BY ORDER OF THE COMMANDER
HILL AIR FORCE BASE (AFMC)

HILL AFB INSTRUCTION 48-105
7 JULY 2004

Aerospace Medicine

BASE RADIATION SAFETY PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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Certified by: 75 AMDS/SGPB
(Lt Col Donald C. Hickman)
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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 Hill AFB personnel, contractors, and tenant organizations on Hill AFB and other operating locations controlled by Hill AFB using radioactive material or radiation producing machines. See Attachment 1 for glossary of references and supporting information. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with AFMAN 37-123, *Management of Records* and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) in WebRims.

SUMMARY OF REVISIONS

This document is substantially revised and must be completely reviewed.

1. Introduction. The control of ionizing and non-ionizing radiological health hazards by the Bio-environmental Engineering (75 AMDS/SGPB) is directed toward safeguarding the health of persons working or living in the vicinity of Hill 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 non-ionizing radiation.

1.1. ALARA Philosophy. The formal definition for ALARA is provided in Attachment 1. The ALARA concept was developed in response to scientific evidence suggesting that no level 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 effect to reduce exposures to the lowest levels reasonable 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 in this instruction provides the basis for conducting an effective ALARA Program.

1.2. The base radiation safety office (RSO) manages he radiation safety program at Hill AFB. Hill AFB is committed to the concept of ALARA. The ALARA commitment is summarized:

1.2.1. Management of Hill AFB 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. Responsibilities.

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

2.1.1. Appoint the installation RSO, and alternate, in writing and in accordance with Air Force Instruction 40-201, *Managing Radioactive Materials in the US Air Force*, and Air Force Instruction 48-148, *Ionizing Radiation Protection*, base radiation safety officer (RSO).

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

2.1.3. Ensure all base activities comply with applicable federal and US Air Force 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.

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

2.3. The RSO is directly responsible to 75 ABW/CC regarding all radiological health protection matters and will:

2.3.1. Manage the Hill AFB radiation safety program whose primary goal is to maintain radiation exposures to personnel ALARA.

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

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

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

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

2.3.6. Develop procedures to assess permit compliance. ***NOTE:*** If organizations are in noncompliance, the RSO has the responsibility to advise 75ABW/CC, Air Force Materiel Command Bioenvironmental Engineer (HQ AFMC/SGBB), 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.

2.3.7. 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.

2.3.8. Monitor areas in which radiation is used.

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

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

2.3.11. Perform radiation protection surveys.

2.3.12. 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.

2.3.13. Maintain all necessary records of the Hill AFB radiation safety program, US Air Force Radioactive Material (RAM) permits, and documentation in support of US Air Force and federal instructions, licenses and permits.

2.3.14. 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.

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

2.3.16. Annually, brief the installation commander, via the Air Force Occupational Safety and Health (AFOSH) Council, and permittee, as required, as to the status of the radiation safety program under their purview.

2.4. Supervisors will, when applicable:

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

2.4.2. Be responsible for implementing the ALARA concept.

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

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

2.4.5. 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.

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

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

2.4.8. Indoctrinate new employees in the principles of radiation safety to include proper wear and storage of personnel dosimeters. Immediately notify Occupational Medicine (75 AMDS/SGPO) and 75 AMDS/SGPB of assignment of fertile women to work involving ionizing radiation.

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

2.4.10. 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.

2.4.11. 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.

2.4.12. Be alert for equipment failure or malfunction or improper safety procedures by personnel, which may result in excessive radiation exposure of personnel.

2.4.13. 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 75 AMDS/SGPB.

2.4.14. By written request to 75 AMDS/SGPO, 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.

2.4.15. Order, maintain, and operate radiation detection equipment necessary to ensure compliance with federal standards.

2.5. Individual users will:

2.5.1. Learn and implement the rules of radiation safety as described in applicable federal, Air Force and HAFB instructions as well as in organizational instructions.

2.5.2. Wear personnel monitoring devices if directed by their supervisors and the RSO.

2.5.3. Wear appropriate protective clothing and equipment as prescribed by supervisors and the RSO.

2.5.4. Report incidents/accidents and hazardous conditions immediately to their supervisor or the RSO, when appropriate.

2.5.5. 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.

2.6. The 75 AMDS/SGPO will:

2.6.1. 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.*

2.6.2. Conduct special examinations and clinical tests as required.

2.7. The Public Health (75 AMDS/SGPM) Office will facilitate education of personnel occupationally exposed to radiation.

2.8 The Civilian Personnel (OO-ALC/DPC) Office and Military Personnel Flight (75 MSS/DPM) will effect temporary reassignment of civilian and military pregnant females occupationally exposed to ionizing radiation when reassignment is recommended by medical personnel.

2.9 The Contracting Directorate (OO-ALC/PK) will coordinate all contractor use of radiation producing devices with the RSO (see paragraph 3.1. 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.

3. Ionizing Radiation.

3.1. Procurement. No individual or organization will procure radioactive materials or radiation producing devices without prior approval of the RSO. 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 OO-ALC/PK. The request must clearly identify the sources and/or equipment to be used on Hill AFB.

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.

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

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

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

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

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

3.2.6. Organizations and contractors performing work at Hill AFB must obtain a Nuclear Regulatory Commission, Agreement State License, US Air Force, or Navy RAM permit in order to possess or use radioactive materials on Hill AFB.

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

3.4. Receipt. All radioactive material shipped to Hill AFB, regardless of destination, will be coordinated with the RSO who will verify the organization is allowed to receive the material IAW applicable standards.

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

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

3.5. Storage. All radioactive material storage areas must be pre-approved by the RSO.

3.5.1. 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.

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

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 and 75 LRS/LGRSCR. The authorized storage area is located in Bldg 830. Radioactive material in Bldg 830 shall be secured/locked and not stored with other hazardous materials. Only authorized personnel, such as Bio-environmental 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.

3.6. Shipment. All radioactive materials will be shipped through DDHU/CGA, Bldg. 849. Materials will be held in the Transportation Hazardous Material Shipping area until surveyed by the 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 RSOs for coordination and assistance.

3.6.1. Other transfers. Individuals or organizations requiring transfer of radioactive materials must notify the RSO prior to the transfer. The 649 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 radioactive material 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 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 RSO. Under no circumstances will one using organization accept radioactive waste from another without written concurrence from the RSO.

3.7.1. Using organizations will:

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

3.7.1.2.. 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.

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

3.7.1.4. Forward waste information as requested by the RSO.

3.7.2. Excess Permitted or Licensed RAM. Excess RAM permitted or licensed will be shipped to Bldg. 830 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 1348A, **Issue Release/Receipt Document,** with the radioactive material when processing it through Bldg. 830. Before bringing the material to Bldg. 830, contact 75 LRS/LGRS for coordination. Permitted or licensed RAM received from off-base organizations will not be disposed of unless approved by the RSO.

3.7.3. Non-Permitted RAM. On-base users needing to dispose of non-permitted excess RAM must submit a completed DD Form 1348A, with the RAM when taking the RAM to Bldg. 830. Before bringing the RAM to Bldg. 830, contact 75 LRS/LGRS for coordination. Non-permitted excess RAM received in Bldg. 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 LRS/LGRS for storage pending disposal.

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

3.7.4.1. Name and organization of person turning in

3.7.4.2. Building number and date turning in

3.7.4.3. Item name/description

3.7.4.4. National stock number *(if available)*

3.7.4.5. Part number/model number

3.7.4.6. Quantity of each item

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

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

3.8. Surveys. The RSO, or designee, will establish a schedule of 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. Those that involve portable survey meters to detect alpha, beta, gamma, neutrons, or x-rays.

3.8.1.2. Swipe sample surveys.

3.8.1.3. Evaluations of procedures, materials, and documentation.

3.9. 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.

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 or more of radioactive material on the test sample.

3.9.3. 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.

3.9.4. 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.

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

3.10. Personnel Dosimetry Program**.**

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. When personnel are relieved from duties involving ionizing radiation the supervisor will submit a written notice to 75 AMDS/SGPB so indicating.

3.10.2. All workers entering radiation areas will wear Thermoluminescent Dosimeter (TLD), as directed by the RSO. The designated POC for work areas where TLDs are used will take the dosimeters to Bldg. 249 for periodic exchange. The 75 AMDS/SGPB TLD monitor will notify the POC of the appropriate exchange interval and procedures for TLD return.

3.10.3. 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.

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 or adjacent to high radiation areas will wear two self-reading pocket dosimeters or one digital alarm dosimeter (DAD) as prescribed by the 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.

3.10.7. 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

IMT 115, **Digital Alarm Dosimeter Result 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 RSO will designate those areas and circumstances in which visitors will wear TLDs in addition to the pocket dosimeter/DAD.

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

3.10.9. The RSO will investigate abnormal exposures IAW with guidance provide in AFI 48-125.

3.11. Occupational Exposure Of Fertile Females. The RSO, or designee, will inform each female who may be occupationally exposed to ionizing radiation of the risks to the unborn.

3.11.1. 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.

3.11.2. The 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.

3.11.3. If the 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.

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 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 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.

3.12. Training. Personnel will be provided radiation safety training commensurate with their duties.

3.12.1. 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:

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.

3.12.1.4. By the permit/base RSO 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.

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.

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

4. Lasers.

4.1. 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, 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 OI for the laser and forward it 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.

4.2.1.7. Training requirements

4.3. Send the following information to 75 AMDS/SGPB on an AF IMT 2760, **Laser Hazard Evaluation**.

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).

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

4.4. MIL-STD-1425, *Military Lasers and Associated Support Equipment*, and the Code of Federal Regulation (CFR) Title 21, *Food and Drug Administration*, must be complied with in procuring nonexempt and exempt lasers respectively.

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

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

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. goggles).

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

4.6.7. Potential hazards.

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 (RF) Radiation.

5.1. All RF operations will be managed IAW AFOSH STD 48-9. Prior to the start of any operation utilizing RF systems, 75 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 75 AMDS/SGPB.

5.2. An AF Form 2759 should be completed at the time of the survey. A copy of the completed AFF 2759 will be provided to Industrial and Logistics Training Division (OO-ALC/SEW) for electro-explosives hazard evaluations. The surveyor will obtain the following information from the supervisor of an area in which RF emitters are used:

5.2.1. Location and nomenclature.

5.2.2. Organization responsible for its use.

5.2.3. Function of the RF 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).

5.2.8. Pulse repetition frequency and pulse width.

5.3. Supervisors will coordinate all modifications and additions to RF emitters with 75 AMDS/SGPB. Supervisors are responsible for ensuring their workers are aware of and follow the safety procedures outlined in AFOSH STD 48-9, 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 operating instruction governing the use of the RF 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

5.4.5. Biological effects of RF radiation

5.5. 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:

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.

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 RSO must be notified immediately of all emergencies involving radiation.
6.2. The 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 Nuclear Regulatory Commission (NRC).

6.3. Treat any radioactive material 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 as follows:

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 isotope 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 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.

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 Radioactive Material. Any cases involving the suspected inhalation or ingestion of RAM must be reported immediately to the RSO for guidance.

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

8. Records.

8.1. Records will be maintained as follows:

8.1.1. The owner, user, and 75 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 37-138, *Records Disposition - Procedures and Responsibilities* and WebRIMS Records Disposition Schedule (RDS).

8.1.2. 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.

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

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

8.4. 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.

9. Forms/IMTs Adopted. 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;** DD Form 1348A, **Issue Release/Receipt Document**; and DDRW Form 359, **Radioactive Material Movement Form.**

SEBASTIAN V. ROMANO III, Colonel, USAF
Commander, 75 Air Base Wing

Attachment
Glossary of References and Supporting Information

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 37-132, *Air Force Privacy Act Program*
AFI 37-138, *Records Disposition—Procedures and Responsibilities*
AFPD 48-1, *Aerospace Medical Program*
AFI 40-201, *Managing Radioactive Materials in the USAF*
AFI 48-125, *US Air Force Personnel Dosimetry* Program
AFI 48-145, *Occupational Health Program*
AFI 48-148, *Ionizing Radiation Protection*
AFI 91-202, *The US Air Force Mishap Prevention Program*
AFI 91-204, *Investigating and Reporting Mishaps*
AFOSHSTD 48-9, *Radio Frequency Radiation (RFR) Safety Program*
AFOSHSTD 48-139,*Laser Radiation Protection Program*
Code of Federal Regulations Titles 10, 21, and 49
MIL-STD-1425, *Military* Lasers and Associated Support Equipment
Public Law 90-602, *Radiation Control for Health and Safety Act of 1968*

Abbreviations and Acronyms

AFOSH–Air Force Occupational Safety and Health
ALARA–As Low as Reasonable Achievable
CFR–Code of Federal Regulations
DAD–Digital Alarm Dosimeter
GHz–Gigahertz
HQ AFMC/SGBB–Air Force Materiel Command Bioenvironmental Engineer
HQ AFMOA/SGZR–HQ Air Force Medical Operations Agency
Mrem–Millirem
NDI–Non-destructive Inspection
NRC–Nuclear Regulatory Commission
OO-ALC/DPC–Civilian Personnel
OO-ALC/PK–Contracting Directorate
OO-ALC/SEW–Industrial and Logistics Training Division
PEL–Permissible Exposure Limit
RAM–Radioactive Material
REM–ROENTGEN Equivalent Man
RSO–Radiation Safety Officer
SSN–Social Security Number
TLD–Thermoluminescent Dosimeter

649 MUNS–649 Munitions Squadron
75 ABW/CC–75 Air Base Wing Commander
75 AMDS/SGPB–Bio-environmental Engineering
75 AMDS/SGPM–Public Health
75 AMDS/SGPO–Occupational Medicine
75 MSS/DPM–Military Personnel
75 SFS/SFOXP–75 Security Forces Squadron Plans
775 CES/CEF–Fire Protection Flight

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 non-ionizing 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.

Electromagnetic Radiation–A term used to mean non-ionizing 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.

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.

Non-Hazardous 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 (non-hazardous 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 2.58×10^{-4} coulomb per 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 thermo luminescent dosimeters (TLD), 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.

T**hermo Luminescent 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 Center for Radiation Dosimetry (formerly Armstrong Lab and Det 1, HSC/OEBD) at Brooks AFB, TX.