This instruction implements AFPD 48-1, *Aerospace Medical Program*. This instruction prescribes the precautionary measures and procedures for requisitioning, handling, storing, using and disposing of Radioactive Materials (RAM), and ionizing (e.g. x-ray, radioactive sources, etc.) and nonionizing (e.g. radio-frequency emitters, lasers, microwave, etc.) radiation producing machines. It applies to all Hill Air Force Base (AFB) personnel, contractors, tenant organizations, Geographically Separated Units (GSUs; Little Mountain, Utah Test and Training Range (UTTR), and Carter Creek), and other operating locations controlled by Hill AFB using RAM or radiation producing machines. Ensure that all records created as a result of processes prescribed in this publication are maintained In Accordance With (IAW) AFMAN 33-363, *Management of Records*, and disposed of IAW the Records Disposition Schedule (RDS) located at https://www.my.af.mil/afrims/afrims/afrims/rims.cfm. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the Air Force Form 847, *Recommendation for Change of Publication* through channels to 75th Aerospace Medicine Squadron, Bioenvironmental Engineering Flight (75 AMDS/SGPB), 7238 6th Street, Building 249, Hill AFB, UT 84056.

**SUMMARY OF CHANGES**

This publication has been revised to clarify pregnancy declaration requirements to accommodate changes in Air Force Manual (AFMAN) 48-125. In addition, new Installation Radiation Safety Officer (IRSO) responsibilities and a section on the responsibilities of a Permit Radiation Safety Officer (PRSO) were added to accommodate changes in Air Force Instruction (AFI) 40-201.
1. **Scope.** The control of ionizing and nonionizing radiological health hazards by the 75 AMDS/SGPB is directed toward safeguarding the health of persons working or living in the vicinity of Hill AFB. The effectiveness of this publication depends on the personnel responsible for organizing and implementing the Hill AFB Radiation Safety program. Specifically needed are the consistent and conscientious efforts practiced by the individual who uses and the supervisor who guides the use of materials or machines producing ionizing and nonionizing radiation.

   1.1. **As Low As Reasonably Achievable (ALARA) Philosophy.** The ALARA concept was developed in response to scientific evidence suggesting that no level of radiation exposure is entirely risk free. It is a policy which states that although there are acceptable, conservative levels of radiation exposure specified by Federal regulations, it is prudent to make every effort to reduce exposures to the lowest levels reasonably achievable, thus offering a low risk of adverse health effects compared to the other hazards of life and occupation and lowering the health risk associated with that exposure. In fact, individual and cumulative radiation exposures must be maintained as close to zero as possible given the type of activities involved, the state of technology, the risk to the individuals exposed, and the benefit to society from the activity being accomplished. The guidance in this instruction provides the basis for conducting an effective ALARA Program.

   1.2. The IRSO manages the radiation safety program and ALARA concept at Hill AFB. The following summarizes Hill AFB’s ALARA commitment:

       1.2.1. Hill AFB and its senior leadership is committed to the ALARA philosophy for maintaining individual and collective radiation doses ALARA.

       1.2.2. Management fully supports modifications to operating and/or maintenance procedures and to equipment and/or facilities if they will reduce exposures unless the cost is considered unjustified.

2. **Roles and Responsibilities**

   2.1. The 75th Air Base Wing Commander (75 ABW/CC):

2.1.2. Ensures all base personnel comply with this instruction. This includes military personnel, civilian employees, contractor personnel, and visitors.

2.1.3. Ensures all base activities comply with applicable Federal and USAF directives covering the use of ionizing and nonionizing radiation-producing equipment, the permitting, procurement, storage, handling, accountability for and disposal of RAM, and the reporting of incidents or accidents to the appropriate authorities.

2.2. The 75th Medical Group Commander (75 MDG/CC) ensures records are maintained, medical follow-up is provided, and compliance is achieved as required in AFI 48-148.

2.3. The Installation Radiation Safety Officer (IRSO).

2.3.1. Is directly responsible to 75 ABW/CC regarding all radiation producing equipment and operations to include radiological health protection matters and will:

2.3.2. Manage the Hill AFB Radiation Safety Program whose primary goal is to maintain radiation exposures to personnel IAW ALARA concept;

2.3.3. Investigate, evaluate, initiate corrective action and report on defects or noncompliance items relating to substantial safety hazards involving materials or devices producing radiation;

2.3.4. Exercise authority to terminate operations when imminent danger to health, environment, or USAF resources exists;

2.3.5. Enforce the rules and regulations stated on all current permits/licenses authorizing use of RAM.

2.3.6. Annually, provide 75th Security Forces Squadron, Plans Office (75 SFS/SFOXP), and 775th Civil Engineer Squadron, Civil Engineer Fire Protection Flight (775 CES/CEF) with a list of facilities containing radioactive commodities and radiation producing equipment that may be potential hazards during emergency operations;

2.3.7. Develop procedures to assess permit compliance. Note: If organizations are in noncompliance, the IRSO has the responsibility to advise 75 ABW/CC, Headquarters Air Force Materiel Command, Bioenvironmental Engineering (HQ AFMC/SGPB), Radioisotope Committee Secretariat (RICS) and organization’s senior management as appropriate. HQ AFMSA/SG3PB or Nuclear Regulatory Commission (NRC) has the authority to revoke the permit;

2.3.8. Monitor the base radiation Thermoluminescent Dosimeter (TLD) program. Provide initial information/training to all personnel subject to occupational ionizing radiation exposure;

2.3.8.1. Obtain from female Active Duty personnel on the dosimetry program (wears an assigned TLD), signed statements that they understand their responsibility to notify their supervisor immediately if they become pregnant;
2.3.8.2. Obtain from female civilian employees on the dosimetry program (wears an assigned TLD), a signed statement that they understand if they become pregnant they may voluntarily declare pregnancy;

2.3.8.3. Instruct female TLD wearers on the risks to the fetus if the worker is exposed to ionizing radiation while pregnant.

2.3.9. Monitor areas in which radiation is used;

2.3.10. Provide technical advice on emergency procedures, e.g., spills, explosions, or fire involving RAM;

2.3.11. Review and approve plans for proposed radiation usage by Hill AFB and contractor personnel. Approval is required for RAM and all radiation producing devices including laser and;

2.3.12. Perform radiation protection surveys;

2.3.13. Provide technical advice and approval/disapproval regarding the receipt, shipment, transfer, and disposal of RAM. Furthermore, ensure the receipt, shipment and transfer of RAM are properly monitored and identified;

2.3.14. Maintain all necessary records of the Hill AFB radiation safety program, USAF RAM permits, and documentation in support of USAF and Federal instructions, licenses, and permits;

2.3.15. Identify to individual users and their supervisors the protective equipment and facilities necessary for the safe conduct of projects and programs involving the use of radiation;

2.3.16. Manage and control the radioactive waste disposal program, which ensures proper packaging, storage, transport, and disposal of radioactive waste by Hill AFB organizations;

2.3.17. Annually brief the Environment, Safety and Occupational Health Council (ESOHC) on the use(s) of RAM on the installation;

2.3.18. Approve the procurement, acceptance, transfer, and use of RAM on the installation;

2.3.19. Assist the UTTR Operating Authority in the identification of RAM in targets or target materials prior to placement on the UTTR;

2.3.20. Provide assistance to the 75th Logistics Readiness Squadron (75 LRS/LGRS) to ensure compliance with all laws and regulations relative to the receipt, shipment, and transfer of RAM; and,

2.3.21. Audit all installation RAM permits and brief the 75 ABW/CC on the results by 31 December of each year.

2.4. The Permit Radiation Safety Officer (PRSO):

2.4.1. Must be a member of the Permittee’s unit, unless otherwise specified by the IRSO and approved by the RICS. The PRSO cannot be the Permittee;
2.4.2. Coordinates with the Permittee on requests for an initial permit (as proposed PRSO), renewals, amendments to an existing permit, or termination of a permit; 

2.4.3. Ensures compliance with applicable AFIs, parts of 10 Code of Federal Regulation (CFR), permit conditions and representations in permit applications; 

2.4.4. Informs the Permittee, supervisors, workers, and IRSO when procedures are not in compliance with instructions; 

2.4.5. Records or files documents as required by AFI 40-201 and maintains in binders or files; and, 

2.4.6. Completes all duties specified in permit and AFI 40-201. 

2.5. Supervisors will, when applicable: 

2.5.1. Be responsible for implementing the ALARA concept; 

2.5.2. Indoctrine new employees in the principles of radiation safety to include proper wear and storage of personnel dosimeters. Immediately notify 75th Aerospace Medicine Squadron Occupational Medicine (75 AMDS/SGPO) and 75 AMDS/SGPB of assignment of personnel to work involving ionizing radiation; 

2.5.3. By written request to 75 AMDS/SGPO, ensure personnel are given pre-employment physicals prior to assignment to duties involving class 3B and 4 laser radiation and request termination physicals when no longer in radiation area; and, 

2.5.4. Immediately notify the IRSO of any equipment, personnel, or procedural changes regarding ionizing or nonionizing radiation use; 

2.5.5. Ensure all radiological health emergencies are reported to the IRSO; 

2.5.6. Enforce the requirements imposed by permits/licenses for RAM; 

2.5.7. When applicable, maintain and comply with the RAM permit. Keep a record of the RAM within the area of supervision and send a copy to 75 AMDS/SGPB; 

2.5.8. Enforce all health and safety publications relative to the safe handling of RAM and machines producing ionizing and nonionizing radiation; 

2.5.9. Ensure the IRSO or alternate IRSO is notified immediately whenever personnel listed on the RAM permit are changed; 

2.5.10. Order, maintain, and operate radiation detection equipment necessary to ensure compliance with Federal standards; 

2.5.11. Be responsible for the safety of workers in any radiation environment, including preoperative checks of safety equipment; for example, monitoring instruments, hood flow, eye shields, and interlocks; 

2.5.12. Ensure all necessary safety equipment (such as shields, hoods, protective clothing, instruments, and long-handled tongs) is available and used by personnel working with radiation sources; 

2.5.13. Conduct inspections necessary to ensure that all safety equipment is operative and in a good state of repair;
2.5.14. Be alert for equipment failure or malfunction or improper safety procedures by personnel, which may result in excessive radiation exposure of personnel;

2.5.15. Prepare a written training lesson plan in coordination with the IRSO. These plans must, at a minimum, address the proper use of equipment and materials, emergency procedures, and exposure minimization.

2.6. Individual users will:

2.6.1. Learn and implement the rules of ALARA and radiation safety as described in applicable Federal, USAF, and Hill AFB instructions as well as in organizational instructions;

2.6.2. Wear personnel monitoring devices if directed by their supervisors and the IRSO. Verify that monitoring devices are functioning properly before beginning work;

2.6.3. Wear appropriate protective clothing and equipment as prescribed by supervisors and the IRSO;

2.6.4. Inform their supervisor of any changes in equipment, procedures, or other factors involving RAM or radiation producing devices which may alter the radiation safety practices or radiation levels in unrestricted areas; and,

2.6.5. Report incidents/accidents and hazardous conditions immediately to their supervisor, PRSO, or the IRSO, when appropriate.

2.7. The 75 AMDS/SGPO will:

2.7.1. Provide pre-employment and termination physical examinations to all persons assigned to duties involving potential exposure to laser radiation as required by Air Force Occupational Safety and Health Standard (AFOSHSTD) 48-139, *Laser Radiation Protection Program*; and,

2.7.2. Conduct special examinations and clinical tests as required.

2.8. The 75th Aerospace Medicine Squadron Public Health Flight (75 AMDS/SGPM) will facilitate education of personnel occupationally exposed to radiation.

2.9. The 75th Force Support Squadron Military Personnel Flight (75 FSS/FSMPS) will effect temporary reassignment of military personnel occupationally exposed to ionizing radiation when reassignment is recommended by medical personnel. The Ogden Air Logistics Complex Civilian Personnel Office (OO-ALC/DPCC) will effect temporary reassignment of a declared pregnant civilian.

2.10. The Hill AFB Contracting Directorate (PK) will coordinate all contractor use of radiation producing devices with the IRSO (see paragraph 3.1. for requestor responsibilities). Contracts will include appropriate requirements as indicated in the Federal Acquisition Regulations for the use of RAM and radiation producing equipment.

### 3. Ionizing Radiation

3.1. Procurement. No individual or organization will procure RAM or radiation producing devices without prior approval of the IRSO. Requests for approval will be submitted to 75 AMDS/SGPB for review and approval at least 30 days prior to the expected project/use start date. Requests involving use by a contractor require coordination and submission of a
requirement package to PK. The request must clearly identify the sources and/or equipment to be used on.

3.2. The user will prepare a letter of justification and supporting documentation indicating the materials or equipment desired. This request must be submitted to 75 AMDS/SGPB for review. Requests must include, as a minimum, the following:

3.2.1. Name, title, organization, and telephone number of user;
3.2.2. Names, titles, and organizations of all personnel who will regularly use the material or equipment;
3.2.3. Exact locations where the material or equipment will be kept; and,
3.2.4. Brief outline of procedure to be followed and any other special requirements;
3.2.5. Organizations and contractors performing work at Hill AFB must obtain a Nuclear Regulatory Commission (NRC), Agreement State License, USAF, or Navy RAM permit in order to possess or use RAM on Hill AFB.

3.3. Permittees will submit an application for permit amendments to 75 AMDS/SGPB. RAM may not be procured until the applicant has received written approval from the IRSO.

3.4. Receipt of RAM on Hill AFB and associated GSUs.

3.4.1. All RAM shipped to Hill AFB, regardless of destination, will be coordinated with the IRSO who will verify the organization is allowed to receive the RAM IAW applicable standards.

3.4.2. Materials authorized under a USAF RAM Permit must have the approval and coordination of both the PRSO and IRSO prior to accepting delivery of RAM.

3.5. Storage. All RAM storage areas must be preapproved by the IRSO.

3.5.1. Store all RAM in safe and secure locations to prevent removal by unauthorized personnel. Machines which produce ionizing radiation may be stored in convenient locations provided they are in a configuration to preclude inadvertent operation.

3.5.2. RAM or items will be stored as directed by the IRSO.

3.5.3. Confine shipping and storage containers to the designated storage area, even when empty.

3.5.4. Excess RAM will be processed through 75 AMDS/SGPB. The authorized storage area is located in Building 830, Bay B. RAM in Building 830 shall be secured/locked and not stored with other hazardous materials. Only 75 AMDS/SGPB staff are allowed access to the storage area. The storage area shall be posted with a conspicuous sign or signs bearing the radiation symbol and the words “CAUTION RADIOACTIVE MATERIAL.”

3.6. Shipment. All RAM will be shipped through Distribution Depot – Hill, Utah (DDHU), DDHU/CGA, Building 849, unless other means are approved by the IRSO. Materials will be held in the Transportation Hazardous Material Shipping area until surveyed by the DDHU designee or the IRSO. Persons responsible for permitted RAM may not transfer such material to another person or organization except as provided in the applicable portions of the
USAF RAM permit and IAW AFI 40-201. Contact the IRSO and PRSO for coordination and assistance.

3.6.1. Other transfers. Individuals or organizations requiring transfer of RAM must notify the IRSO prior to the transfer. The 649th Munitions Squadron (649 MUNS) must coordinate all transfers, receipts, and movements of 30 mm rounds containing depleted uranium.

3.6.2. Users will complete a DD Form 1149, Requisition and Invoice/Shipping Document, when turning in RAM for shipment off base.

3.7. Disposal. The owning organization where the waste was generated is responsible for collection, segregation, and handling of radioactive wastes in consultation with the IRSO. The area supervisor will keep inventory records of the type of RAM in each waste container. Waste containers will be marked with labels bearing the radiation symbol and the words “RADIOACTIVE MATERIAL,” and labeled to indicate the nature of the contents. The supervisor will report any lost or misplaced containers/material immediately to the IRSO. Under no circumstances will one using organization accept radioactive waste from another without written concurrence from the IRSO.

3.7.1. Using organizations will:

3.7.1.1. Dispose of radioactive waste IAW guidance provided by the IRSO;

3.7.1.2. Monitor containers for radiation intensity and take swipe samples to determine if there is any removable contamination; and,

3.7.1.3. Forward waste information as requested by the IRSO.

3.7.2. Excess permitted, licensed RAM or nonpermitted RAM. These materials will be shipped to Building 830 for storage pending disposal upon approval of the IRSO. Owners and users of permitted RAM will contact the PRSO and IRSO for approval to dispose of their sources. Permitted or licensed RAM received from off-base organizations will not be disposed of unless approved by the IRSO.

3.7.3. Nonpermitted RAM. On-base users needing to dispose of nonpermitted excess RAM must submit a completed DD Form 1348A with the RAM when taking the RAM to Building 830. Before bringing the RAM to Building 830, contact 75 AMDS/SGPB for coordination. Nonpermitted excess RAM received in Building 849 from off-base sources shall be surveyed and a DDRW Form 359, Radioactive Material Movement Form, or equivalent completed. Transfer of the RAM can then be coordinated with 75 AMDS/SGPB for storage pending disposal.

3.7.4. The following information must accompany RAM sent to Building 830:

3.7.4.1. Name and organization of person turning in the material;

3.7.4.2. Building number and date the material was turned in;

3.7.4.3. Item name and/or description;

3.7.4.4. National stock number (if available);

3.7.4.5. Part number or model number;
3.7.4.6. Quantity of each item;

3.7.4.7. Radioactive material (e.g., tritium, Cs-137, Ra-226, etc.); and,

3.7.4.8. Radioactivity (e.g., 10 mCi, 5 microcuries, 100 nCi, 3 uCi, etc.)

3.7.5. No RAM will be sent to the Defense Reutilization Marketing Office (DRMO).

3.7.6. The IRSO will arrange for disposal of RAM with Air Force Radioactive Recycling and Disposal (AFFRAD) at Wright-Patterson AFB, OH. They office will provide disposal instructions. Disposal will be arranged periodically.

3.8. Surveys. The IRSO will establish a schedule and conduct surveys deemed necessary. Special surveys will be performed upon request; please contact 75 AMDS/SGPB (777-4551) to schedule.

3.8.1. Types of surveys are:

3.8.1.1. Portable survey meters to detect alpha, beta, gamma, neutrons, or x-rays;

3.8.1.2. Swipe sample surveys; and,

3.8.1.3. Evaluations of procedures, materials, and documentation.

3.9. Leak Testing Sealed Sources. Each generally licensed or permitted sealed source acquired from another person or organization, (containing RAM with a half-life greater than 30 days and in any form other than gas) will be tested for contamination and leakage before use, as applicable.

3.9.1. In the absence of certification indicating a test had been made within six months prior to the transfer, the sealed source will not be put in use until tested.

3.9.2. The test will be capable of detecting the presence of 0.005 microcuries (185 Becquerels [Bq]) or more of RAM on the test sample.

3.9.3. Each sealed source the permittee uses (containing by-product material or any other RAM with a half-life greater than 30 days and in any form other than gas) will be tested for leakage and contamination at intervals of six months, unless otherwise specified in the permit.

3.9.4. If the above tests reveal the presence of 0.005 microcuries (185 Bq) or more of removable contamination, the permittee will immediately notify the IRSO and withdraw the sealed source from use.

3.9.5. Sources are to be leak tested before and after long-term storage.

3.10. Personnel Dosimetry Program (TLD).

3.10.1. Requests for dosimetry service will be completed before personnel are assigned duties involving ionizing radiation. The area supervisor will have the individual report to 75 AMDS/SGPB, Building 249. The supervisor will submit a written notice to 75 AMDS/SGPB when personnel are relieved from duties involving ionizing radiation.

3.10.2. All workers entering radiation areas will wear a Thermoluminescent Dosimeter (TLD), as directed by the IRSO.
3.10.3. TLDs will be worn on the part of the body most likely to receive the greatest exposure to radiation. When one badge is issued it will be worn outside of any protective equipment such as a lead apron. When two badges are issued, the badge designated as the collar badge will be worn outside any protective equipment on or near the collar. The body badge will be worn under the protective equipment.

3.10.4. Never place the badge inside the pocket or behind cloth, cigarettes, coins, or any personal obstruction whatsoever.

3.10.5. Tampering with TLDs is prohibited. If these devices are accidentally damaged or exposed, the wearer must immediately return them to 75 AMDS/SGPB for exchange and subsequent evaluation. The wearer will explain the nature of the accident to aid in evaluation of the TLD.

3.10.6. Personnel working with industrial x-ray equipment will wear one Electronic Pocket Dosimeter (EPD) as prescribed by the IRSO. This will permit frequent reading of the dosimeters during hazardous procedures. EPDs should be worn clipped on the breast pocket of the outer garment. Never place EPDs behind dense materials in the pocket.

3.10.7. When visitors enter a radiation area, they are required to register with the supervisor before entry. The supervisor will issue an EPD to the visitor and maintain an AFTO IMT 115, Digital Alarm Dosimeter Result Log, with the visitor's name, address, date, time in and out, EPD number, and final readings on the EPD. The IRSO will designate those areas and circumstances in which visitors will wear TLDs in addition to the EPD.

3.10.8. Allowable limits for occupationally exposed individuals, as well as those for the general public and action/investigational levels will be documented by 75 AMDS/SGPB.

3.10.9. The IRSO will investigate abnormal exposures IAW AFMAN 48-125.

3.11. Occupational Exposure of Declared Pregnant Females. The IRSO, or designee, will inform personnel who declare pregnancy of the risks of radiation exposure to the unborn.

3.11.1. Female military personnel must declare pregnancy and provide the estimated date of conception. Female civilian employees may voluntarily notify 75 AMDS/SGPO or the IRSO in writing of their pregnancy and date of conception.

3.11.2. The IRSO may recommend to the referring physician that specific duties of a declared pregnant female be limited if the individual may receive a whole body exposure greater than 500 mrem (5 millisieverts [mSv]) during the gestational period.

3.11.3. If the IRSO determines it is unlikely that the declared pregnant female would receive a total exposure during the term of the pregnancy (including the period preceding the confirmation of the pregnancy) in excess of 500 mrem (5 mSv), she may continue in her radiation-related duties; however, if the individual is not on the USAF personnel TLD program, she will be enrolled for the duration of her pregnancy.

3.11.4. Special consideration will be given when a declared pregnant worker’s radiation duties involve the operation of high output sources or the use of unsealed RAM.

3.12. Training will be provided to individuals who in the course of their duties are likely to receive an occupational dose in excess of ten percent of the occupational limit in a year.
3.12.1. Personnel will be provided radiation safety training commensurate with their duties. Additionally, training will be provided:

3.12.1.1. Before the individual is permitted to assume duties with or in the vicinity of radiation sources;
3.12.1.2. Annually during refresher training;
3.12.1.3. When there is a significant change in duties or radiation safety requirements; and,
3.12.1.4. By the supervisor, PRSO, IRSO or their designee.

3.12.2. Topics covered will include, but are not limited to:

3.12.2.1. Applicable regulations and permit conditions;
3.12.2.2. Areas where radiation sources are used or stored and the types of radiation emitted;
3.12.2.3. Potential hazards from the radiation sources;
3.12.2.4. Radiation safety procedures;
3.12.2.5. Work rules pertinent to the radiation source(s);
3.12.2.6. Employee responsibility to report unsafe conditions or practices;
3.12.2.7. Emergency response procedures;
3.12.2.8. Employee right to be informed of occupational radiation exposure results; and,
3.12.2.9. Location where pertinent regulations and documents are available for review.

4. Lasers

4.1. The Installation Laser Radiation Safety Officer (LRSO) manages the laser radiation safety program at Hill AFB. The IRSO is also designated as the LRSO. All laser operations will be managed IAW AFOSH STD 48-139, Laser Radiation Protection Program. Prior to the start of any operation utilizing Class 3 or 4 lasers, 75 AMDS/SGPB must be contacted to conduct a laser safety evaluation. The 75 AMDS/SGPB has final approval authority for laser operations.

4.2. The using activity, when requesting approval of laser operations, shall:

4.2.1. Prepare an Operating Instruction (OI) for the laser based on the manufacturer’s instructions and forward a copy to 75 AMDS/SGPB for review and approval. The instruction will contain the following information, as a minimum:

4.2.1.1. Safety requirements;
4.2.1.2. Personal hazards including safe eye exposure distance;
4.2.1.3. Location;
4.2.1.4. Sequence of operations;
4.2.1.5. Individual (name) assigned as unit laser safety officer by the unit commander;

4.2.1.6. Biological effects of lasers; and,

4.2.1.7. Training requirements.

4.3. Send the following information to 75 AMDS/SGPB on AF Form 2760:

4.3.1. Location of use (building and room number);

4.3.2. Type of laser;

4.3.3. Wavelength;

4.3.4. Output power;

4.3.5. Mode of operation;

4.3.6. Pulse duration, if applicable;

4.3.7. Beam diameter in millimeters or centimeters;

4.3.8. Beam divergence in radians;

4.3.9. Transverse electromagnetic modes, if applicable;

4.3.10. Pulse repetition rate;

4.3.11. List of operational personnel giving the last, first, and middle name, rank or civil service rating, and last four digits of their Social Security Number (SSN); and,

4.3.12. The maximum number of personnel required to participate in the operation.

4.4. Standards. MIL-STD-1425, Military Lasers and Associated Support Equipment, and CFR Title 21, Food and Drug Administration, must be complied with in procuring nonexempt and exempt lasers respectively.


4.6. Training. Training may be provided by the LRSO or other qualified individual, subject to LRSO approval, and will be provided upon assignment to laser duties and annually thereafter. Users of lasers will receive training commensurate with their duties. At a minimum, training will include:

4.6.1. Location of lasers;

4.6.2. Hazard evaluation of the emitter (provided by 75 AMDS/SGPB);

4.6.3. Emergency procedures;

4.6.4. Biological effects of lasers;

4.6.5. Protective equipment requirements (e.g., laser goggles);

4.6.6. Conditions and limitations of use (hazard areas, emergency shut-off location, notifications, signage requirements, etc.);

4.6.7. Potential hazards; and,

4.6.8. Worker responsibilities.
4.7. Medical Surveillance. Only personnel who routinely work in a laser environment and are exposed to Class 3B or 4 lasers will be monitored.

5. **Radio Frequency Radiation (RFR)**

5.1. Operations. All RFR operations will be managed IAW AFOSH STD 48-9, *Radio Frequency Radiation (RFR) Safety Program*. Prior to the start of any operation utilizing RF systems, the user must contact the 75th Air Base Wing Frequency Manager (75 ABW/SCOI) and 75 AMDS/SGPB to conduct a hazard evaluation. After the initial evaluation, the frequency of future surveys will be based on the risk assessment rating and will be at the discretion of the IRSO.

5.2. RFR Surveys. The surveyor will obtain the following information from the supervisor of an area in which RFR emitters are used:

   5.2.1. Location and nomenclature;
   5.2.2. Organization responsible for its use;
   5.2.3. Function of the RFR emitter;
   5.2.4. Operating frequency (or frequencies);
   5.2.5. Antenna gain;
   5.2.6. Output power (state if average or peak);
   5.2.7. Operating mode (continuous wave or pulsed); and,
   5.2.8. Pulse repetition frequency and pulse width.

5.3. Supervisors will coordinate all modifications and additions to RFR emitters with 75 AMDS/SGPB. Supervisors are responsible for ensuring their workers are aware of and follow the safety procedures outlined in AFOSH STD 489, equipment technical manuals, and unit safety awareness training. Supervisors will review and implement their responsibilities as explained in AFOSH STD 48-9.

5.4. Units will develop a local OI governing the use of the RFR equipment and submit it to 75 AMDS/SGPB for review and approval. As a minimum, the instruction will include:

   5.4.1. Modes of operation;
   5.4.2. Hazard evaluation data;
   5.4.3. Training requirements;
   5.4.4. Location of emitter; and,
   5.4.5. Biological effects of RF radiation.

5.5. Training. Personnel who work in a RFR environment and may be exposed to levels above the Permissible Exposure Limit (PEL) listed in AFOSH STD 48-9 will receive initial and annual training. Training will be provided and documented by the unit. Users of RFR emitters will receive training commensurate with their duties. At a minimum, training will include:

   5.5.1. Location of emitters;
5.5.2. Hazard evaluation of the emitter (provided by 75 AMDS/SGPB);
5.5.3. Emergency procedures;
5.5.4. Biological effects of RF radiation;
5.5.5. Conditions and limitations of use (hazard areas, emergency shut-off location, notifications, signage requirements, etc.);
5.5.6. Potential hazards; and,
5.5.7. Worker responsibilities.

5.6. Medical Surveillance. There are no requirements for routine medical surveillance.

6. Emergency Procedures

6.1. Emergencies include any unusual occurrences that result in contamination of facilities or environment, or that may result in the exposure of personnel to hazardous levels of radiation. The IRSO must be notified immediately of all emergencies involving radiation.

6.2. Investigations. The IRSO will conduct an investigation to determine and evaluate the extent of exposures from all sources of radiation. All reporting and investigations will be IAW AFI 91-202, The US Air Force Mishap Prevention Program; AFI 91-204, Safety Investigations and Reports; and AFI 40-201, Managing Radioactive Materials in the US Air Force. Reporting under AFI 91-204 does not negate the reporting requirements of AFI 40-201 and the NRC.

6.3. Spills. Treat any RAM spill as a major spill until monitoring can be accomplished to determine the actual intensity of the radiation exposure.

6.4. Basic fire-fighting procedures are:

6.4.1. The fighting of fires, which may occur in buildings, 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. The supervisor will forward to the 775 CES/CEF a set of floor plans showing the locations of radiation areas and RAM storage areas.

6.4.2. 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.

6.4.3. Should a fire ignite, sound the evacuation alarm, call 911 and notify 75 AMDS/SGPB of its location. If no immediate radiation hazard exists and the potential for sustaining injuries is remote, combat the fire using the nearest fire extinguisher, sand, or water. If there is sufficient time, personnel who are using RAM and are not in the fire area should quickly place their RAM into storage containers, transport containers from the area, then close the windows and doors, and shut off the ventilation system before leaving the area.

6.4.4. 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.

6.5. Ingestion or Inhalation of RAM. Any cases involving the suspected inhalation or ingestion of RAM must be reported immediately to the IRSO for guidance.
7. Miscellaneous

7.1. Consultant Services. The 75 AMDS/SGPB is available to all base and tenant organizations for consultant services regarding radiation related issues.

7.2. Records. Records will be maintained as follows:

7.2.1. The owner, user, and 75 AMDS/SGPB will maintain records on all USAF permits and on all materials licenses, as required by Title 10, CFR, and AFMAN 33-363, Management of Records and AFRIMS Records Disposition Schedule (RDS).

7.2.2. The records will have the specific radionuclide, date of original activity, serial number, physical nature (solid, liquid, or plated), amount of original activity; and if a liquid, the volume and concentration.

7.2.3. Personnel exposure records will be kept on AF Form 1527, History of Occupational Exposure to Ionizing Radiation.

7.2.4. The 75 AMDS/SGPB will maintain records of routine surveys.

7.2.5. Area supervisors are responsible for keeping waste disposal records on the contents of radioactive wastes accumulating within their areas. These records will include the radioisotope identity, estimated activity, radiation level at surface of container, and the instrument used to determine surface radiation level.

KATHRYN L. KOLBE, Colonel, USAF
Commander
Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References
AFI 40-201, Managing Radioactive Materials in the USAF, 13 April 2007
AFI 48-148, Ionizing Radiation Protection, 21 September 2011
AFMAN 48-125, Personnel Ionizing Radiation Dosimetry, 4 October 2011
AFOSHSTD 48-9, Radio Frequency Radiation (RFR) Safety Program, 1 August 1997
AFOSHSTD 48-139, Laser Radiation Protection Program, 10 December 1999

Adopted Forms
AF Form 1527, History of Occupational Exposure to Ionizing Radiation
AF IMT 2760, Laser Hazard Evaluation
AFTO IMT 115, Digital Alarm Dosimeter Results Log
DD Form 1149, Requisition and Invoice/Shipping Document

Abbreviations and Acronyms
AFOSH—Air Force Occupational Safety and Health
ALARA—As Low as Reasonable Achievable
Bq—Becquerels
CFR—Code of Federal Regulations
DDHU—Distribution Depot – Hill, Utah
EPD—Electronic Pocket Dosimeter
IRSO—Installation Radiation Safety Officer
Mrem—Millirem
mSv—Millisieverts
NRC—Nuclear Regulatory Commission
OI—Operating Instruction
PEL—Permissible Exposure Limit
PRSO—Permit Radiation Safety Officer
RAM—Radioactive Material
SSN—Social Security Number
TLD—Thermoluminescent Dosimeter
Terms

As Low As Reasonably Achievable (ALARA) Concept—ALARA is defined as that set of management and administrative actions taken to reduce personnel ionizing radiation exposure to as low a level as possible consistent with existing technology, costs, and operational requirements.

Controlled Area—Any area in which radioisotopes are used or stored and access to which is controlled for the protection of individuals from exposure to radiation. In the case of nonionizing radiation, controlled areas are those that may be occupied by personnel who accept potential exposure as concomitant of employment or duties; by individuals who knowingly enter areas where levels above the Permissible Exposure Limits (PEL), defined in AFOSHSTD 48—9 are to be expected; and by personnel passing through such areas.

Declared Pregnant Woman—A female civilian who has voluntarily, or Active Duty female who has, informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

Electromagnetic Radiation—A term used to mean nonionizing radiation in the frequency range from about 10 kilohertz (kHz) to 300 gigahertz (GHz).

Ground—Level Hazard Emitter—Systems capable of producing power density levels at or above the PEL in areas accessible to personnel at or near ground level.

Microcuries—One-millionth of a curie. A curie is a term that designates a quantity of radioactive material present. It is the amount of radioactive material that disintegrates at the rate of 37 billion atoms per second. Becquerels is the internationally recognized unit of measure.

Millirem—One-thousandth of Roentgen Equivalent Man (rem). A rem is a unit of absorbed radiation by man. Radiation standards are normally expressed in millirem (mrem) or rem per unit of time. Millisievert is the internationally recognized unit of measure.

Nonhazardous Emitter—Low—power devices, as described in AFOSHSTD 48-9, that are not maintained within 2.5 cm of the body.

Potentially Hazardous Emitter—RFR emitters which do not fit the criteria for low—power devices (nonhazardous emitters) and are capable of producing levels at or in excess of the PELs given in AFOSHSTD 48-9.

Probe Surveys—Measurements using portable survey meter to detect alpha, beta, gamma, neutrons, or x—ray radiation.

Radiation Area—An area in which an individual could receive a radiation dose to a major portion of the body of 5 mrem or more in any one hour. Thermoluminescent badges and self—reading pocket dosimeters will be worn in radiation areas.

Radiation Dosimeter Program—A program described in AFI 48—125 for routinely monitoring personnel who work with radiation producing devices and who are likely to receive radiation doses in excess of one-tenth of the applicable radiation standard.

Restricted Area—An area having access limited to protect individual against undue risks from exposure to radiation or radioactive material.
**Roentgen (R)** A unit of measure of x—ray or gamma radiation in air. Specifically, that amount of x-ray or gamma radiation that produces a charge of $2.58 \times 10^{-4}$ coulomb per kilogram (kg) air.

**Self—Reading Pocket Dosimeter** A radiation detection device normally worn by an individual and designed to detect and quantitatively measure x-ray and gamma radiation. These dosimeters are not as accurate as TLDs but they are read by the wearer and give a good indication of the radiation dose received by the wearer. These devices are not to be worn alone. They are to be worn while wearing TLDs.

**Swipe Samples**—Samples using filter paper to detect removable radioactive material. Filter paper is smeared across suspected contaminated areas.

**Thermoluminescent Dosimeters (TLD)** A radiation detection device normally worn by an individual and designed to detect and quantitatively measure beta, gamma, x—ray, and, if required, neutron radiation. These dosimeters are read by the USAF Radiation Dosimetry Laboratory at Wright-Patterson AFB, OH.