BY ORDER OF THE COMMANDER
RAMSTEIN AIR BASE (USAFE)

RAMSTEIN AIR BASE INSTRUCTION

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Aerospace Medicine

CONSOLIDATED RADIATION SAFETY AND CONTROL PROGRAM

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This instruction establishes the protection requirements necessary for the safe use of RAM and RPDs. A properly managed radiation protection program will minimize the incidence of exposures to radiation to workers and the public; ensure a knowledgeable workforce exists; and maintain safety and compliance with all federal, DoD, Air Force, and host-nation regulations. This instruction provides guidance, procedures, precautionary measures, and responsibilities for the control of radioactive materials (RAM) and radiation-producing devices (RPDs). It applies to all activities on Ramstein Air Base, tenant units, and geographically separated units (GSUs) as well as contractors who possess, use, handle, store, or bring radiation sources onto the installation. This publication applies to all civilian employees and uniformed members of the Department of Defense where personnel have duties that involve performing or supervising work in areas where exposures to ionizing and non-ionizing radiation may occur. It also applies to persons not occupationally exposed (members of the general public) to the extent that it addresses controls to protect the public from the potential hazards from sources of ionizing and non-ionizing radiation owned and/or operated by the Air Force. This instruction does not apply to the exposure of medical patients during diagnostic or therapeutic procedures, nor does it apply to exposures of personnel to ionizing radiation resulting from the employment of nuclear or thermonuclear weapons in combat. This publication incorporates Air Force Manual (AFMAN) 48-148, *Ionizing Radiation Protection;* AFMAN 40-201, *Radioactive Materials Management*; Air Force Specialty Code 4B051 Bioenvironmental Engineer's Guide to Ionizing Radiation; DAFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*; T.O. 33B-1-1, *Nondestructive Inspection Methods, Basic Theory*; AFI 48-139, *Laser and Optical Radiation Protection Program*; American National Standards Institute

Z136.1, *Safe Use of Lasers*; AFI 48-109, *Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program*; and the ALARA (As Low As Reasonably Achievable) concept, 10 C.F.R. 20.1003, for exposures to ionizing radiation (e.g., RAM or RPDs. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 through the appropriate installation's chain of command. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) DAFI 90-160, *Publications and Forms Management*, and disposed of IAW Air Force Records Disposition Schedule (RDS). This publication requires the collection and/or maintenance of information protected by the Privacy Act of 1974 authorized by Department of Defense Directive (DoDD) 5400.11, *DoD Privacy Program*. The Systems of Records Notice (SORN) for the United States Air Force Master Radiation Exposure Registry is F044 AF SG O. The authority to collect and maintain the records prescribed in this publication is DODI 6055.08, *Occupational Ionizing Radiation Protection Program*. Ensure all records generated as a result of processes prescribed in this publication adhere to AFI 33-322, Records Management and Information Governance Program, and are disposed in accordance with the Air Force Records Disposition Schedule, which is located in the Air Force Records Information Management System. Compliance with the attachments in this publication is mandatory. Submit requests for waivers to the publication OPR (the Installation Radiation Safety Officer or Installation Laser Safety Officer in the Bioenvironmental Engineering Flight) for non-tiered compliance items. Failure to observe prohibitions and mandatory provisions of this directive in paragraphs **6.4** and **6.5** by military personnel is a violation of Article 92, Uniform Code of Military Justice. Violations may result in administrative disciplinary action without regard to otherwise applicable criminal or civil sanctions for violations of related laws.

SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. Major changes include: updates from newly published regulations including: AFMAN 48-148, *Ionizing Radiation Protection,* AFI 48-139, *Laser and Optical Radiation Protection Program,* AFMAN 40-201, *Radioactive Materials (RAM) Management,* DAFMAN 48-125, *Personnel Ionizing Radiation Dosimetry* and AFI 48-109, *Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program*. In addition to removal of the Radiation Safety Officer Liaison position.

Chapter 1

OVERVIEW

1.1. Purpose. This instruction establishes the protection requirements necessary for the safe use of RAM and RPDs. A properly managed radiation protection program will minimize the incidence of exposures to radiation to workers and the public; ensure a knowledgeable workforce exists; and maintain safety and compliance with all federal, DoD, Air Force, and host-nation regulations.

1.2. Scope. This instruction provides the responsibilities and requirements for an effective radiation protection program for those who work with and around ionizing or non-onizing radiation. In addition, it provides procedures to ensure the public's safety when near radiation. Ionizing radiation requirements apply to x-ray emitting devices, all items on Ramstein AB requiring a radioactive permit or classified as a generally licensed device (GLD), and all areas that procure/transport/store such items. Non-ionizing radiation requirements apply to Class 3B and 4 lasers, and electromagnetic frequencies of 3 kHz to 300 GHz.

Chapter 2

ROLES AND RESPONSIBILITIES

2.1. The Commander, 86th Airlift Wing shall:

2.1.1. Designate, in writing, a qualified individual to serve as the Installation Radiation Safety Officer (IRSO) and Installation Laser Safety Officer (ILSO) IAW AFMAN 48-148 and AFI 48-139.

2.1.2. Delegate authority to the IRSO/ILSO to suspend installation operations involving the operation of radiation producing devices, materials, or lasers that pose a significant health risk to personnel, are in clear violation or regulations or requirements, or can negatively impact AF operations, materiel, or real estate.

2.2. Installation Radiation or Laser Safety Officer (IRSO/ILSO) shall:

2.2.1. Serve as central point of contact for all requests to use RAM or RPDs, including those by contractors.

2.2.2. Initiate, supervise, and execute Ramstein AB's Radiation Safety Program providing the following support:

2.2.2.1. Be the sole authority for contacting HQ USAFE/SGPB, USAF Radioisotope Committee (RIC), regarding reportable events.

2.2.2.2. Ensure that Unit Radiation or Laser Safety Officers (URSOs or ULSOs) are assigned and adequately trained with annual refresher training for all units that may use, possess, or come in contact with ionizing/non-ionizing radiation.

2.2.2.3. Provide oversight of all permit and unit radiation programs to ensure all federal, DoD, Air Force, installation, and host-nation requirements relating to radiation safety are met.

2.2.2.4. Maintain a listing of hazardous radiation producing devices to include at a minimum: system nomenclature, hazard classification, unit owning the device, unit point of contact (name, DSN, bldg.), physical location, and list of current controls if applicable. This inventory will be updated and maintained regularly in the Defense Occupational and Environmental Health Reporting System (DOEHRS).

2.2.2.5. Investigate the loss, theft, or spill of RAM, and all real or suspected overexposure incident to radiation and report to the RIC portions that involve AF involvement if applicable.

2.2.2.6. Suspend any operation which, in the professional judgement of the IRSO/ILSO, poses a substantial radiation hazard to personnel or the environment. A report of such actions will be made to the installation commander.

2.2.3. Verify that the contracting unit (700 CONS) has updated contact information for the IRSO/ILSO when a new appointment letter is signed.

2.2.3.1. Coordinate with ULSOs and 700 CONS prior to the acquisition of laser devices to ensure the device is FDA compliant if it is not a military specific system with an Air Force Laser System Safety Review Board (LSSRB) approval letter.

2.2.4. Meet with Ramstein's Spectrum Manager (86 CS) annually to review the accuracy and update the installation/geographically separated unit (GSU) inventory for Electromagnetic Frequency (EMF) emitters.

2.2.5. Review design plans for facilities to be used for RAM or RPDs that could require shielding and provide preliminary hazard evaluations.

2.2.6. Coordinate disposal of radioactive waste through the Air Force Radioactive, Recycle, and Disposal (AFRRAD). Once approval is received from AFRRAD, the IRSO will maintain the requests until the items are removed from the Radioactive Material Management Information System (RAMMIS) inventory and approved by the RIC

2.3. The Unit Commander shall:

2.3.1. Ensure unit personnel who receive, possess, distribute, use, transfer, or dispose of RAM, Electromagnetic Frequency Radiation (EMFR) devices, and optical radiation producing devices observe the requirements of this instruction, federal, local, and USAF policies and regulations.

2.3.2. Appoint the following positions that apply (coordinate with the IRSO/ILSO for templates if applicable) and send a copy of the appointment letter to the IRSO/ILSO in the 86 OMRS/SGXB (**usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) or include while routing. 2.3.2.1. Permit Radiation Safety Officer (PRSO) as required by AFMAN 40-201. The PRSO must be a member of the using organization and meet education and experience requirements in **Paragraph 3.9 of AFMAN 40-201.**

2.3.2.2. ULSO for units using or possessing American National Standards Institute (ANSI) Class 3B or 4 lasers.

2.3.2.3. URSO if their unit or workplaces use and/or possess RAM, RPDs, or GLDs.

2.3.2.4. Unit Device Officer (UDO) for units with EMFR emitters/receivers (high power emitters) with coordination through the IRSO.

2.3.3. The individuals appointed by the unit commander will be the IRSO/ILSO's point of contact for their respective materials, devices, and instruments.

2.3.4. Delegate the authority to the ULSO to suspend lasers operations within their work center that pose a significant health risk to personnel, are in clear violation of regulations or requirements, or can negatively impact Air Force operations, materials or real estate. For suspension of RPD or RAM operations, consult with the IRSO.

2.3.5. Provide immediate notification to the IRSO of suspected, attempted or actual theft or sabotage of RAM, to include any situation where the potential for collateral damage exists due to threats in proximity to RAM.

2.4. The 700th Contracting Squadron shall:

2.4.1. Ensure that all contracts contain the terms and conditions the IRSO or ILSO has determined must be in the contract (IAW AFMAN 40-201 Paragraph, 3.4.4.2.) for managing RAM in the Air Force and for the acquisition of FDA-compliant lasers. For contractors, these requirements must be included in the statement of work. Contractors will include a current USNRC Materials License (NRC Form 374) or host nation equivalent; leak test report if applicable for the contractor's equipment; equipment information (serial no. calibration dates,

etc.); personnel certified to use the equipment including their training dates; and applicable Radioactive Materials License. This will include the requirement that non-Air Force organizations, including other DoD organizations; Department of Energy (DoE) organizations; DoE prime contractors; and other contractors or local nationals that need to use RAM either licensed by the Nuclear Regulatory Commission (NRC) or an Agreement State on the installations, have one of the following:

2.4.1.1. An NRC or agreement state license. A copy of the NRC Form 241, NRC Reciprocity Form or equivalent, must be an adjunct to the agreement state license for those areas of exclusive federal jurisdiction in agreement states. For those areas of concurrent or proprietary jurisdiction in an agreement state, then the respective agreement state license is a valid authorization.

2.4.1.2. Written certification from DoE organizations or DoE prime contractors that they are exempt from NRC license requirements.

2.4.1.3. Written approval from IRSO/ILSO to transfer, transport, or use temporary storage areas for RAM on the installation.

2.4.2. In coordination with IRSO, and in accordance with the terms and conditions of the contract, suspend contractor operations that violate AFMAN 40-201, Radioactive Materials (RAM) Management, a permit or license, federal, or state regulations until corrective action is taken**.**

2.5. The 86th Logistics Readiness Group (Transportation Management) shall:

2.5.1. Prepares and transports RAM shipments in accordance with 10 CFR 71, Packaging and Transportation of Radioactive Material; 49 CFR, Transportation; Agreement Concerning the International Carriage of Dangerous Goods by Road sub-section 1.7.6.1 (b); Defense Transportation Regulation (DTR) DoD 4500.9-R-Part II, Cargo Movement; and RABI 23-104, Road Transportation of Hazardous Material On and Off Ramstein AB, as applicable.

2.5.2. Ensure personnel performing transportation operations (e.g., receipt, shipment, packaging) of RAM comply with requirements specified in **Paragraph 49**. CFR 172.704 and DTR DoD 4500.9-R-Part II.

2.5.3. Does not transfer any RAM to units on the installation without prior coordination with IRSO and local national authorities, if applicable. Permitted RAM will not be transferred to any organizations without an up-to-date permit, a PRSO, or the proper identification of radionuclide/quantities of material/devices as authorized on the permit.

2.5.4. Develop and implements procedures to prevent the unauthorized transfer of RAM/items containing RAM, or any item of suspect through the Defense Logistics Agency Disposition Services (DLADS) system. Establish procedures to notify IRSO in the event of an incident(s) or the need to perform radiological survey(s) of material that has been identified by DLADS as potentially containing radioactive and/or components.

2.5.5. Ensure RAM is stored in a secured and properly marked vehicle.

2.6. The 86th Airlift Wing Command Post shall:

2.6.1. Ensure IRSO, ILSO, Bioenvironmental Engineering Flight, and Flight Medicine are notified immediately if any suspected exposure to radiation, lasers, or EMF is reported including aircraft or aircrew incidents.

2.7. The 86th Operational Medical Readiness Squadron:

2.7.1. The Bioenvironmental Engineering (BE) Flight shall:

2.7.1.1. Assist the IRSO/ILSO in management of the Ramstein Air Base Radiation Safety Program outlined in **Paragraph 2.2.2** of this instruction

2.7.1.2. Coordinate with Civil Engineering, Emergency Management, and Fire Department on base emergency response plans and checklists related to radiation.

2.7.1.3. Provide radiation safety training and materials for URSOs and for users of RAM and RPDs through as low as reasonably achievable (ALARA) training. Approve radiation safety training plans for training provided by others, such as PRSOs.

2.7.1.4. Conduct the installation radiation dosimetry program in accordance with federal, DoD, Air Force, and foreign requirements.

2.7.2. Ramstein Air Base, Flight and Operational Medicine Flight shall:

2.7.2.1. Conduct pre-employment and termination medical examinations of civil service employees and Air Force personnel who may be routinely exposed to ionizing radiation.

2.7.2.2. Coordinate with Public Health (PH) and Optometry to ensure pre-employment and termination eye exams are performed for personnel in work centers with Class 3B and 4 lasers.

2.7.2.3. Document all examinations in individual medical records.

2.8. The Permit Radiation Safety Officers, Unit Radiation Safety Officers, Unit Laser Safety Officers, and Unit Device Officers shall:

2.8.1. Maintain and update an inventory of all permits, lasers, RAM, GLDs, and radiation producing devices, respectively, within the organization. Verify the inventory annually. The IRSO/ILSO will be contacted when changes occur.

2.8.2. Remain responsible for any GLDs within the unit by

2.8.2.1. Preserving all labels affixed to the device recognizing the radiation isotope and follow all instructions on the label.

2.8.2.2. Ensuring the device is not transferred to another organization until transfer is approved and coordinated with IRSO.

2.8.2.3. Ensuring maintenance only be completed by the manufacturer of the product. If shipping of device is required, will contact IRSO.

2.8.2.4. Ensuring that GLDs are properly disposed.

2.8.3. Remain responsible for lasers and EMF by

2.8.3.1. Enforcing all safety requirements regarding hazard Class 3B and 4 lasers operated by their unit, to include conducting and documenting initial and annual training regarding

the proper use of lasers and the hazards of lasers. The ILSO can assist with development of training material.

2.8.3.2. Assisting the unit commander in developing policies and procedures for non-ionizing radiation in accordance with federal, DoD, and Air Force regulations.

2.8.3.3. Reporting all suspected laser or EMF exposures to the unit commander and installation radiation/laser safety officer.

2.8.3.4. Understand and enforce the requirements in **Attachment 2** of this instruction pertaining to contractors bringing RAM onto Ramstein Air Base or any of its GSUs and tenant organizations.

2.9. The Workplace Supervisors shall:

2.9.1. Protect the health and safety of personnel by ensuring all operations involving ionizing and non-ionizing radiation adhere to all radiation safety instructions, technical orders, and workplace operating instructions.

2.9.1.1. Notify the BE Flight when a female that is exposed to ionizing radiation becomes pregnant.

2.9.2. Ensure any planned changes in laser operations are coordinated with their respective ULSO to include procurement of lasers. The ULSO will then coordinate with ILSO prior to becoming operational.

2.9.3. Aid the URSO, ULSO, and/or PRSO in ensuring required warning signs, safety devices, and personal protective equipment (PPE), as recommended/required by IRSO, are functional and properly worn or placed before beginning work.

2.10. The Individuals shall:

2.10.1. Learn and implement the rules of radiation safety as described in applicable federal, state, Air Force, and Ramstein AB instructions as well as in organizational operating instructions.

2.10.2. Perform all duties to keep radiation exposures ALARA.

2.10.3. Wear personal monitoring devices if directed by their supervisors and IRSO.

2.10.4. Wear appropriate protective clothing and equipment as prescribed by supervisors and IRSO.

2.10.5. Report incidents, accidents, and hazardous conditions immediately to their supervisors.

2.10.6. Do not override engineering controls, modify PPE, tamper with radiation dosimeters or purposely expose radiation dosimeters to radiation or RAM.

2.10.7. Inform their supervisors of any changes in equipment, procedures, or other factors involving RAM or RPDs that may alter the radiation safety practices or radiation levels in unrestricted areas.

Chapter 3

RADIOACTIVE MATERIAL (RAM).

3.1. RAM are materials whose nuclei, because of their unstable nature, decay by emission of ionizing radiation. The radiation emitted may be alpha or beta particles, gamma or x-rays, or neutrons. If supervisors suspect or have RAM, contact the IRSO immediately to determine requirements.

3.2. The IRSO will maintain and update, semiannually, RAM inventories in RAMMIS, to include NRC specifically licensed RAM, GLDs, RIC permitted RAM, and any other type of RAM specified by the RIC which is utilized by DoD activities and organizations or in facilities for which the installation commander is responsible.

3.3. RAM Storage.

3.3.1. Keep all RAM in a RAM storage area or a locked enclosure separate from other items to ensure personnel not familiar with RAM are not accidentally exposed to ionizing radiation. Proper storage techniques and labeling requirements are outline in 10 CFR Part 20 Subpart I.

3.3.2. Facility managers will request a survey from the IRSO 14 days prior to the expected usage date of the facility.

3.3.3. A storage area from which RAM has been permanently removed must be surveyed by the IRSO/BE and written clearance must be received before the area is repurposed.

3.4. RAM Movement.

3.4.1. Personnel must account for the location of RAM and prevent the movement of RAM to unauthorized persons or locations without appropriate handling or storage facilities. Notify the IRSO if you plan to move RAM within or off the installation.

3.4.1.1. RAM may only be moved off the installation by authorized transporters. Contact the IRSO immediately if RAM movement is needed.

3.4.1.2. Transport RAM off installation only in adequately shielded and authorized containers per Department of Transportation (DOT) regulations (49 CFR Part 173 Subpart I).

3.4.1.3. All users must have proper survey instruments when transporting RAM. Refer to **Attachment 3** or ask BE for assistance.

3.5. RAM Permit Requests, Renewals, Amendments, and Terminations.

3.5.1. Initial applications for permits are prepared and submitted through the IRSO (DSN 479-2220 or by email **usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) to the Radioisotope Committee Secretariat (RICS) with a courtesy copy to the USAFE/SGXB. The requestor will prepare the application in accordance with Paragraph 3.4 of AFMAN 40-201.

3.5.2. USAF RAM Permits are issued with expiration dates and must be routed through the IRSO at least 60 days prior to the expiration date if the organization wishes to renew their permit.

3.5.3. Requests for amendments to an organization's RAM permit must be submitted through the IRSO to the RICS with a courtesy copy to the USAFE/SGPB and follow the guidelines listed in Paragraph 3.4.3.1 of AFMAN 40-201.

3.5.4. If permitted operations cease, the Permittee must initiate decommissioning operations within two years of the date when use of the permitted operation stops. See paragraph 3.11.4 of AFMAN 40-201 for guidelines on decommissioning a RAM permit.

3.5.5. Template permits are issued for devices or applications that pose relatively little radiological risk and employ standardized permit conditions.

3.6. Records shall be retained for the receipt, storage, distribution, use, transfer, disposal and incident involving permitted or licensed RAM in accordance with criteria in 10 CFR Parts: 19 (notices, instructions, and reports to workers), 20 (radiation protection standards), 21 (defects and noncompliance), 30 (byproduct material), 31 (general byproduct license), 32 (specific byproduct license), 33 (broad scope byproduct license), 34 (industrial radiography), 35 (medical use), 36 (irradiators), 37 (increased controls), 40 (source material license), 51 (environmental protection), 70 (special nuclear material license), 71 (transportation), and 74 (control/accounting of SNM); and, as implemented in **https://www.my.af.mil/afrims/afrims/afrims/rims.cfm**.

3.7. Generally Licensed Devices (GLDs).

3.7.1. The NRC or agreement state issues a general license to acquire, receive, use, store, or transfer certain devices that contain RAM which have been manufactured, tested, and labeled by the manufacturer in accordance with the specifications contained in a specific license issued to the manufacturer by the NRC. These devices are labeled as being generally licensed. GLDs do not require a template permit.

3.7.2. GLDs shall be purchased using Defense Federal Acquisition Regulations, assigned a National Stock Number, and registered in the Federal Logistics Information System and Hazardous Material Information Resource System. Local purchase of these devices is strongly discouraged. In either case, devices shall be registered in the Air Force logistics system and identified as radioactive. IRSO will be notified prior of purchase.

3.7.3. GLDs will be leak tested at least every six months. The BE Flight will coordinate with shop to perform leak tests.

3.7.4. GLDs must not be stored without use for more than 2 years. Unused GLDs shall be reported to IRSO.

3.7.5. The URSO and IRSO will ensure that GLDs are disposed of in accordance with AFMAN 40-201, Radioactive Materials (RAM) Management. GLDs will not be taken to DLADS for disposal.

3.8. Radiation Monitoring Equipment.

3.8.1. Radiation survey meters used for determining compliance with Air Force instructions and federal regulations must be calibrated according to American National Standards Institute guidance at intervals not to exceed one year. Calibration records shall be kept in accordance with AFMAN 40-201, Radioactive Materials (RAM) Management.

Chapter 4

IONIZING RADIATION.

4.1. Ionizing radiation exposures must be maintained below the limits published in 10 CFR 20 Subpart C and kept ALARA. BE will assist shop supervisors and personnel in identifying areas and conducting surveys where ionizing radiation hazards may exist.

4.2. Modifications and construction plans for facilities intended for use with operations involving ionizing radiation or RAM must be coordinated with the IRSO.

4.3. Any incident in which personnel suspect or are potentially exposed to ionizing radiation in excess of exposure limits must be immediately reported to the IRSO located at the BE Flight (Building 2182, DSN 479-2220). Exposure incidents that occur during non-duty hours will be reported to the BE Flight's on-call phone (0172-825-5547).

Chapter 5

PERSONNEL RADIATION DOSIMETRY.

5.1. Enrollment in the radiation dosimetry program is required for individuals who are occupationally exposed to ionizing radiation measured or calculated to exceed 1 mSv (100 mrem) total effective dose equivalent within a year or as determined by the IRSO.

5.2. General Guidelines.

5.2.1. Newly assigned personnel or visitors will provide the required information to the IRSO, receive training from the BE flight on placement and storage of the member's dosimeters, and sign a statement of understanding for entry into the dosimetry program. This includes the worker's social security number, prior work history regarding radiation, and verification of initial training. Failure to provide this information will prevent the worker from working in radiation areas.

5.2.2. Dosimeters will be exchanged by the BE Flight quarterly. Pregnant individuals will be enrolled on the monthly monitoring program.

5.2.3. Annually, the BE Flight will provide the worker their yearly cumulative dose record. This form will be signed by IRSO and individual. The form will be maintained within the BE Flight and the individual's medical record. The IRSO shall retain the Form 1527-1 for a period of five years.

5.3. BE will be notified if a member on the dosimetry program is going on a TDY or deployment at least 30 days before departure or upon notification.

5.4. The IRSO will initiate and conduct an investigation if dosimeter results are at or above local investigation action levels (25 mrem for pregnant workers and 125 mrem for non-pregnant workers). Exceeding these limits does not mean the individual is overexposed.

5.5. Personnel participating in a radiological response operation will be supplied electronic personal dosimeters by the IRSO and have their dose included within the individual's MRER.

Chapter 6

LASER SAFETY PROGRAM.

6.1. The American National Standards Institute (ANSI) Z136. 1 classifies lasers based on the type of hazards present and according to the extent of safety controls required. Classes range from the least hazardous, Class 1, to the most hazardous Class 4 and are categorized as either military specific, research, or FDA Compliant based on use.

6.1.1. The ILSO approves all use of lasers, Class 3B or 4, on the installation, this approval must be gained before purchasing or bringing any new systems on base.

6.1.2. ILSO must be notified of any unit owning, operating, or purchasing a Class 3B or 4 laser, for addition to base laser inventory. The laser classification is typically labeled on the equipment or in the manual. The BE Flight will routinely assess and document potential laser hazards in industrial workplaces in accordance with their surveillance schedule.

6.2. Laser Safety Training and Controls.

6.2.1. Appointment of a unit laser safety officer (ULSO) is required for units with a Class 3B and 4 lasers. Initial and annual refresher training of the ULSO will be performed by the ILSO and documented on the AF Form 55, or an equivalent computer-generated product.

6.2.2. Controls

6.2.2.1. Enclosure of the laser equipment or beam path is the preferred method of control because the enclosure will isolate or minimize the hazard. Though enclosure is the optimal method of control, this may not be practical for some systems and facilities (i.e., laser ranges and laser pointers).

6.2.2.2. Standard operation procedures (SOPs) will be required for units with Class 3B or 4 lasers. The ULSO will work with the ILSO and workplace supervisor to ensure all the procedures and other controls are both appropriate and reasonable for the work performed.

6.2.2.3. ILSO will recommend the appropriate laser protective eyewear and skin protection, if required, for each laser system. Not all lasers will require protective eyewear. There is no single eyewear adequate for all lasers. Users will not utilize nor purchase protective eyewear not certified for use by ILSO.

6.2.3. Laser Safety Committee. Installations with three or more units using Class 3B and/or Class 4 FDA Compliant or military specific lasers may establish a laser safety committee if deemed necessary by the ILSO based on a hazard assessment.

6.3. Medical Surveillance.

6.3.1. BE will identify populations with Class 3B or 4 lasers to the Occupational and Environmental Health Working Group (OEHWG) where the type and frequency of medical exams are determined by the Installation Occupational and Environmental Medicine Consultant (usually the SGP) along with an optometrist.

6.4. Laser Accidents/Incidents & Investigations. Any accident/incident involving a suspected laser or other optical radiation overexposure that negatively impacts mission operations; material

damage to AF equipment, systems, or sensors; or injury to personnel shall be investigated or documented. In the event of a suspected accident or injury, the following steps will be taken:

6.4.1. The individual(s) involved will immediately notify their supervisor and seek medical care at the closest military treatment facility (MTF); a military MTF is preferred. If the individual is not cared for at an AF MTF, they or their supervisor must contact the installation Flight Medicine on call doctor who will then contact the attending physician immediately to coordinate required medical examinations and treatments.

6.4.2. The workplace supervisor shall notify the unit commander, ULSO, and ILSO within 8 hours of the accident/injury and ensure action is taken to prevent injury to other personnel. This includes taken the system out of service until the accident/incident has been investigated and corrective actions made, as necessary.

6.4.3. Laser investigations will be conducted by the ILSO or installation safety office to determine the event characteristics, root cause, contributing factors, and corrective measures.

6.4.4. For laser incidents involving aircrews or aircraft, the aircrew is requested to immediately report the incident by radio to the appropriate air traffic control (ATC) facility. Reports will include event position (e.g. latitude/longitude), altitude, beam color, originating direction, and any other necessary information believed necessary for the ATC or law enforcement. Upon arrival to their destination, all aircrew personnel that have been affected are requested to seek medical care at the local MTF.

6.5. Laser Procurement and Disposal.

6.5.1. Laser Procurement. The requesting unit or contracting office will coordinate with the ILSO prior to introducing/purchasing Class 3B or 4 lasers on the installation. A written request with the following criteria will be provided for the ILSO to complete a hazard assessment and approve/disapprove the laser system:

6.5.1.1. Manufacturer, model number, serial number, quantity, laser class, and mode of operation (if the laser operates in continuous wave, single phase, or multiple pulse).

6.5.1.2. Scope of work to include intent and frequency of operations and controls to minimize hazards to operators.

6.5.1.3. Laser system safety review board (LSSRB) approval letter for military specific lasers or compliance paperwork filed with the FDA for FDA Compliant lasers.

6.5.2. Laser Disposal

6.5.2.1. Military specific lasers must not be 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 and 1040.11; has compliance paperwork filed with the FDA; or has been destroyed IAW DODM 4160.21, Volume 1, Defense Materiel Disposition: Disposal Guidance and Procedures.

6.5.2.2. Lasers that are unclassified, off-the-shelf models (such as laser etchers and engravers), may be traded in or returned to the manufacturer.

6.5.2.3. The laser may also be turned into the local AF Defense Reutilization and Marketing Office as excess equipment. Completing the required documentation will transfer ownership of the laser system to this group.

Chapter 7

ELECTROMAGNETIC FIELD (EMF) SAFETY PROGRAM.

7.1. EMF Health Risk Assessments.

7.1.1. All EMF emitters owned and operated by avionics workplaces, communications facilities, industrial processes, and medical facilities shall be identified during BE's routine workplace surveillance and determine whether the EMF emitter is hazardous given system parameters from the workplace supervisor

7.1.1.1. Commercially procured telecommunications systems designed for public use (e.g. Wi-Fi routers, cellphones, microwaves, computers, etc.) that are used in their manufactured conditions do not require evaluations. Medical treatment devices do not require a special evaluation beyond manufacturer recommendations.

7.1.2. EMF emitter inventories will be maintained and conducted at a minimum, biennially. BE will coordinate with the Weapons Safety Manager and Installation Spectrum Manager or equivalent to ensure a comprehensive base inventory. The inventories will include at a minimum the following categories: work center, point of contact and phone number, emitter nomenclature, emitter description, quantity, frequency range, upper and lower tiers maximum permissible exposures (MPEs), and hazard distances.

7.1.3. The BE Flight will provide control recommendations for hazardous EMF systems.

7.2. EMF Protection Standards.

7.2.1. MPEs are established for lower and upper tier environments. Lower Tier environments represent locations where EMF exposures do not exceed the MPEs in Table A2.2 of AFI 48-109. Such locations generally represent living quarters, workplaces, or public access areas where personnel would not expect to encounter higher levels of EMF energy. Upper Tier environments represent areas that are occupied by individuals aware of their potential for EMF exposures. Workplace supervisors will provide education and training for workers in these environments.

7.2.2. Baseline, periodic, and termination occupational medical examinations are not required.

7.2.3. There are no special EMF exposure limits for pregnant females. Any level EMF environment that is safe for the mother is also safe for the developing embryo or fetus. Pregnant workers will follow the requirements in their profile.

7.3. Administrative Controls.

7.3.1. In areas where engineering controls or other methods are not adequate, appropriate warning signs will be placed to restrict access to areas where the potential exists for EMF exposures to exceed exposure limits.

7.4. Electro-Magnetic Frequency (EMF) Safety Training.

7.4.1. Workplace personnel with the potential to exceed the Lower Tier MPEs (Table A2.2 of AFI 48-109 will be provided initial and refresher training. The installation BE Flight will assist with the development of training for other personnel as required incorporating the following topics: location of emitters, areas can exceed MPE, control procedures, response to suspected

overexposure, bio-effects, risk/hazard assessment, standards, measurements, operation of RF emitter (equipment), PPE, lock-out /tag-out, reports, investigations, risk communication, properties of RF, RF physics and antenna characteristics.

7.4.2. Initial and annual training must be documented to show that employees are adequately trained. This training shall be documented on the AF Form 55 or equivalent computer-generated product.

7.5. EMF Accidents/Incidents. BE shall investigate and document all alleged incidents involving personnel exposure that may exceed the upper tier MPEs in **Table A.2.1** of AFI 48-109. Exposure incidents that occur during non-duty hours will be reported to the BE Flight's on-call phone (0172-825-5547).

OTIS C. JONES
Brigadier General, USAF
Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 48-109, Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program, 21 April 2020

AFI 48-139, Laser and Optical Radiation Protection Program, 21 April 2020

AFMAN 40-201, Radioactive Materials (RAM) Management, 28 March 2019

AFI 33-322, Records Management and Information Governance Program, 23 March 2020

AFMAN 48-148, Ionizing Radiation Protection, 19 July 2020

AFMAN 48-149, Flight and Operational Medicine Program, 13 October 2020

ANSI Standard Z136.1, American National Standard for Safe Use of Lasers, 16 March 2007

Article 92 Uniform Code of Military Justice

Bioenvironmental Engineer's Guide to Ionizing Radiation, 1 October 2005

Bioenvironmental Engineer's Guide for Lasers and Optical Radiation, August 2014

Bioenvironmental Engineering Program Management Guide: Laser Safety, September 2019

Bioenvironmental Engineering Program Management Guide: Radiation Safety Program, January 2021

DAFMAN 48-125, Personnel Ionizing Radiation Dosimetry, 27 October 2020

DODI 6055.11, Protecting Personnel from Electromagnetic Fields, 12 May 2021

IEEE Standard C95 7-2005, IEEE Recommended Practice for Radio Frequency Safety Programs, 22 March 2006

T.O. 33B-1-1, Nondestructive Inspection Methods, Basic Theory, 15 May 2014

Prescribed Forms

None

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

ATC—Air Traffic Control

ALARA—As Low as Reasonably Achievable

ANSI—American National Standards Institute

BE—Bioenvironmental Engineering

DoD—Department of Defense

DoE—Department of Energy

DLADS—Defense Logistics Agency Disposition Services

DTR—Defense Transportation Regulation

EMF—Electromagnetic Frequency

EMFR—Electromagnetic Frequency Radiation

GLD—Generally Licensed Device

HRA—Health Risk Assessment

ILSO—Installation Laser Safety Officer

IRSO—Installation Radiation Safety Officer

OEHWG—Occupational and Environmental Health Working Group

OPR—Office of Primary Responsibility

PH—Public Health

PPE—Personal Protective Equipment

RAM—Radioactive Material

RIC—Radioisotope Committee

RICS—Radioisotope Committee Secretariat

RPD—Radiation Producing Device

TDY—Temporary Duty Location

UDO—Unit Device Officer

ULSO—Unit Laser Safety Officer

URSO—Unit Radiation Safety Officer

Attachment 2

USE OF RADIATION SOURCES FOR NON-AIR FORCE ENTITIES

A2.1. Use of RAM:

A2.1.1. AFMAN 40-201, Radioactive Materials Management, sets USAF policy for using radioactive materials (RAM). It applies to other DoD organizations; Department of Energy (DoE) organizations; DoE prime contractors; and other contractors or local nationals bringing RAM onto Air Force installations.

A2.1.2. Non-Air Force organizations that bring RAM onto USAF installations, or conduct operations involving RAM on USAF installations, must obtain the approval in writing of the installation commander or his/her designee. To obtain this approval, the contractor must forward an application to the IRSO located at the BE Flight by email (**usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) with a courtesy copy to the contracting officer at least 30 calendar days before the planned date for commencement of activities on the installation. The following are required on the application:

A2.1.2.1. A description of the proposed activities on NRC Form 241

A2.1.2.2. The procedures established to ensure radiological health and safety of Air Force personnel and the public while on Air Force installations; the name, local address, and telephone number for the responsible local representative; and the name, address, and telephone number of the RSO named on their license.

A2.1.2.3. A current copy of the applicable NRC, or Agreement State License. Expired licenses are unacceptable. To be valid at the installation, the license must either specifically state the installation by name on the license, or state approval for work at temporary job sites anywhere in the United States where the NRC or Agreement State maintains jurisdiction. DOE or DOE prime contractors must provide, in lieu of a license, written certification of their exemption from NRC licensing requirements and cite the applicable exemption of 10 CFR.

A2.1.2.4. The part of the Air Force contract describing work to be done at the installation and the inclusive dates of such work.

A2.1.2.5. An acknowledgement the IRSO can make periodic checks to ensure the contractor is following applicable radiological health and safety practices, which prevent unnecessary exposures to Air Force personnel and prevent potential contamination of government property. The IRSO must identify deficiencies to the contracting officer for corrective actions. In addition, the IRSO has authority to suspend contractor operations believed to be unsafe.

A2.1.2.6. Copies of the most recent leak test results (not over 180 days old) for sealed sources.

A2.1.2.7. Copies of training certificates for authorized users.

A2.2. Contractors will adhere to 10 CFR and 49 CFR sections pertaining to transportation of RAM.

A2.3. Contractors must notify the IRSO when RAM arrives on installation, and when the RAM is removed from the installation. A2.4. Use of LASERs:

A2.4.1. Non-Air Force organizations required to use laser classes 3B or 4, on Ramstein Air Base or its GSUs must submit a written request for approval at least 30 calendar days before commencement of activities, which require the use of a laser.

A2.4.2. Contractors must submit their request to ILSO by email (**usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) with a courtesy copy to the contracting officer, and will include:

Figure A2.1. Contractor ILSO Requirements.

- Manufacturer
- Model
- Number of same units
- Serial numbers
- LASER medium
- Mode of operation (i.e. continuous wave (CW), single pulse, multiple pulse)
- Maximum exposure time (train length)
- Time (sec) & wavelength
- Energy/pulse (J) or CW power (W)
- Pulse repetition frequency
- Pulse width
- Beam diameter (at 1/e point)
- Beam divergence (at 1/e point)

A2.4.2.1. The part of the Air Force contract describing work to be done at the installation and the inclusive dates of such work. Additional information required to be included: where the LASER will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.4.2.2. An acknowledgement that the ILSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices, which prevent unnecessary exposures to Air Force personnel.

A2.5. [Use of EMFR:]

A2.5.1. Non-Air Force organizations required to use equipment generating EMFR in excess of 7 watts peak power and a frequency of 100 MHz or greater on Ramstein Air Base property or its GSUs must submit a written request for approval at least 30 calendar days before commencement of activities, which require the use of the RF generating device.

A2.5.2. Contractors must submit their request to IRSO by email (**usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) with a courtesy copy to the contracting officer; and will include:

Figure A2.2. Contractor Request to IRSO requirements sent to usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil.

- Description
- Nomenclature
- Location of emitters
- Quantity
- Frequency (MHz)
- Pulse width (microsecond.)
- Pulse repetition freq. (pps)
- Peak power (kW)
- Antenna size (feet--horizontal/vertical)
- Antenna band width (degrees--horizontal/vertical)
- Antenna gain (dB)
- Scan rate (rpm)

A2.5.2.1. The part of the Air Force contract describing work to be done at the installation and the inclusive dates of such work. Additional information required to be included where the EMF generating device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.5.2.2. An acknowledgement that the IRSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices, which prevent unnecessary exposures to Air Force personnel.

A2.6. [Use of Ionizing Radiation Generating Devices:]

A2.6.1. Non-Air Force organizations required to use ionizing radiation-producing devices (on Ramstein Air Base and its GSUs must submit a written request for approval at least 30 calendar days before commencement of activities, which require the use of ionizing radiation-producing devices.

A2.6.2. Contractors must submit their request to IRSO by email (**usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) with a courtesy copy to the contracting officer; and will include:

Figure A2.3. Contractor Request to IRSO requirements sent to usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil.

- Unit manufacturer
- Model number
- Serial number
- Maximum kVp, mA, Sec
- Ionizing radiation source/emitter (electron tube)

A2.6.2.1. The part of the Air Force contract describing work to be done at the installation and the inclusive dates of such work. Additional information required to be included: where the ionizing radiation-producing device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.6.2.2. An acknowledgement that the IRSO can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices, which prevent unnecessary exposures to Air Force personnel.

A2.7. [Use of Ultraviolet (UV) Radiation-Producing Devices:]

A2.7.1. Non-Air Force organizations required to use UV generating devices, including welders, on Ramstein Air Base must submit a written request for approval at least 30 calendar days before commencement of activities, which require the use of UV generating devices.

A2.7.2. Contractors must submit their request to the IRSO by email **usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil**) with a courtesy copy to the contracting officer; and will include:

Figure A2.4. Contractor Request to IRSO requirements sent to usaf.ramstein.86-mdg.mbx.omrs-sgxb@health.mil.

- Description
- Nomenclature
- Location of devices
- Quantity
- Wavelength
- Effective Irradiance

A2.7.2.1. The part of the Air Force contract describing work to be done at the installation and the inclusive dates of such work. Additional information required to be included: where the UV generating device will be used (location, indoors, outdoors, enclosures, etc.), and the safety features of the device.

A2.7.2.2. An acknowledgement that the site URSO and BE can make initial and periodic checks to ensure the contractor is following applicable radiological health and safety practices, which prevent unnecessary exposures to Air Force personnel.

Attachment 3

BASIC RAM SHIPPING PROCEDURES

A3.1. Each receiving or shipping agency must have a separate, marked, and locked enclosure for the receipt, handling, or shipment of radioactive packages. This separate area is to ensure personnel not familiar with the proper handling or RAM are not accidentally exposed to ionizing radiation. This location must be coordinated with Ramstein Air Base BE Flight, Building 2182, DSN 479-2220.

A3.2. All RAM that are covered by a license or permit must be accounted for by a RAM transfer receipt, which is separate from any contractual, security, or other receipt documents. Contract shipping and receiving agencies will obtain transfer receipts when items are dispensed to Ramstein Air Base organizations.

A3.3. When RAM is received at, or is to be shipped from Ramstein Air Base and its GSUs, the IRSO must be contacted by the receiving or shipping agency. The IRSO or designated representative will monitor the container. If the receiving or shipping agency is a contractor, the contractor is not required to notify the IRSO. The contractor must perform all labeling, packaging, and monitoring requirements outlined in the federal law. IMPORTANT: In accordance with 10 CFR 20.1906, all packages labeled with a Radioactive White I, Yellow II, or Yellow III, as specified DOT regulations (49 CFR 172.403 and 172.436-440), must be monitored as soon as possible but not later than 3 hours after the package is received. If the package is received after normal duty hours, the package must be surveyed not later than 3 hours from the beginning of the next workday.

A3.3.1. If the RAM received is a sealed source, the most recent leak test results must accompany the package, and a copy of these results must be sent to the IRSO. If this test does not accompany the sealed source, an individual approved by the IRSO performs the leak test before the item is placed into use. Current leak test results must accompany sealed sources shipped from Ramstein Air Base.

A3.3.2. Once the package has been monitored and cleared by an individual approved by the IRSO, contact the user or custodian and transport the material directly to the user or custodian. If the user or custodian cannot be located, store the RAM until the user or custodian accepts receipt. Note: Only authorized personnel will open or package containers of RAM or items.

A3.4. If the RAM is to be transported from Ramstein Air Base, prepare for shipment and packaging per applicable NRC and Department of Transportation regulations. Contact the IRSO for assistance and shipping surveys.