine lines between safe and dangerous levels

Visual Interference Level—A visible laser beam, with irradiance less than the MPE can produce a visual response that interferes with the safe performance of sensitive or critical tasks by aircrews or other personnel. This level varies in accordance with the particular zone the laser is operating in and where it is directed. Zones include laser-free, critical and sensitive.

ATTACHMENT 2 (Added-DYESS)

APPOINTMENT LETTER AND THE ROLE OF THE INSTALLATION LASER SAFETY OFFICER

Figure A2.1. (Added-DYESS) Appointment Letter and the Role of the Installation Laser Safety Officer, Pg 1

The appointment of this specialized installation safety officer should be transparent to the installation. This is a comprehensive appointment letter to inform Unit Commanders of roles, and provide situational awareness. This may be amended by the ILSO and or Installation Commander as needed.

(7 BW Letterhead)

To All Unit Commanders,

1. In accordance with AFI 48-139, Laser and Optical Radiation Protection Program, I appoint the following personnel to the roles of the Installation Laser Safety Officer (ILSO) for Dyess AFB. The ILSO is charged with the Installation Laser and Optical Radiation Safety Program as detailed in the Dyess Supplement to AFI 48-139 available on the Air Force e-publishing website.

   Primary ILSO: Rank First Name Last Name, Contact Number, Office Symbol

   Alternate ILSO: Rank First Name Last Name, Contact Number, Office Symbol

2. The ILSO has the authority to: 1) approve/disapprove non-military laser acquisitions, 2) suspend installation operations that pose a significant health risk to personnel, are in clear violation, or can negatively impact operations, materiel or real estate. Per Dyess Supplement 48-139, the ILSO is the approving authority for acquisition of FDA-compliant lasers.

3. Attached you will find the mandatory briefing to Unit Commanders. Direct all questions to the appointed ILSO.

BRANDON D. PARKER, Col, USAF
Commander, 7th Bomb Wing

Attached: Briefing to Unit Commanders

Figure A2.2. (Added-DYESS) Appointment Letter and the Role of the Installation Laser Safety Officer, Pg 2

cc:
7 AMDS/SGPB (ILSO)
7 BW/SE

ATTACHMENT 2: Appointment Letter and the Role of the Installation Laser Safety Officer (cont'd)

Briefing to Unit Commanders:

Laser and optical radiation sources such as ultraviolet radiation, highly focused beams of light, and high intensity light are an increasing part of our society, and pose a threat to air operations and the optical health of our Airmen. Often invisible and capable of producing a range of eye injuries from immediate/painful to delayed/unnoticed, laser hazard education and preparation is the best means of protecting our personnel and our mission. The following are highlights from Dyess Supplement 48-139 that will best assist you in protecting our Airmen:

1. Acquisitions of laser systems shall be pre-coordinated with the ILSO. Commercially available systems are: laser etchers/cutters, range finders, atmospheric monitors, laser targeting devices, and bird control devices. Military lasers, including directed energy weapons, must be approved at the Air Force level. The ILSO may be contacted for approval documentation for Air Force approved systems, and will aid in the approval of new systems.

2. If required by Dyess Supplement 48-139, establish a Unit Laser Safety Officer (ULSO) who will be trained by, and liaison with, the ILSO. Appointees should be familiar with the laser systems in the organization, and properly authorized to halt unsafe activities.

3. There are many devices that look like laser pointers but are powerful enough to cause damage to human tissue. Any hand-held lasers rated at Class 3B, Class 4, or any Class laser with power output levels greater than/equal to 5 mW shall be removed immediately, and the ILSO shall be consulted prior to re-use.

4. If you feel the need is pertinent to your Unit, disseminate Dyess Supplement 48-139 to your flight commanders. The appointed ILSO are available for any questions/concerns at: 325-696-2325 or by email at 7MDG.Bioenvironmental@us.af.mil.

Figure A2.3. (Added-DYESS) Appointment Letter and the Role of the Installation Laser Safety Officer, Pg 3

For your situational awareness:

1. Dyess AFB has several Class 4 systems (highest hazard rating). The B-1B and C-130J have systems that could be fired on the flightline for testing and/or maintenance. Personnel who access the flightline should be aware of when these activities either through the Maintenance Operations Center or the Air Tower, and should heed any laser safety hazard warnings on the flightline.

2. There is an increasing number of Class 4 lasers that are available to even the average consumer. These range from cheap laser etchers to hand-held enthusiast products. Such devices do not have the engineering safety controls that industrial companies design into their products. Unit requests to purchase such low-cost devices have a high chance of acquisition disapproval, or will require substantial engineering control costs and the use of expensive laser PPE.