

**BY ORDER OF THE COMMANDER
TYNDALL AIR FORCE BASE**

**TYNDALL AIRFORCE BASE INSTRUCTION
40-201**



1 MARCH 2011

Medical Command

BASE RADIATION SAFETY PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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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 and ionizing and non-ionizing radiation-producing machines. It applies to all Tyndall AFB personnel, contractors, and tenant organizations on Tyndall AFB and other operating locations controlled by Tyndall AFB using radioactive material or radiation producing machines. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Form 847s from the field through the appropriate functional chain of command. This publication may be supplemented at any level, but all direct Supplements must be routed to the OPR of this publication for coordination prior to certification and approval. It applies to individuals at all levels who prepare, manage, review, certify, approve, disseminate and/or use official Air Force publications and forms, including Air Force Reserve Command (AFRC) and Air National Guard (ANG) units, except where noted otherwise. Ensure all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) at <https://www.my.af.mil/afrims/afrims/afrims/rims.cfm>. This instruction requires the Air Force to collect or maintain personal information in a PA system of records that is retrieved by personal identifier. Follow AFI33-332, *Privacy Act Program*, for further privacy act guidance and sample privacy act statements. Privacy Act System Notices are available online at: <http://www.defenselink.mil/privacy/notices/usaf>.

SUMMARY OF CHANGES

Responsibilities were expanded to include specific requirements for contract use of radioactive materials. Definitions for radiation safety officer, ionizing and non-ionizing radiation were added. TAFBI was shortened to prevent significant overlap between this instruction and complementary Air Force Instructions. This TAFBI also combines information/requirements from rescinded TAFBI 40-201 and TAFBI 40-202. Complete description of the ALARA philosophy and management commitment was added. This TAFBI removed the old requirement for General Licensed Device’s (GLD) to be registered with the Radioisotope Committee (RIC).

1.	INTRODUCTION.	2
2.	REFERENCES.	3
3.	TERMS EXPLAINED.	3
4.	RESPONSIBILITIES.	4
5.	IONIZING RADIATION.	8
Table 5.1.	Occupational Standards and ALARA Investigation Action Levels.	12
6.	LASERS.	14
7.	RADIOFREQUENCY (RF) RADIATION.	15
8.	EMERGENCY PROCEDURES.	16
9.	CONSULTANT SERVICES.	17
10.	RECORDS.	17
11.	Adopted Forms:	18
Attachment 1—GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION		19

1. INTRODUCTION. The control of ionizing and non-ionizing radiological health hazards by the Bioenvironmental Engineering Flight (325 AMDS/SGPB) is directed toward safeguarding the health of persons working or living in the vicinity of Tyndall AFB. The effectiveness of the program depends on the personnel responsible for organizing and implementing the 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 formal definition of ALARA is provided in paragraph 3.1.) 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 which offer a low risk of adverse health effects compared to the other hazards of life and occupation, it is prudent to make every effort to reduce exposures to the lowest levels reasonably achievable, thereby 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 contained in this instruction provides the basis for conducting an effective ALARA program.

1.2. The base Radiation Safety Officer (RSO) manages the radiation safety program at Tyndall AFB (TAFB). TAFB is committed to the concept of ALARA. The ALARA commitment is summarized below:

1.2.1. Management of TAFB is committed to the ALARA program for maintaining individual and collective radiation doses ALARA.

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

2. REFERENCES. Provided at attachment.

3. TERMS EXPLAINED.

3.1. As Low As Reasonably Achievable (ALARA). 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.

3.2. Controlled area. Any area in which access is controlled for any reason but outside of a restricted area. This definition applies only to radiation and as defined in Title 10, Code of Federal Regulations, Part 20.1003 and AFOSH Standards 48-9 and 48-139.

3.3. Curie. Unit describing the intensity of radioactivity. It is equal to 37 billion disintegrations per second. Common subunits include the microCurie and milliCurie.

3.4. Electromagnetic radiation. Non-ionizing radiation in the frequency range from about 10 kilohertz (kHz) to 300 gigahertz (GHz).

3.5. Ground-level hazard emitter. Non-ionizing system capable of producing power density levels at or above the Permissible Exposure Limit (PEL) in areas accessible to personnel at or near ground level.

3.6. Ionizing radiation. Any radiation (material or device) capable of liberating atomic or molecular electrons. Examples include radioactive materials and x-ray generating devices such as those used in non-destructive inspection (NDI) and medical treatment facilities.

3.7. Non-ionizing radiation. Radiation not capable of liberating molecular or atomic electrons. Examples include laser systems, microwave ovens, radio-frequency emitters, and ultrasound.

3.8. Permissible Exposure Limit. That exposure value to which an individual may be exposed without exhibiting damaging biological effects.

3.9. Permit Radiation Safety Officer. The individual responsible for radiation safety aspects unique to the use of radioactive material authorized on a USAF Radioactive Material Permit. This individual is identified in writing by the permittee and HQ AFMOA/SGZR.

3.10. Permittee. The commander or senior functional manager of the AF organization identified on a USAF Radioactive Material Permit. This individual is ultimately responsible for the safe use of radioactive material under their purview.

3.11. Personnel dosimetry program. A program described in AFI 48-125, The US Air Force Personnel Dosimetry Program, for routinely monitoring personnel who work with radiation-producing devices and who are likely to receive ionizing radiation doses in excess of one-tenth of the applicable radiation standard.

3.12. Radiation area. An accessible area in which an individual could receive a radiation dose equivalent in excess of 5 millirem (mrem) in one hour at 30 centimeters from the radiation source. Thermoluminescent badges and self-reading pocket dosimeters will be worn in radiation areas.

3.13. Installation Radiation Safety Officer. The individual designated in writing by the installation commander (325 FW/CC) having responsibility and authority to act for the commander in areas related to the safe use of radiation on Tyndall AFB and any other area under the purview of the Tyndall AFB's commanders. For purposes of this instruction, references to RSO and 325 AMDS/SGPB are synonymous.

3.14. Radioactive Material (RAM). Any material that spontaneously emits ionizing radiation in the form of gamma or x-rays, beta or alpha particles or neutrons.

3.15. Restricted area. An area having access limited to protect individuals against undue risks from exposure to radiation or radioactive material as defined in Title 10, Code of Federal Regulations, Part 20.1003.

3.16. Roentgen. A unit of measure of x-ray or gamma radiation in air. The amount of x-ray or gamma radiation that produces a charge of 2.58×10^{-4} Coulomb per kg air.

3.17. Roentgen Equivalent Man (REM). Unit of dose equivalent. Common sub-units are microrem and millirem.

3.18. 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 thermoluminescent dosimeters, 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 without an accompanying thermoluminescent dosimeter.

3.19. Swipe samples. Samples using filter paper to detect removable radioactive material.

3.20. Thermoluminescent Dosimeter (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.

4. RESPONSIBILITIES.

4.1. The Installation Commander (325 FW/CC) will:

4.1.1. Appoint the Installation RSO, and alternate, in writing and in accordance with Air Force Instructions (AFIs) 40-201 and 48-148.

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

4.1.3. Ensure all base activities comply with applicable federal and USAF directives covering the use of radiation-producing equipment, the permitting, procurement, storage, handling, accountability for and disposal of radioactive materials and the reporting of incidents or accidents to the appropriate authorities.

4.2. The Medical Group Commander (325 MDG/CC) will ensure records are maintained, medical follow-up is provided and compliance is achieved as required in AFI 48-148.

4.3. The Installation RSO is directly responsible to 325 FW/CC regarding all radiological health protection matters and will:

4.3.1. Manage the TAFB radiation safety program whose primary goal is to maintain radiation exposures to personnel ALARA.

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

4.3.3. Enforce the rules and regulations stated on all current permits/licenses authorizing use of radioactive materials.

4.3.4. Exercise authority to terminate operations when imminent danger to health, environment or AF resources exists.

4.3.5. Annually, provide Security Forces Squadron (325 SFS/SFOXP) and Fire Department (325 CES/CEF) with a list of facilities containing radioactive commodities that may be potential hazards during emergency operations.

4.3.6. Develop procedures to assess permit compliance. NOTE: If organizations are in noncompliance, the Installation RSO has the responsibility to advise 325 FW/CC, Air Force Education and Training Command Bioenvironmental Engineer (HQ AETC/SGPB), HQ Air Force Medical Operations Agency (HQ AFMOA/SGZR), and user senior management as appropriate. HQ AFMOA/SGZR or Nuclear Regulatory Commission (NRC) has the authority to revoke the permit.

4.3.7. Monitor the base radiation dosimetry program, obtaining from female employees on the personnel dosimetry program signed statements indicating that they understand their responsibility to notify their supervisor immediately if they become pregnant. Provide initial information/training to all fertile women subject to occupational ionizing radiation exposure.

4.3.8. Monitor areas in which radiation is used.

4.3.9. Provide technical advice on emergency procedures e.g., spills, explosions, or fire involving radioactive materials.

4.3.10. Review and approve plans for proposed radiation usage by TAFB and contractor personnel. Approval is required for radioactive materials and all radiation-producing devices including laser and radio-frequency emitters.

4.3.11. Perform radiation protection surveys.

4.3.12. Provide technical advice and approval/disapproval regarding the receipt, shipment, transfer, and disposal of radioactive materials. Furthermore, ensure the receipt, shipment and transfer of radioactive materials are properly monitored and identified.

4.3.13. Maintain all necessary records of the TAFB radiation safety program, USAF RAM permits, and documentation in support of USAF and federal instructions, licenses and permits.

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

4.3.15. Manage and control the radioactive waste disposal program, which ensures proper packaging, storage, transport and disposal of radioactive waste by TAFB organizations.

4.3.16. Annually, brief the installation commander, via the Environmental Safety and Occupational Health (ESOH) Council, and permittee(s), as required, as to the status of the radiation safety program under their purview.

4.4. Supervisors will, when applicable:

4.4.1. Enforce the requirements imposed by permits/licenses for radioactive materials.

4.4.2. Be responsible for implementing the ALARA concept.

4.4.3. Immediately notify the Installation RSO of any equipment, personnel, or procedural changes regarding ionizing or non-ionizing radiation use.

4.4.4. Enforce all health and safety publications relative to the safe handling of radioactive materials and machines producing ionizing and non-ionizing radiation.

4.4.5. 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.

4.4.6. Ensure the Installation RSO or alternate Installation RSO is notified immediately whenever personnel listed on the radioactive permit are changed.

4.4.7. Conduct inspections necessary to ensure that all safety equipment is operative and in a good state of repair.

4.4.8. Indoctrinate new employees in the principles of radiation safety to include proper wear and storage of personnel dosimeters. Immediately notify Flight Medicine (325 AMDS/SGPF) and 325 AMDS/SGPB of assignment of fertile women to work involving ionizing radiation.

4.4.9. Ensure all radiological health emergencies are reported to the RSO.

4.4.10. 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.

- 4.4.11. Prepare a written Radiation Safety Operating Instruction (OI) in coordination with the RSO. These instructions must, at a minimum, address the proper use of equipment and materials, emergency procedures, and training requirements.
 - 4.4.12. Be alert for equipment failure or malfunction or improper safety procedures by personnel, which may result in excessive radiation exposure of personnel.
 - 4.4.13. When applicable, maintain and comply with the radioactive material permit. Keep a record of the radioactive material within the area of supervision and send a copy to 325 AMDS/SGPB.
 - 4.4.14. By written request to 325 AMDS/SGPF, ensure personnel are given pre-employment physicals prior to assignment to duties involving laser radiation and request termination physicals when no longer in radiation area.
 - 4.4.15. Order, maintain, and operate radiation detection equipment necessary to ensure compliance with federal standards.
- 4.5. Individual users will:
- 4.5.1. Learn and implement the rules of radiation safety as described in applicable federal, Air Force and TAFB instructions as well as in organizational instructions.
 - 4.5.2. Wear personnel monitoring devices if directed by their supervisors and the RSO.
 - 4.5.3. Wear appropriate protective clothing and equipment as prescribed by supervisors and the RSO.
 - 4.5.4. Report incidents/accidents and hazardous conditions immediately to their supervisor or the RSO, when appropriate.
 - 4.5.5. Inform their supervisor of any changes in equipment, procedures or other factors involving radioactive materials or radiation producing devices, which may alter the radiation safety practices or radiation levels in unrestricted areas.
- 4.6. Flight Medicine (325 AMDS/SGPF) will:
- 4.6.1. Provide pre-employment and termination physical examinations to all persons assigned to duties involving potential exposure to laser radiation as required by AFOSHSTD 48-139, Laser Radiation Protection Program.
 - 4.6.2. Conduct special examinations and clinical tests as required.
- 4.7. Public Health Flight (325 AMDS/SGPM) will facilitate education of personnel occupationally exposed to radiation.
- 4.8. Civilian Personnel Office and Military Personnel Flight (325 MSS/DPM) will effect temporary reassignment of civilian and military pregnant females occupationally exposed to ionizing radiation when reassignment is recommended by medical personnel.
- 4.9. Contracting will coordinate all contractor use of radiation producing devices with the Installation RSO (see paragraph 5.1. for requestor responsibilities). Contracts will include appropriate requirements as indicated in the Federal Acquisition Regulations for the use of radioactive materials and radiation producing equipment.

5. IONIZING RADIATION.

5.1. **PROCUREMENT.** No individual or organization will procure radioactive materials or radiation-producing devices without prior approval of the Installation RSO. Requests for approval will be submitted to 325 AMDS/SGPB for review and approval at least thirty (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 325 CONS. The request must clearly identify the source(s) and/or equipment to be used on Tyndall AFB.

5.2. The user will prepare a letter of justification and supporting documentation indicating the materials or equipment desired. This request must be submitted to 325 AMDS/SGPB for review.

5.2.1. Requests must include, as a minimum, the following:

5.2.2. Name, title, organization, and telephone number of user.

5.2.3. Names, titles, and organizations of all personnel who will regularly use the material or equipment.

5.2.4. Exact locations where the material or equipment will be kept.

5.2.5. Brief outline of procedure to be followed and any other special requirements.

5.2.6. Organizations and contractors performing work at TAFB must obtain a Nuclear Regulatory Commission, Agreement State License, USAF, or Navy RAM permit in order to possess or use radioactive materials on TAFB.

5.3. Users will submit an application for permit amendments to 325 AMDS/SGPB. Radionuclides may not be procured until the applicant has received written approval from the Installation RSO.

5.4. **RECEIPT.** All radioactive material shipped to Tyndall AFB, regardless of destination, will be coordinated with the Installation RSO who will verify the organization is allowed to receive the material IAW applicable standards.

5.4.1. Materials authorized under a USAF Radioactive Material Permit must have the approval and coordination of both the permit and Installation RSO prior to accepting delivery of radioactive materials.

5.4.2. The Defense Reutilization and Marketing Office cannot accept any radioactive materials.

5.5. **STORAGE.** All radioactive material storage areas must be pre-approved by the Installation RSO.

5.5.1. Store all radioactive materials 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.

5.5.2. Radioactive material or items will be stored as directed by the Installation RSO.

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

5.5.4. Excess RAM will be processed through 325 AMDS/SGPB and 325 LRS/LGRSCR. The authorized storage area is located in warehouse 10, Bldg. 269. Radioactive material in Bldg. 269 shall be secured/locked and not stored with other hazardous materials. Only authorized personnel, such as Bioenvironmental Engineering staff and LGRSCR personnel 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". Surveys of the storage area shall be conducted at least annually.

5.6. SHIPMENT. All radioactive materials will be shipped through 325 LRS/LRDSSDS, Bldg 269. Materials will be held in the Transportation Hazardous Material Shipping area until surveyed by the Installation RSO or designee. Persons responsible for permitted radioactive material may not transfer such material to another person or organization except as provided in the applicable portions of the USAF radioactive material permit and in accordance with AFI 40-201. Contact the base and permit RSO's for coordination and assistance.

5.6.1. Other transfers. Individuals or organizations requiring transfer of radioactive materials must notify the Installation RSO prior to the transfer.

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

5.7. DISPOSAL. The owning organization where the waste was generated is responsible for collection, segregation, and handling of radioactive wastes, in consultation with the Installation RSO. The area supervisor will keep inventory records of the type of radioactive material in each waste container. Waste containers will be marked with labels bearing the radiation symbol and the words "RADIOACTIVE MATERIAL," and tagged to indicate the nature of the contents. Each directorate or staff office will maintain serialized control (with number sequence controlled at a central point) of each waste container and a log stating the location and number of each container. The supervisor will report any lost or misplaced containers/material immediately to the Installation RSO. Under no circumstances will one using-organization accept radioactive waste from another without written concurrence from the Installation RSO.

5.7.1. Using organizations will:

5.7.1.1. Dispose of radioactive waste in accordance with guidance provided by the Installation RSO.

5.7.1.2. Attach warning labels bearing the radiation symbol and the words, "RADIOACTIVE MATERIAL," to the container. The labels will be affixed so that at least one is visible from any direction of approach.

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

5.7.1.4. Forward waste information as requested by the Installation RSO.

5.7.2. Excess Permitted or Licensed Radioactive Material (RAM). Excess RAM permitted or licensed will be shipped to Bldg. 269 for storage pending disposal upon approval of the RSO. Owners and users of permitted RAM will contact the base and

permit RSOs for approval to dispose of their sources. After approval, users must submit a completed DD Form 1348, Issue Release/Receipt Document, with the radioactive material when processing it through Bldg. 269. Before bringing the material to Bldg.269, contact 325 LRS/LGRSCR for coordination. Permitted or licensed RAM received from off-base organizations will not be disposed of unless approved by the RSO.

5.7.3. Non-Permitted RAM. On-base users needing to dispose of non-permitted excess RAM must submit a completed DD Form 1348, Issue Release/Receipt Document, with the RAM when taking the RAM to Bldg. 269. Before bringing the RAM to Bldg. 269, contact 325 LRS/LGRSCR for coordination. Non-permitted excess RAM received in Bldg. 269 from off-base sources shall be surveyed and a Radioactive Material Movement Form, or equivalent, completed. Transfer of the RAM can then be coordinated with 325 LRS/LGRSCR for storage pending disposal.

5.7.4. The following information must accompany RAM sent to Bldg.269:

- 5.7.4.1. Name and organization of person turning in
- 5.7.4.2. Building number and date turning in
- 5.7.4.3. Item name/description
- 5.7.4.4. National stock number (if available)
- 5.7.4.5. Part number/model number
- 5.7.4.6. Quantity of each item
- 5.7.4.7. Radioactive material (e.g., tritium, Cs-137, Ra-226, etc.)
- 5.7.4.8. Radioactivity (e.g., 10 mCi, 5 microcuries, 100 nCi, 3 uCi, etc.)

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

5.7.6. The Installation RSO will arrange for disposal of RAM with the Air Force Institute of Occupational Health, Radiation Surveillance Division, Health Physics Branch, Air Force Radioactive and Mixed Waste Office or AFIOH/SDRH, 2402 E. Drive, Brooks City Base, TX 78235-5114. The AFIOH/SDRH office will provide disposal instructions. Disposal will be arranged periodically.

5.8. SURVEYS. The Installation RSO, or designee, will establish a schedule of and conduct surveys deemed necessary. Special surveys will be performed upon request; please contact 325 AMDS/SGPB (523-7139) to schedule.

5.8.1. Types of surveys are:

- 5.8.1.1. Those that involve portable survey meters to detect alpha, beta, gamma, neutrons, or x-rays.
- 5.8.1.2. Swipe sample surveys.
- 5.8.1.3. Evaluations of procedures, materials, and documentation.

5.9. LEAK TESTING SEALED SOURCES. Each sealed source acquired from another person or organization, (containing radioactive material 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.

5.9.1. 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.

5.9.2. The test will be capable of detecting the presence of 0.005 microcuries or more of radioactive material on the test sample.

5.9.3. Each sealed source the permittee uses (containing by-product material or any other radioactive material 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. Exception: each sealed source designed for the purpose of emitting alpha particles will be tested at intervals of three months.

5.9.4. If the above tests reveal the presence of 0.005 microcuries or more of removable contamination, the permittee will immediately notify the RSO and withdraw the sealed source from use.

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

5.10. PERSONNEL DOSIMETRY PROGRAM

5.10.1. Requests for dosimetry service will be completed before personnel are assigned duties involving ionizing radiation. The area supervisor will have the individual report to 325 AMDS/SGPB, Building 1465. When personnel are relieved from duties involving ionizing radiation, the supervisor will submit a written notice to 325 AMDS/SGPB so indicating.

5.10.2. All workers entering radiation areas will wear TLDs, as directed by the RSO. The designated POC for work areas where TLDs are used will take the dosimeters to Bldg. 1465 for periodic exchange. The 325 AMDS/SGPB TLD monitor will notify the POC of the appropriate exchange interval and procedures for TLD return.

5.10.3. TLDs will be worn on the part of the body most likely to receive the greatest exposure to radiation. If 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.

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

5.10.5. Tampering with TLDs is prohibited. If these devices are accidentally damaged or exposed, the wearer must immediately return them to 325 AMDS/SGPB for exchange and subsequent evaluation. The wearer will explain the nature of the accident to aid in evaluation of the TLD.

5.10.6. Personnel working with industrial x-ray equipment or adjacent to high radiation areas will wear two self-reading pocket dosimeters or one digital alarm dosimeter (DAD) as prescribed by the Installation RSO. This will permit frequent reading of the dosimeters during hazardous procedures. Pocket dosimeters should be worn clipped on the breast pocket of the outer garment. Never place dosimeters behind dense materials in the pocket.

5.10.7. When visitors enter a radiation area, they are required to register with the supervisor before entry. The supervisor will issue pocket dosimeters to the visitor and maintain an AFTO Form 115, Pocket Dosimeter Results Log, with the visitor's name, address, date, time in and out, pocket dosimeter or DAD number, and the initial and final readings on the pocket dosimeter/DAD. The Installation RSO will designate those areas and circumstances in which visitors will wear TLDs in addition to the pocket dosimeter/DAD.

5.10.8. Allowable limits for occupationally exposed individuals, as well as those for the general public, and action/investigational levels are documented in the following table:

Table 5.1. Occupational Standards and ALARA Investigation Action Levels.

OCCUPATIONAL STANDARDS AND ALARA INVESTIGATION ACTION LEVELS (Units in Millirem)			
Type of Exposure	Occupational Standard	*Level I	** Level II
Eye Dose Equivalent	3,750/qtr	938/qtr	1,875/qtr
	1,250/mo	313/mo	625/mo
Deep Dose Equivalent (External Whole Body)	1,250/qtr	313/qtr	625/qtr
	417/mo	104/mo	208/mo
Shallow Dose Equivalent (Skin of the Whole Body or Extremities)	12,500/qtr	3,125/qtr	6,250/qtr
	4,167/mo	1,042/mo	2,084/mo
Total Effective Dose Equivalent	1,250/qtr	313/qtr	625/qtr
	417/mo	104/mo	208/mo
Pregnant Females	***500	25/mo	50/mo

* 25% of the occupational limit

** 50% of the occupational limit

*** over gestation period

5.10.9. The Installation RSO will investigate abnormal exposures IAW with guidance provided in AFI 48-125.

5.11. OCCUPATIONAL EXPOSURE OF FERTILE FEMALES. The Installation RSO, or designee, will inform each female who may be occupationally exposed to ionizing radiation of the risks to the unborn.

5.11.1. A woman must voluntarily declare her pregnancy in writing and provide the estimated date of conception, for the radiation exposure limits of the embryo/fetus to be applied.

5.11.2. The Installation RSO 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 during the gestational period.

5.11.3. If the Installation RSO 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, she may continue in her radiation-related duties. However, if the individual is not on the Air Force personnel dosimetry program, she will be enrolled for the duration of her pregnancy.

5.11.4. 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 radioactive materials. Pregnant workers will not continue in duties involving these sources without the concurrence of HQ AFMOA. When a pregnancy is suspected and reported to the immediate supervisor, women working with such sources or materials will receive a prompt evaluation by the Installation RSO (within five workdays after receipt of the consult request) and, if warranted, actions such as restrictions or removal may be taken even prior to confirmation of the pregnancy.

5.12. TRAINING. Personnel will be provided radiation safety training commensurate with their duties.

5.12.1. Training will be provided to individuals who in the course of their duties are likely to receive in a year an occupational dose in excess of 100 mrem. Additionally, training will be provided:

5.12.1.1. Before the individual is permitted to assume duties with or in the vicinity of radiation sources.

5.12.1.2. Annually during refresher training.

5.12.1.3. When there is a significant change in duties or radiation safety requirements.

5.12.1.4. By the permit/ Installation RSO or their designee.

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

5.12.2.1. Applicable regulations and permit conditions.

5.12.2.2. Areas where radiation sources are used or stored.

5.12.2.3. Potential hazards from the radiation sources.

5.12.2.4. Radiation safety procedures.

5.12.2.5. Work rules pertinent to the radiation source(s).

5.12.2.6. Employee responsibility to report unsafe conditions or practices.

5.12.2.7. Emergency response procedures.

5.12.2.8. Employee right to be informed of occupational radiation exposure results.

5.12.2.9. Location where pertinent regulations and documents are available for review.

6. LASERS.

6.1. All laser operations will be managed IAW AFOSH Standard (AFOSH STD) 48-139. Prior to the start of any operation utilizing Class 3 or 4 lasers, 325 AMDS/SGPB must be contacted to conduct a laser safety evaluation. 325 AMDS/SGPB has final approval authority for laser operations.

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

6.2.1. Prepare an operating instruction for the laser and forward it to 325 AMDS/SGPB for review and approval. The instruction will contain the following information, as a minimum:

6.2.2. Safety requirements.

6.2.3. Personal hazards including safe eye exposure distance.

6.2.4. Location.

6.2.5. Sequence of operations.

6.2.6. Individual (name) assigned as unit laser safety officer by the unit commander.

6.2.7. Biological effects of lasers.

6.2.8. Training requirements

6.3. Send the following information to 325 AMDS/SGPB on an AF Form 2760:

6.3.1. Location of use (building and room number).

6.3.2. Type of laser.

6.3.3. Wavelength.

6.3.4. Output power.

6.3.5. Mode of operation.

6.3.6. Pulse duration, if applicable.

6.3.7. Beam diameter in millimeters or centimeters.

6.3.8. Beam divergence in radians.

6.3.9. Transverse electromagnetic modes, if applicable.

6.3.10. Pulse repetition rate.

6.3.11. 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).

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

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

6.5. Exempt lasers must be disposed of in accordance with MIL-STD-1425.

6.6. TRAINING. Training may be provided by the Installation RSO, unit RSO or other qualified individual, subject to Installation RSO 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:

- 6.6.1. Location of laser(s).
- 6.6.2. Hazard evaluation of the emitter (provided by 325 AMDS/SGPB).
- 6.6.3. Emergency procedures.
- 6.6.4. Biological effects of lasers.
- 6.6.5. Protective equipment requirements (e.g. goggles).
- 6.6.6. Conditions and limitations of use (hazard areas, emergency shut-off location, notifications, signage requirements, etc).
- 6.6.7. Potential hazards.
- 6.6.8. Worker responsibilities.

6.7. MEDICAL SURVEILLANCE. Only personnel who routinely work in a laser environment and are exposed to Class 3B or 4 lasers will be monitored.

7. RADIOFREQUENCY (RF) RADIATION.

7.1. All RF operations will be managed IAW AFOSH STD 48-9. Prior to the start of any operation utilizing RF systems, 325 AMDS/SGPB must be contacted 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 325 AMDS/SGPB.

7.2. An AFF 2759 should be completed at the time of the survey. A copy of the completed AFF 2759 will be provided to Weapons Safety (325 FW/SEG) for electro-explosives hazard evaluations. The surveyor will obtain the following information from the supervisor of an area in which RF emitters are used:

- 7.2.1. Location and nomenclature.
- 7.2.2. Organization responsible for its use.
- 7.2.3. Function of the RF emitter.
- 7.2.4. Operating frequency (or frequencies).
- 7.2.5. Antenna gain.
- 7.2.6. Output power (state if average or peak).
- 7.2.7. Operating mode (continuous wave or pulsed).
- 7.2.8. Pulse repetition frequency and pulse width.

7.3. Supervisors will coordinate all modifications and additions to RF emitters with 325 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.

7.4. Units will develop a local operating instruction governing the use of the RF equipment and submit it to 325 AMDS/SGPB for review and approval. As a minimum the instruction will include:

- 7.4.1. Modes of operation
- 7.4.2. Hazard evaluation data
- 7.4.3. Training requirements
- 7.4.4. Location of emitter(s)
- 7.4.5. Biological effects of RF radiation

7.5. TRAINING. Personnel who work in a RF environment and may be exposed to levels above the PELs listed in AFOSH STD 48-9 will receive initial and annual training. Training will be provided and documented by the unit. Users of RF emitters will receive training commensurate with their duties. At a minimum training will include:

- 7.5.1. Location of emitter(s).
- 7.5.2. Hazard evaluation of the emitter (provided by 325 AMDS/SGPB).
- 7.5.3. Emergency procedures.
- 7.5.4. Biological effects of RF radiation.
- 7.5.5. Conditions and limitations of use (hazard areas, emergency shut-off location, notifications, signage requirements, etc).
- 7.5.6. Potential hazards.
- 7.5.7. Worker responsibilities.

7.6. MEDICAL SURVEILLANCE. There are no requirements for routine medical surveillance.

8. EMERGENCY PROCEDURES.

8.1. 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 RSO must be notified immediately of all emergencies involving radiation.

8.2. The Installation RSO will conduct an investigation to determine and evaluate the extent of exposures from all sources of radiation. All reporting and investigations will be IAW the applicable sections of 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.

8.3. Treat any radioactive material spill as a major spill until monitoring can be accomplished to determine the actual intensity of the radiation exposure.

8.4. Basic fire-fighting procedures are as follows:

- 8.4.1. 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 Fire

Department (325 CES/CEF) a set of floor plans showing the locations of radiation areas and isotope storage areas.

8.4.2. 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.

8.4.3. Should a fire ignite, sound the evacuation alarm, call 911, and notify 325 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 isotopes and are not in the fire area should quickly place their isotopes into storage containers, transport containers from the area, then close the windows and doors, and shut off the ventilation system before leaving the area.

8.4.4. 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.

8.5. **INGESTION OR INHALATION OF RADIOACTIVE MATERIAL.** Any cases involving the suspected inhalation or ingestion of RAM must be reported immediately to the Installation RSO for guidance.

9. CONSULTANT SERVICES. 325 AMDS/SGPB is available to all base and tenant organizations for consultant services regarding radiation related issues.

10. RECORDS.

10.1. Records will be maintained as follows:

10.1.1. The owner, user, and 325 AMDS/SGPB will maintain records on all Air Force permits and on all materials licenses, as required by Title 10, Code of Federal Regulations and AFI 33-364, Records Disposition - Procedures and Responsibilities.

10.1.2. 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.

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

10.3. 325 AMDS/SGPB will maintain records of routine surveys.

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

11. Adopted Forms:

AF Form 847, *Recommendation for Change of Publication*

GINO L AUTERI, Col, USAF, BSC
Commander, 325th Medical Group

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFPD 48-1, Aerospace Medical Program
AFI 33-364, Records Disposition—Procedures and Responsibilities
AFMAN 37-139, Records Disposition Schedule
AFI 40-201, Managing Radioactive Materials in the USAF
AFMAN 48-125, Personnel Ionizing Radiation Dosimetry
AFI 48-148, Ionizing Radiation Protection
AFI 91-202, The US Air Force Mishap Prevention Program
AFI 91-204, Safety Investigations and Reports
AFOSHSTD 48-9, Radio Frequency Radiation (RFR) Safety Program
AFOSHSTD 48-139, Laser Radiation Protection Program
AFI 48-145, Occupational and Environmental Health Program
MIL-STD-1425, Military Lasers and Associated Support Equipment
Code of Federal Regulations Titles 10, 21, and 49