

**BY ORDER OF THE COMMANDER  
673D AIR BASE WING (PACAF)**

**673D AIR BASE WING INSTRUCTION 48-103**

**23 JANUARY 2015**

***Aerospace Medicine***

**INSTALLATION RADIATION SAFETY  
PROGRAM**



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OPR: 673 AMDS/SGPB

Certified by: 673 MDG/CC  
(Col Theresa Bisnett)

Supersedes: 673 ABWI 48-103, 23  
February 2012

Pages: 21

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This instruction implements Air Force Policy Directive (AFPD) 48-1, *Aerospace Medicine Enterprise*; and is used in conjunction with AFIs 40-201, *Managing Radioactive Materials In The US Air Force*; 48-148, *Ionizing Radiation Protection*; AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, AFI 48-109, *Electro-Magnetic Frequency (EMF) Radiation Occupational Health Program*; AFI 48-139, *Laser and Optical Radiation Protection Program*; AFI 91-202, *The US Air Force Mishap Prevention Program*; AFI 91-204, *Safety Investigations and Reports*; DA PAM 385-24, *The Army Radiation Safety Program*; AR 385-10, *The Army Safety Program*; DA PAM 385-40, *Army Accident Investigation and Reporting*; Title 10, Code of Federal Regulations (CFR), *Energy*; 21 CFR, *Food and Drugs*; 29 CFR, *Labor*; 40 CFR, *Environmental Protection*; 49 CFR, *Transportation*; DODI 6055.8, *Occupational Ionizing Radiation Protection Program*; DODI 6055.11, *Protecting Personnel from Electromagnetic Fields*; and the Uniform Code of Military Justice (UCMJ), *Article 92*. This instruction applies to all 673d Air Base Wing, Joint Base Elmendorf – Richardson (JBER), United States Army-Alaska (USA-AK), 3rd Wing, associated tenant units that possess, use, or handle sources of radioactive materials (RAM), ionizing radiation producing devices (RPD), lasers, and EMF emitters within the confines of JBER. This publication does not apply to the US Air Force Reserve, Air National Guard units, Civil Air Patrol and members unless otherwise stated. The Paperwork Reduction Act of 1974 as amended in 1996 affects this publication. Submit requests for waivers through the chain of command to the publication Office of Primary Responsibility (OPR) for non-tiered compliance items and this instruction cannot be supplemented or further extended. Refer recommended changes and questions about this publication to the OPR, using AF Form 847, *Recommendation*

for Change of Publication. Route the AF Forms 847 through the appropriate chain of command. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). See [Attachment 1](#) for Glossary, References and Supporting Information.

**SUMMARY OF CHANGES**

**This document is substantially revised and must be completely reviewed.** It was updated to reflect changes in AFIs 48-139, 48-109, and AFMAN 48-125.

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**Attachment 1—GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION** Error! Bookmark not defined

**1. Introduction:**

1.1. **Purpose.** This instruction provides uniform policy, instruction, and guidance for the management of all radiation-producing sources at JBER. It sets forth how joint base personnel and units provide all programs associated with the safe usage of RAM, ionizing RPD, lasers, and electromagnetic frequency (EMF) emitters. This instruction also prescribes how tenant units and non-JBER entities get approval to use radiation-producing sources on JBER.

**1.2. Safety Statement.** All exposures to radiation will be as low as reasonably achievable (ALARA) consistent with existing technology, cost, and operational requirements. Each person involved in radiological operations on JBER must use all reasonable means available (that is, time, distance, and shielding) to minimize radiation exposure to personnel from all ionizing radiation sources. In order to implement the ALARA concept, each agency, organization, contractor and individual who uses or handles radiation-producing materials or equipment must make a concerted effort to ensure operations and maintenance procedures result in safe workplaces and minimized exposure.

## **2. Responsibilities:**

### **2.1. Commander, 673d Air Base Wing, JBER (673 ABW/CC):**

2.1.1. Has overall responsibility for the JBER Radiation Safety program.

2.1.2. Has designated the Bioenvironmental Engineer (673 AMDS/SGPB), in writing, as Installation Radiation Safety Officer (IRSO) to support the joint base.

2.1.3. Enforces AFI 40-201, AFI 48-148, and DA PAM 385-24, as applicable, for all activities on JBER including non-Air Force/non-Army entities, for example, other Department of Defense (DoD) organizations, Department of Energy (DOE) organizations, Department of Labor (DOL) organizations and all contractors.

2.1.4. When the situation involves Army materials or personnel, reporting is routed to Army Command (ACOM), Army Service Component Commander (ASCC), Direct Reporting Unit Radiation Safety Staff Officer (DRURSSO), and the affected Nuclear Regulatory Committee (NRC) license Radiation Safety Officer (RSO) in accordance with DA PAM 385-40 and AR 385-10.

### **2.2. Commander, 673d Medical Group (673 MDG/CC):**

2.2.1. Ensures all pregnant individuals working in potential occupational radiation exposure environments during their pregnancy are referred to the IRSO. Pregnant workers will be enrolled in the Dosimetry Program on a monthly monitoring frequency. Civilian personnel are not required to enroll in the Dosimetry Program, but are highly encouraged. If the civil service worker elects not to be monitored, reassignment to a non-radiation work environment is required to ensure the Air Force meets the legal limit of 500 mrem during gestation as stated in 10 CFR, Part 20.

2.2.2. Arranges for the provision of pre-employment and termination physical examinations to JBER employees assigned to duties involving potential exposure to laser radiation as required by AFI 48-139.

2.2.3. Oversees special examinations and clinical tests as part of an overexposure investigation.

### **2.3. Commander, 673d Civil Engineering Group (673 CEG/CC):**

2.3.1. Ensures the IRSO has approved the use of RAM on base by contractors.

2.3.2. Ensures disaster emergency response plans include procedures for theft, loss, sabotage, or release of RAM.

2.3.3. Provides all design reviews and work order requests involving potential use, movement or disposal of RAM to the IRSO for review and approval prior to allowing work to commence on contract.

2.4. Commander, 673d Contracting Squadron (673 CONS/CC):

2.4.1. Ensures contractors desiring to use RAM/RPD on JBER provide a written request for permission to the IRSO at least 30 days prior to the items entering the installation.

2.4.2. Requires contractors to follow applicable Air Force directives and technical orders when conducting operations on JBER.

2.4.3. Ensures all contracts involving the use of RAM contain a clause authorizing the IRSO to suspend unsafe operations.

2.5. Commander, 673d Force Support Squadron (673 FSS/CC). Directs the Civilian Personnel Office (673 FSS/FSMC) to effect temporary reassignment of pregnant civilians occupationally exposed to ionizing radiation when reassignment is recommended by medical personnel.

2.6. Commander, 773d Logistics Readiness Squadron (773 LRS/CC):

2.6.1. Ships and receives RAM packages, properly log them, and place them into temporary storage pending transport to the customer, or at the request of the IRSO.

2.6.1.1. Air Force RAM will be turned in to the Cargo Movement, Building 5257 on JBER Elmendorf for temporary storage for the purpose of shipment.

2.6.1.2. Army RAM commodities can be stored at the storage area in the warehouse, Building 804 on JBER Richardson for more than a year while waiting for final disposition. Every attempt should be made by the Unit Radiation Safety Officer (URSO) in coordination with the IRSO to reduce the length of RAM storage time.

2.6.2. Properly package and label RAM to meet requirements in 49 CFR 173, when requested. Prepare appropriate forms for shipping of radioactive material. Report all RAM packaging, shipping, or receiving discrepancies to the IRSO.

2.6.3. Arrange transport of radioactive items for turn in to the Defense Logistics Agency (DLA) Disposition Service.

2.6.4. Ensure personnel working in RAM packaging, shipping, receiving, or storage areas are trained on the requirements of 49 CFR and the ALARA principles.

2.6.5. Ensure RAM packaged by other organizations meets requirements in 49 CFR 173.

2.6.6. Contact the IRSO to evaluate all RAM packages prior to shipment or upon receipt.

2.6.7. Immediately notify the package addressee upon package receipt so that the package can be picked up before the end of the duty day. RAM packages will not be stored overnight.

2.7. Unit Commanders:

2.7.1. Ensure radiation safety procedures are followed within the organization.

2.7.2. Ensure unit personnel and contractors who receive, possess, distribute, use, transfer, or dispose of RAM/RPD have appropriate licensure and/or permits.

2.7.3. Ensure personnel who use RAM/RPD, lasers, and/or EMF emitters meet training requirements.

2.7.4. Appoint a Permit Radiation Safety Officer (PRSO), in writing, when the organization possesses permit-requiring RAM.

2.7.5. Appoint a URSO, in writing, when the organization possesses RAM/RPD and/or hazardous EMF emitters.

2.7.6. Appoint a Laser Safety Officer (LSO) in writing when the organization possesses Class 3b or Class 4 lasers. The LSO will also be assigned to the Base Laser Safety Committee.

2.8. Installation Radiation Safety Officer (IRSO) (673 AMDS/SGPB):

2.8.1. Acts as the main point of contact and provides technical assistance to base and tenant units on the radiological health aspects of the use of RAM/RPD, lasers, EMF emitters, and radioactive wastes.

2.8.2. Provides technical information and aid to Public Affairs on all incidents involving RAM/RPD.

2.8.3. Has the authority to suspend operations which may be unsafe from a radiation safety standpoint.

2.8.4. Performs announced and unannounced radiation protection surveys to ensure radioactive sources and materials are being stored and used properly, in compliance with applicable permits.

2.8.5. Reviews and approves/disapproves all requests for the use of RAM/RPD on JBER.

2.8.6. Performs radiation surveys for the receipt, shipment, transfer, and use of Air Force/Army owned or operated RAM/RPD.

2.8.7. Manages the Thermo Luminescent Dosimetry (TLD) program in accordance with AFI 48-125 and DA PAM 385-24. The IRSO will investigate potential overexposures.

2.8.8. Ensures the ALARA principles are practiced throughout the installation, thereby minimizing employee exposure to ionizing radiation.

2.8.9. Provides initial ALARA training to URSOs and reviews URSO training plans.

2.8.10. Investigates the loss or spill of RAM/RPD, and all real or suspected overexposures to radiation.

2.8.11. With 673 ABW/CC concurrence, contacts Air Force Radioisotope Committee (AFRIC), Army Command (ACOM), Army Service Component Commander (ASCC), and/or direct reporting unit radiation safety staff officer (DRURSSO) whenever an issue arises regarding the loss of RAM/RPD, illegal use of RAM/RPD, RAM permit violations, and/or overexposures to radiation.

2.8.12. Reviews and approves/disapproves usage requests by contractors desiring to use RAM/RPD on JBER.

2.8.13. Notifies the appropriate contracting officer if a contractor violates JBER requirements in regards to the use of radiation-producing devices on the installation.

2.8.14. Supports LRS with training on storage, shipping and receiving procedures for RAM in accordance with 49 CFR. Monitors, swipes, and surveys all AF/Army radioactive packages being shipped to, or from, JBER.

2.8.15. Annually briefs 673 ABW/CC and the Environmental, Safety, and Occupational Health Committee (ESOHC) on status of RAM permits on the installation.

2.8.16. Coordinates with the base Point of Contact for EMF emitters to determine new, or modified systems and ensures a current inventory for JBER.

2.8.17. Chairs the Laser Safety Committee which is made up of the base LSO.

2.9. Permit Radiation Safety Officer (PRSO):

2.9.1. Ensures permit requirements are followed at all times.

2.9.2. Contact the IRSO if any questions or problems arise concerning the permitted radioactive material.

2.9.3. Maintains all records concerning the radioactive material permit available for inspection.

2.9.4. Briefs the owning Squadron Commander and the IRSO annually on the radiation safety program. Documents this brief with a memo, Staff Summary Sheet (SSS), or electronic SSS signed by the owning Squadron Commander and the IRSO.

2.9.5. Ensures annual training is done and documented for all authorized users. Training of non-radiation workers who may work in the area will be conducted and documented, as well.

2.9.6. Prior to shipping, receiving, or moving RAM storage location, informs IRSO and 673 ABW Safety Office.

2.10. Unit Radiation Safety Officer (URSO):

2.10.1. Acts as central point of contact for each organization using generally licensed RAM, RPD or EMF radiation.

2.10.2. Immediately informs the IRSO of the need for new RAM/RPD or EMF emitters before acquisition.

2.10.3. Immediately notifies the IRSO and Safety of any incident involving a potential overexposure to radiation.

2.10.4. Ensures radiation monitoring devices are used by personnel, when required.

2.10.5. Maintains an inventory and accountability for all unit RAM/RPD and/or EMF emitters at all times and provides the inventory to the IRSO when requested.

2.10.6. Compiles and maintains section specific operating instructions for using RAM/RPD and/or EMF emitters.

2.10.7. Ensures work procedures are in compliance with ALARA principles.

2.11. Unit LSOs:

2.11.1. Will be appointed by the Unit Commander and assists the Unit Commander in developing policies, procedures, and instructions necessary; to meet this standard at the unit level.

2.11.2. Reports all suspected laser exposures to the Unit Commander.

2.11.3. Acts as a single point of contact for the unit on laser radiation safety matters and maintain active liaison with IRSO, Public Health (673 AMDS/SGPM), and Safety personnel.

2.11.4. Coordinates laser radiation evaluation activities with command, supervisory personnel, and IRSO.

2.11.5. Conducts initial and annual laser safety training for personnel that use the laser.

2.11.6. Ensures required corrective actions are completed expeditiously.

## 2.12. Supervisors:

2.12.1. Enforce the rules and regulations for RAM/RPD, lasers and EMF emitters.

2.12.2. Train and document compliance with ALARA principles for ionizing radiation, lasers, and EMF hazards, as applicable to their section.

2.12.3. Ensure all necessary safety equipment (such as shields, hoods, protective clothing, instruments, and so forth) is available and used by personnel working with radiation sources.

2.12.4. Assume responsibility for the safety of workers in all radiation environments, including preoperative checks of safety equipment.

2.12.5. Train new employees prior to assignment to duties involving radiation. Training will focus on the principles of radiation safety and include proper wear and storage of radiation dosimeters, when applicable.

2.12.6. Immediately notify Bioenvironmental Engineering (BE) if a worker assigned to radiation duties becomes pregnant.

2.12.7. Ensure possible overexposures are reported to the IRSO and members involved are taken to the emergency department of the 673 MDG.

2.12.8. Maintain awareness for equipment failure/malfunction, or improper safety procedures by personnel, which may result in excessive radiation exposure.

2.12.9. Order, maintain, operate, and ensure proper calibration of radiation-measuring equipment necessary to ensure compliance with standards.

2.12.10. Document initial and annual worker training on hazards associated with radiation on AF Form 55, *Employee Safety and Health Record*, or another AF or Army equivalent.

## 2.13. RAM/RPD, Laser, and/or EMF Emitter User:

2.13.1. Follows all safety precautions to ensure exposures to radiation meet ALARA requirements.

2.13.2. Notifies the LSO, URSO and/or PRSO of any incident involving a potential exposure or instrument damage/loss.

2.13.3. Completes required training and ensures it is documented on AF Form 55 or equivalent.

2.13.4. If required, properly stores and wears personnel monitoring devices and protective equipment.

2.13.5. Notifies IRSO of any changes to off-duty employment status, that involve the potential exposure to radiation.

2.13.6. If pregnant, notifies Public Health and the unit supervisor as soon as possible.

### **3. Radioactive Material Usage Requirements. Air Force, Army, and Tenant units on JBER:**

3.1. RAM usage can be split into three categories: exempt, generally licensed, and permitted. Specific management requirements are driven by the category.

3.1.1. Exempt RAM is defined in 10 CFR 30.71, Schedule B, and is addressed in AFI 40-201, paragraph **3.1.12**. There is no requirement for licensure of these items, but any organization possessing them must assign an URSO, maintain an inventory of all items, verify the inventory annually, provide a copy of the inventory to the IRSO annually, and notify the IRSO when items are received, transferred or disposed of.

3.1.2. Generally licensed RAM is defined in AFI 40-201, Attachment 3. Items in this category do not require a broad scope AF license. Instead, a general license is issued upon receipt of the device. The license is typically provided by the device manufacturer or in the case of device transfer, by the prior owner. If a device is labeled as generally licensed, but a license document is not available, it can be obtained by contacting the manufacturer or the IRSO. This license will outline leak test and surveillance requirements for the item. In addition to testing requirements, the owning organization must assign an URSO, maintain an inventory of all items, verify the inventory annually, provide a copy of the inventory to the IRSO annually, and notify the IRSO when items are received, transferred or disposed of.

3.1.3. Permitted RAM includes all materials not covered under the other two categories. All users of permitted RAM must possess a Radioactive Material Permit issued by AFRIC or an Army Radiation Authorization (ARA); refer to DA PAM 385-24. Permits issued by AFRIC allow the possession of specified quantities of RAM under the authority of the Air Force Master Materials License. Control of these items is closely regulated and all permit requirements must be followed by the owning organization. Coordination through the IRSO is required prior to obtaining any item requiring a RAM Permit.

3.2. For Army RAM commodities, reports, applications and/or amendments to permits will be provided to the Western Regional Medical Command (WRMC), MCWR-CLO, ATTN: CRSO, Tacoma, WA 98431-1100.

### **4. Radioactive Material Handling, Storage, and Transportation Requirements:**

4.1. Every JBER unit that receives or ships RAM must have a specific location set aside for storage purposes. This location should be a RAM storage vault or a locked enclosure,

separate from public areas and personnel not familiar with RAM. Proper storage techniques and labeling requirements are outlined in 10 CFR 19, *Notices, Instructions and Reports to Workers: Inspection and Investigations*, 20 *Standards For Protection Against Radiation*, and 21 *Reporting of Defects and Noncompliance*. This location must be coordinated with the IRSO.

4.2. Only personnel authorized by the IRSO will open or package containers of RAM.

4.3. All RAM which is 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.

4.4. When RAM is received at, or shipped from JBER, the receiving or shipping URSO must contact the IRSO. Exception: the daily shipment and receipt of RAM by nuclear medicine.

4.5. All RAM must be monitored upon receipt and prior to shipment. For JBER and tenant agencies, the IRSO will arrange for this monitoring. If the receiving or shipping agency is a contractor, the contractor must perform all labeling, packaging, and monitoring requirements outlined in 10 CFR and 49 CFR.

4.6. Sealed sources must have the most recent leak test results accompanying the package, unless exempted in 10 CFR 39.35, *Leak Testing of Sealed Sources*. If the leak test is not required, removable contamination swipe results in accordance with 49 CFR 173.443, *Contamination Control* must accompany the package. If a leak test is not available, the IRSO or representative will perform the leak test before shipment or prior to distribution to the URSO. Contractors must perform their own leak tests.

4.7. Once a received package has been monitored and cleared by the IRSO, the URSO will be contacted for transport from the receiving location to the unit storage location. Packages will remain in the receiving location until claimed by the URSO.

4.8. When RAM is to be transported from JBER, it will be prepared for shipment and packaging per applicable NRC and DOT regulations (49 CFR).

4.9. Radioactive items will not be stored with explosives, flammables, food products, or other incompatible commodities. Items with radioactive gas or radium will be stored in ventilated structures. Storage areas and containers will be marked in accordance with 10 CFR 835, *Occupational Radiation Protection* and cannot be located near administrative areas. An area designated for RAM storage can only be returned to normal usage with written approval of the IRSO.

4.10. Army RAM commodities can be stored at the storage area in the 773 LRS warehouse, Building 804 on JBER Richardson for more than a year while waiting for final disposition. Every attempt should be made by the URSO in coordination with the IRSO to reduce the length of RAM storage time.

4.11. All vehicles used to transport RAM while on JBER will be properly placarded and meet all requirements of 10 CFR 71, *Packaging and Transportation of Radioactive Material*.

## **5. Radioactive Material Disposition:**

5.1. The PRSO and/or the URSO, in coordination with the IRSO, is responsible for proper disposal of all RAM assigned.

5.2. Disposition of RAM may only be carried out by transfer to another licensed agency or to a licensed disposal contractor.

5.3. To transfer any RAM off of JBER, the PRSO and/or the URSO must give written notification to the IRSO of the final planned disposition. Notification must include the radioisotope, activity, quantity and name of individual receiving the RAM. For permitted items, the IRSO will need a copy of the current license for both the gaining and losing units. The IRSO is available to assist with RAM transfer and coordinate proper disposal procedures.

5.4. All disposal actions will comply with the procedures outlined in AFI 40-201, Attachment 10, 10 CFR 61, *Managing and Disposing of Radioactive Waste*, and accepted health physics practices.

5.5. For AF RAM waste, the IRSO will arrange for disposal through the United States Air Force School of Aerospace Medicine (USAFSAM), Radiation Surveillance Division, Health Physics Branch, Air Force Radioactive and Mixed Waste Office (Wright-Patterson AFB, OH). Disposal will occur as soon as practical after the item is declared a waste.

5.6. For AF recyclable RAM, the IRSO will arrange with the Wright-Patterson AFB Radioactive Material Recycling Facility (88 ABW/EMB, 5490 Pearson Road, Wright-Patterson AFB, OH). Recycling will occur as soon as practical after the item is declared unneeded and is determined to be recyclable.

5.7. The US Army Joint Munitions Command is responsible for disposal of Army radioactive waste. Waste generators will coordinate with and obtain the approval of the Chief, Army Low-Level Radioactive Waste Disposal Division, US Army Joint Munitions Command (ATTN: AMSJM-SF, Rock Island Arsenal, Rock Island, IL) for off-site storage, packaging, shipment, treatment, and final disposition of unwanted low-level RAM. Managers of special projects that generate unusually large amounts of radioactive waste (that is, US Army Corps of Engineers environmental restoration projects) may arrange for radioactive waste disposal as part of the project. However, project managers shall coordinate DOD radioactive waste disposal actions with the Chief, Army Low-Level Radioactive Waste Disposal Division (refer to DA PAM 385-24 for more guidance). Disposal of Army RAM commodities must also be coordinated and approved by the IRSO.

5.8. Land burial of RAM is not permitted on JBER.

5.9. Release of RAM to the atmosphere or to the sanitary sewer system is not allowed on JBER.

## **6. Contractor Operations Involving RAM/RPD, Lasers, and/or EMF Emitters:**

6.1. All contractor usage of RAM/RPD, lasers, and/or EMF emitters on JBER must be approved, in writing, by the IRSO. To obtain approval, contractors must submit a request, in writing, to the IRSO at least 30 days prior to the required use date. Requests must include:

6.1.1. A brief description of the proposed activities;

6.1.2. If applicable, a copy of a current NRC or Agreement State license with current NRC Form 241, , *Report Of Proposed Activities In Non-Agreement States, Areas of Exclusive Federal Jurisdiction, Or Offshore Waters*, specifying use locations. The

license must either specifically list JBER or grant approval for work at temporary job sites anywhere in the United States where the NRC or Agreement State has jurisdiction;

6.1.3. If applicable, current leak tests required by a NRC license or general license.

6.1.4. The name, local address, and telephone number for the responsible local representative and the name, address, and telephone number of the RSO.

6.1.5. A copy of the all operator's qualifications and radiation safety training.

6.1.6. A copy of the contract describing work to be done at the installation and the inclusive dates of the work.

6.1.7. An acknowledgment that the IRSO can make periodic checks to ensure that contractor personnel follow radiation safety practices to prevent exposures to Air Force personnel and avoid contamination of government property.

6.2. Contractor RAM/RPD usage approvals will be valid for no longer than 6 months. A complete package with updated information must be submitted for renewal. Laser and EMF emitter approvals are valid for the length of the contract unless usage parameters significantly change.

6.3. Contractors using RAM on JBER will contact IRSO prior to bringing materials onto the installation and upon removing materials from the installation.

6.4. Contractor RAM will not be stored on JBER over night.

6.5. If RAM/RPD is improperly or illegally transported onto JBER, such items will be impounded and appropriate agencies notified.

6.6. When contractors are hired to conduct industrial radiography, coordination of operations with the IRSO is the responsibility of the unit requesting the service.

## **7. Industrial Radiography:**

7.1. JBER Non-Destructive Inspection (NDI) is authorized to perform fixed and temporary industrial radiographic operations on JBER with prior coordination with the IRSO.

7.2. Radiographic devices must be properly licensed by the NRC or State of Alaska. All radiographic operations must meet the requirements outlined in 10 CFR 34, *Licenses for Industrial Radiography and Radiation Safety Requirements for Radiographic Operations* and TO 33B-1-1, *Nondestructive Inspection Methods*.

7.3. The licensed radiographer and at least one other individual must be present during radiographic operations.

7.4. At least two calibrated radiation survey meters must be used for radiographic operations.

7.5. Radiation-controlled areas must be properly posted with proper radiation hazard warning signs. Radiation hazard warning signs are described in 10 CFR 19. A controlled area is an area where radiation levels exceed  $2 \times 10^{-3}$  roentgens per hour (R/hr). The signs must be placed at the 2 mR/hr boundary in sufficient numbers to adequately provide warning to personnel approaching from any direction.

- 7.6. Temporary field or job-site operations should have enough radiographic personnel to adequately monitor controlled areas for possible intrusion by unauthorized personnel.
- 7.7. Restraining barriers may be used in conjunction with appropriate radiation hazard warning signs to preclude access into the controlled area.
- 7.8. For night operations, radiation hazard areas must be lighted. Flashing red lights must identify the controlled area.
- 7.9. The IRSO will periodically monitor industrial radiography operations to ensure compliance with this instruction and 10 CFR 34.
- 7.10. In the event that violation of the controlled area by an unauthorized individual occurs, the radiographer will:
- 7.10.1. Immediately secure the radiographic operation (put source into storage container, shut down machine, and so forth).
  - 7.10.2. Escort the individual out of controlled area.
  - 7.10.3. Obtain the name and organization of the individual and the supervisor's phone number.
  - 7.10.4. Record pertinent information (that is, time, date, length of time individual was in the area, approximate maximum exposure level the individual was subjected to, and so forth).
  - 7.10.5. Report the incident to the IRSO and Safety immediately.

## **8. Medical and Dental X-Ray Equipment:**

- 8.1. All diagnostic radiographic operations must meet the requirements outlined in 21 CFR 1020.30, *Diagnostic X-ray Systems and Their Major Components*.
- 8.2. Medical and dental radiographic equipment must be operated by authorized persons who are properly trained and knowledgeable about radiation protection, safe operation of equipment, effects of ionizing radiation, and exposure limiting techniques. Operator trainees may be permitted to use such equipment when under the direct supervision of a qualified operator.
- 8.3. Medical radiographers will wear assigned thermoluminescent dosimetry (TLD) badges during all exposures. When not in use, badges will always be stored in an identified, central area.
- 8.4. Medical radiology personnel assigned TLDs are not permitted to hold patients during exposures.
- 8.5. Only personnel required for the radiographic operation will be in the radiographic room during exposures.
- 8.6. The useful beam of radiological equipment will be limited to the smallest area consistent with the objectives of the examination.
- 8.7. Medical radiographers will stand behind a protective barrier during all exposures.
- 8.8. Individuals may not be exposed solely for the purpose of demonstration or training.

8.9. A quality control program must be in place to reduce exposures through optimized techniques, choice of film and screen combinations, preventive maintenance, proper film development, and calibration.

8.10. Lead aprons, or other shields should be used to protect critical areas of the patient, whenever possible.

8.11. Medical and dental radiographic equipment and usage areas will be surveyed at a frequency dictated by the owning service's directives. Air Force radiographic systems will be surveyed by BE and the reports will be maintained in accordance with 40-201. Army radiographic systems will be surveyed in accordance with TB MED 521. Copies of Army radiographic system reports will be provided to WRMC, MCWR-CLO, ATTN: CRSO, Tacoma, WA 98431-1100.

## **9. Personnel Dosimetry Program:**

9.1. Work centers with personnel who are occupationally exposed to ionizing radiation will be evaluated for inclusion in the Thermo Luminescent Dosimetry (TLD) Program. Typically, if routine exposure exceeds 10 percent of the dose limits specified in 10 CFR 20, work centers will be enrolled in the program. The IRSO will be the final arbiter for program inclusion.

9.2. The IRSO has identified the following work areas for inclusion in the JBER TLD Program:

9.2.1. 673 MDOS/SGOX Medical Radiology.

9.2.2. 673 MDOS/SGOX Nuclear Medicine.

9.2.3. 3 MXS/MXMFN Nondestructive Inspection.

9.2.4. 673 MDSS/SGSM Medical Equipment Repair.

9.2.5. Army Veterinary Clinic.

9.3. Supervisors of work centers enrolled in the TLD Program are responsible for sending assigned personnel to BE prior to them performing the duties that drive program inclusion. When personnel are removed from duties requiring TLD usage, the work center supervisor will ensure BE is notified. Personnel are not allowed to permanent change of station (PCS) until all TLDs have been turned in to BE.

9.4. TLDs will be worn in accordance with the following rules:

9.4.1. TLDs will be worn on the part of the body most likely to receive the greatest exposure to radiation. Ring badges will be worn on the hand closest to the radioactive source.

9.4.2. Never place the badge inside the pocket or behind any obstruction.

9.4.3. Do not tamper with the TLD. If these devices are accidentally damaged or exposed, the wearer must immediately return them to BE and exchange them for new ones. The wearer will explain the nature of the accident to aid in evaluation of the TLD.

9.4.4. The only authorized storage location for TLDs is with the control badge.

9.4.5. If a woman who is on the TLD Program becomes pregnant, she must immediately notify Public Health, BE, and her supervisor.

9.4.6. If a worker accepts any off-duty employment for which they wear a TLD, they must immediately notify BE.

9.5. The IRSO reviews quarterly dosimetry results to verify radiation exposures comply with ALARA principles. When exposure exceeds the investigation action levels outlined in **Table 1** below, the IRSO will take the actions outlined.

**Table 1. Investigation Action Levels (Quarterly Limits In Mrem).**

Work Center	ALARA I	ALARA II
Medical Radiology	125	375
Nuclear Medicine - Body	125	375
Nuclear Medicine – Ring	1250	3750
Non-Destructive Inspection	125	375
Medical Equipment Repair	125	375
Army Veterinary Services	125	375

9.5.1. Except when deemed appropriate by the IRSO, no further action will be taken in those cases in which an individual's exposure is less than the values in **Table 1**, above.

9.5.2. The IRSO will review the exposure of each individual whose quarterly exposure equals or exceeds **Level I** values and will report the results of the review at the 673 ABW ESOHC meeting in the following quarter. If the exposure does not equal or exceed **Level II**, no action related specifically to the exposure is required. However, the IRSO must consider if changes are necessary to the work center ALARA program to improve quality.

9.5.3. The IRSO will investigate in a timely manner the causes of all personnel exposures that exceed **Level II** values and take appropriate action to reduce exposures. A report of the result of the investigation and actions taken will be presented at the ESOHC meeting in the following quarter. In addition, reports will be forwarded to the individual's appropriate DoD agency as outlined.

9.5.3.1. For Air Force personnel, the investigation report will be provided to the AFRIC.

9.5.3.2. For Army personnel, the investigation report will be furnished to WRMC, MCWR-CLO, ATTN: CRSO, Tacoma, WA 98431-1100.

9.6. Contractors are responsible for their own monitoring program. Contractor personnel must complete all ALARA training requirements prior to performing radiation duties.

## 10. Laser Operations:

10.1. All work with lasers will be done in accordance with AFI 48-139 and DA PAM 385-24. ILSO will have final approval authority for the safe use of lasers.

10.2. When requesting approval of laser operations, the using organization will:

10.2.1. Prepare a safety Operating Instruction (OI) for the laser and forward it to BE. The OI will contain the following information, as a minimum:

10.2.1.1. Location (building, room number; preferably a map).

10.2.1.2. Individual (name) assigned as laser safety officer (LSO).

10.2.1.3. Type of laser and intended use.

10.2.2. The LSO will forward the following information to BE:

10.2.2.1. Operational wavelengths.

10.2.2.2. Output power.

10.2.2.3. Mode of operation.

10.2.2.4. Pulse duration (if applicable).

10.2.2.5. Beam diameter in millimeters or centimeters.

10.2.2.6. Beam divergence in radians.

10.2.2.7. Transverse electromagnetic modes (if applicable).

10.2.2.8. Pulse repetition rate.

10.2.2.9. A list of operational personnel which includes name (last, first, and middle), rank or civil service rating.

10.3. Laser Radiation Hazard Evaluations:

10.3.1. A hazard evaluation must be accomplished by BE and all required engineering and administrative controls must be in place prior to commencement of operations or maintenance for all readily accessible (non-interlocked, non-embedded, or both) laser systems of Class 3b, 4 and any Class 3a laser that exceeds 5 mW average power. All military unique laser systems must have a hazard evaluation (that is, GCP-1, GCP-2, MILES, and Saber 203, et. al.). Ensure the laser is properly labeled with the appropriate classification. Examples of systems **NOT** requiring a hazard evaluation include laser printers containing an embedded interlocked Class 4 laser. BE, accompanied by the ULSO, will conduct an inspection of the operation to ensure all safety procedures are in place, as prescribed in AFI 48-139 (for Air Force systems) and DA PAM 385-24 (for Army Systems).

10.3.2. If there are any changes to the operational parameters, the usage location, or the safety procedures, the ULSO will immediately notify ILSO. If needed, ILSO will schedule a new inspection.

10.3.3. In case of a suspected overexposure to laser radiation, all personnel involved will immediately report to the emergency room for evaluation. The system involved in the suspected overexposure should be powered down, but all other settings should be left alone to facilitate the incident investigation. If the system involved is mobile (for example, aircraft, vehicle, and so forth), it should remain in the location where the incident occurred, as long as safety is not compromised. The supervisor of exposed

personnel must notify the unit LSO and ILSO immediately so that required interviews and system measurements can occur as soon as practical.

## **11. EMF Emitter Operations:**

11.1. Each unit that procures an EMF emitter must contact BE for an initial evaluation. BE will assess the health risks associated with EMF use.

11.1.1. BE will maintain an inventory of EMF emitters and unit supervisors will provide updates to that inventory, when requested.

11.1.2. If there any changes to the operational parameters, the usage location, or the safety procedures associated with an emitter, the shop supervisor will immediately notify BE. If needed, BE will schedule a new BE survey.

11.1.3. BE will assign a routine surveillance frequency for emitters based upon hazard potential. If possible, routine surveillance will be conducted during periodic industrial hygiene surveys.

11.2. In the case of a suspected overexposure to EMF radiation, all personnel involved will immediately report to the emergency room for evaluation. The system involved in the suspected overexposure should be powered down, but all other settings should be left alone to facilitate the incident investigation. If the system involved is mobile (for example, aircraft, vehicle, and so forth), it should remain in the location where the incident occurred, as long as safety is not compromised. The supervisor of exposed personnel must notify BE immediately so that required interviews and system measurements can take place as soon as practical.

## **12. Training:**

12.1. Personnel who use RAM/RPD, lasers, and/or EMF emitters require initial and annual radiation safety training.

12.2. The workplace supervisor is responsible for ensuring training is conducted. Although many personnel receive training in technical school, it must be supplemented with worksite specific procedures. Training documentation shall be maintained by the supervisor.

## **13. Incidents and Accidents:**

13.1. If a spill, fire, explosion or injury involving RAM/RPD occurs, immediately notify emergency services. Specify that RAM is involved to ensure that all other appropriate agencies respond. Shut down all ancillary operations and evacuate the area. Account for all personnel. Do not allow personnel to leave the assembly area until cleared by the IRSO. Give a full description of what happened, including circumstances, amount and type of isotope, number of personnel involved, where the incident occurred, and an estimate of the extent of contamination to emergency responders and follow-on personnel.

13.1.1. In situations where radioactive materials are in use and the situation allows, personnel should quickly place the materials into appropriate storage containers and transport them away from the affected area.

13.1.2. Fire fighting must be accomplished in such a manner that exposure of personnel to radiation is held to a minimum and the spread of radioactive contamination is avoided.

13.1.3. As a general rule, when using fire hoses, water fog is preferable to solid stream application to avoid excessive runoff of water that may spread contamination.

13.1.4. Firefighters must wear protective clothing and respiratory equipment even though there is no evidence of immediate radiation danger. If possible, fire fighting should be conducted from the upwind side of the blaze.

13.2. A person who ingests or inhales radioactive material should be removed to an uncontaminated area immediately and transported for medical treatment as soon as it is safe to do so. IRSO should be notified of the incident immediately by the person's unit.

13.3. A person who has been exposed to ionizing radiation above allowable levels, either from RAM or X-ray sources, should seek immediate medical attention. The source of the exposure should be contained and any equipment involved should be shut off, but the area should be undisturbed to facilitate re-creation of the event. IRSO should be notified of the incident immediately by the exposed person's unit.

13.4. Depending on the incident, notification of off-base entities may be required as outlined in AFI 40-201, Attachment 11, *Reporting Criteria*. All off-base communications will be coordinated with the 673 ABW/CC.

13.5. Within 20 days from the date of the incident, the IRSO and Safety must receive a complete written report from the URSO with a detailed description of the incident, a chronological description of how the incident was handled, and preventive measures taken to ensure the incident will not be repeated.

#### **14. Records:**

14.1. For radioactive material permits, the PRSO and BE will maintain records as required by the CFR Title 10, DA PAM 385-24 and AFI 33-364, *Records Disposition-Procedures and Responsibilities*.

14.2. For non-permitted radioactive materials and radiation producing devices, the URSO and BE will maintain surveys, inventories, investigations, and disposition records.

14.3. For lasers and EMF emitters, the URSO and BE will maintain inspections, investigations, surveys and inventories.

14.4. Personnel exposure records will be kept on AF Form 1527-1, *Annual Report of Individual Occupational Exposure to Ionizing Radiation* or Army equivalent, and maintained in the BE Office and individual's personal medical record.

**15. Information Collections.** No information collections are required by this publication.

BRIAN R. BRUCKBAUER, Colonel, USAF  
Commander

**Attachment 1****GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

- AFPD 48-1, *Aerospace Medicine Enterprise*, 23 August 2011.
- AFI 40-201, *Managing Radioactive Materials In The US Air Force*, 16 March 2011.
- AFI 48-148, *Ionizing Radiation Protection*, 21 September 2011.
- AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, 4 October 2011.
- AFI 48-109, *Electromagnetic Frequency (EMF) Occupational Health Program*, 1 Aug 2014.
- AFI 48-139, *Laser Radiation Protection Program*, 25 July 2012.
- AFI 91-202, *The US Air Force Mishap Prevention Program*, 5 August 2011.
- AFI 91-204, *Safety Investigations and Reports*, 12 February 2014.
- AR 385-10, *The Army Safety Program*, 23 May 2008.
- DA PAM 385-24, *The Army Radiation Safety Program*, 22 September 2011.
- DA PAM 385-25, *Occupational Dosimetry and Dose Recording for Exposure to Ionizing Radiation*, 2 Oct 2012
- DA PAM 385-40, *Army Accident Investigation and Reporting*, 25 February 2010.
- 10 CFR, *Energy*, 1 January 2011.
- 29 CFR, *Labor*, 1 July 2011.
- 40 CFR, *Environmental Protection*, 1 July 2011.
- 49 CFR, *Transportation*, 1 October 2011.
- DODI 6055.08, *Occupational Ionizing Radiation Protection Program*, 15 December 2009.
- DODI 6055.11, *Protecting Personnel from Electromagnetic Fields*, 19 August 2009.

**Adopted Forms**

- AF Form 55, *Employee Safety and Health Record*.
- NRC Form 241, *Report Of Proposed Activities In Non-Agreement States, Areas of Exclusive Federal Jurisdiction, Or Offshore Waters*.
- AF Form 847, *Recommendation For Change Of Publication*.
- AF Form 1527-1, *Annual Report of Individual Occupational Exposure to Ionizing Radiation*.
- AF Form 2759, *Industrial Hygiene Survey Data Sheet – General*.

**Prescribed Forms**

No forms were prescribed by this publication.

*Abbreviations and Acronyms*

**ACOM**—Army Command.

**AFPD**—Air Force Policy Directive.

**AFRIMS**— Air Force Records Information Management System.

**ALARA**—As Low As Reasonably Achievable.

**ASCC**—Army Service Component Commander.

**BE**—Bioenvironmental Engineering.

**CFR**—Code of Federal Regulations.

**DLA**— Defense Logistics Agency.

**DOD**—Department of Defense.

**DOE**—Department of Energy.

**DOL**—Department of Labor.

**DRMO**—Defense Reutilization and Marketing Office.

**DRURSSO**—Direct Reporting Unit Radiation Safety Staff Officer.

**EMF**—Electromagnetic Frequency.

**ESOHC**—Environmental, Safety, and Occupational Health Committee.

**ILSO**—Installation Laser Safety Officer.

**IRSO**—Installation Radiation Safety Officer.

**JBER**— Joint Base Elmendorf – Richardson.

**LSO**—Laser Safety Officer.

**NDI**— Non-Destructive Inspection.

**NRC**—Nuclear Regulatory Commission.

**OI**—Operating Instruction.

**OPR**—Office of Primary Responsibility.

**PCS**—Permanent Change of Station.

**PRSO**—Permit Radiation Safety Officer.

**RAM**—Radioactive Material.

**RIC**—Radioisotope Committee.

**RDS**— Records Disposition Schedule.

**RPD**—Radiation Producing Device.

**RSO**—Radiation Safety Officer.

**SSS**— Staff Summary Sheet.

**TLD**—Thermo Luminescent Dosimetry.

**UCMJ**— Uniform Code of Military Justice.

**URSO**—Unit Radiation Safety Officer.

**WRMC**—Western Regional Medical Center.

### *Terms*

**91(a) Material**— RAM exempted from NRC licensing controls under Section 91(a) of the AEA of 1954, as amended, in the interest of national defense, under the possession of the DOE.

**91(b) Material**— RAM exempted from NRC licensing controls under Section 91(b) of the AEA of 1954, as amended, in the interest of national defense, under the possession of the DoD. These include materials in nuclear weapons.

**As Low As Reasonably Achievable (ALARA)**— The principle that personnel exposures must be maintained as low as possible consistent with existing technology, cost, and operational requirements.

**Emitter**— Any device which is designed to generate RF energy and couple this energy into the surrounding space.

**Frequency**— The number of cycles completed by an electromagnetic wave in one second, given in cycles and (or) second or hertz.

**Ionizing Radiation**— Any electromagnetic or particulate radiation capable of producing ions directly or indirectly in its passage through matter. Examples are X-rays and gamma rays.

**License**— Written authorization from the NRC or an Agreement State to acquire, receive, use, store or transfer byproduct, source, or SNM. Licenses will be either (1) General License published in NRC or Agreement State Regulations, that is effective without any need to send an application to, or that is effective to any applicant on registration with, the NRC or an Agreement State or (2) Specific License issued by the NRC or Agreement State to a named applicant who has filed an application authorizing acquisition, ownership, receipt, storage, use, transfer, and disposal of chemical or physical forms of radioisotopes specified in the license. This license has an expiration date renewable on application to the issuing authority. The license may be limited in scope (authorizing only certain specific radioisotopes for limited users) or broad (authorizing the use of a wide variety of radioisotopes without regard to form, quantity, or use).

**Nonionizing Radiation**—Any electromagnetic radiation incapable of producing ions directly or indirectly. Microwaves and RF energy are forms of nonionizing radiation.

**Nuclear Regulatory Commission**— An agency established by Title II of the Energy Reorganization Act of 1974 (Public Law 93-438) to regulate byproduct, source, and Special Nuclear Material (SNM) as provided for by the Atomic Energy Act of 1954, as amended. Within the NRC, final authority rests with the five member Commission acting as a body.

**Permit**— Shortened term for USAF or USN RAM Permit. See USAF RAM Permit.

**Radiation Safety Officer**— An individual with specific education, military training, and professional experience in radiation protection practice appointed by a Permittee or the USAF Radioisotope Committee to manage radiation safety programs. The term "Radiation Safety

Officer" is a functional title and does not denote a commissioned status or specialty code. The RSO must have the education, military training, and professional experience needed for the job. Take care when addressing RSO qualifications and duties to distinguish between IRSO and PRSOs. Individuals appointed as the IRSO might not always have the specific technical experience and training needed to qualify as the PRSO.

**Radioactive Item**— A single unit or article constructed of or having RAM, greater than exempt quantities, as a component part.

**Radioactive Material (RAM)**— Materials whose nuclei, because of their unstable nature, decay by emission of ionizing radiation. The radiation emitted may be alpha particles, beta particles, gamma rays, X-rays, or neutrons.

**USAF Radioactive Material Permit**— Written authorization from the USAF Radioisotope Committee for USAF organizations to receive, possess, use, distribute, store, transport, transfer and dispose of RAM. Permits parallel NRC licenses in applications and scope. The USAF's Master Materials License, and Broad Scope licensees, issue permits which are equivalent to NRC licenses for authorizing NRC regulated material. Unlike the NRC, a single permit may authorize byproduct, source, SNM, and Naturally Occurring or Accelerator Produced Radioactive Material (NARM).

**USAF Radioisotope Committee (RIC)**— A committee established in accordance with requirements of the USAF Master Materials License to coordinate the administrative and regulatory aspects of permitting, acquiring, receiving, possessing, using, distributing, storing, transporting, transferring and disposing of all RAM in the USAF, except that material transferred from the Department of Energy to the Department of Defense in nuclear weapon systems, certain radioactive parts of weapons systems and nuclear reactor systems, parts and fuel controlled under Section 91(a) or 91(b) of the AEA. It is composed of stake-holder representatives from Staff Air Force and Headquarters Air Force.