

**BY ORDER OF THE COMMANDER
35TH FIGHTER WING**

**35TH FIGHTER WING INSTRUCTION
48-101**



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Aerospace Medicine

**INSTALLATION
RADIATION PROGRAM**

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This instruction implements procedures for administering the Misawa Air Base (MAB) Radiation Safety Program in accordance with (IAW) Air Force Manual (AFMAN) 48-148, Ionizing Radiation Protection; AFMAN 40-201, Radioactive Materials (RAM) Management; Air Force Specialty Code 4B051 Bioenvironmental Engineer's Guide to Ionizing Radiation; DAFMAN 48-125, Personnel Ionizing Radiation Dosimetry; T.O. 33B-1-1, Nondestructive Inspection Methods, Basic Theory; AFI 48-139, Laser and Optical Radiation Protection Program; American National Standards Institute Z136.1, Safe Use of Lasers; AFI 48-109, Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program; and the ALARA (As Low As Reasonably Achievable) concept, 10 C.F.R. 20.1003, for exposures to ionizing radiation (e.g., RAM or radiation producing devices (RPDs)). It gives guidance for all commanders, radiation safety officers (RSO), laser safety officers (LSO), unit radiation safety officer (URSO), contracting office personnel, and all other personnel whose duties involve potential exposure to ionizing and nonionizing radiation. This publication applies to all civilian employees and uniformed members of the Department of Defense (DoD) where personnel have duties that involve performing or supervising work in areas where exposures to ionizing and non-ionizing radiation may occur. It also applies to persons not occupationally exposed (members of the general public) to the extent that it addresses controls to protect the public from the potential hazards from sources of ionizing and non-ionizing radiation owned and/or operated by the Air Force. This instruction does not apply to the exposure of medical patients during diagnostic or therapeutic procedures, nor does it apply to exposures of personnel to ionizing radiation resulting from the employment of nuclear or thermonuclear weapons in combat.

Ensure that all records created as a result of processes prescribed in this publication are maintained IAW AFI 33-322, Records Management and Information Governance Program, and disposed of IAW Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS). Additionally, if the publication generates a report(s), alert readers in a statement and cite all applicable Reports Control Numbers IAW AFI 33-324, The Air Force Information Collections and Reports Management Program. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using AF Form 847, Recommendation for Change of Publication; Route AF Form 847s from the field through appropriate functional's chain of command. This publication requires the collection and/or maintenance of information protected by the Privacy Act of 1974 authorized by Department of Defense Directive (DoDD) 5400.11, DoD Privacy Program. The Systems of Records Notice (SORN) for the United States Air Force Master Radiation Exposure Registry is F044 AF SG O. The authority to collect and maintain the records prescribed in this publication is Department of Defense Instruction DODI 6055.08, Occupational Ionizing Radiation Protection Program. Compliance with the attachments in this publication is mandatory.

SUMMARY OF CHANGES

This document has been substantially revised and must be completely reviewed. Major changes include updates from newly published regulations including AFMAN 48-148, Ionizing Radiation Protection, AFI 48-139, Laser and Optical Radiation Protection Program, AFMAN 40-201, Radioactive Materials (RAM) Management, DAFMAN 48-125, Personnel Ionizing Radiation Dosimetry and term change from radio frequency radiation (RFR) to electromagnetic field radiation (EMF).

This instruction now includes a checklist ([Attachment 2](#)) for shipping equipment, instruments and articles containing radioactive materials (RAM). It adds Deployment Distribution Readiness Flight (35 MSG/LGRD, formerly Traffic Management Flight) responsibilities and requirements for a shipment tracking system. This instruction addresses required training for ALARA practices, and investigation action levels for incidental exposures.

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1. Overview.

1.1. Purpose. The purpose of the base radiation protection program is to establish protection requirements necessary for the safe use of radiation producing devices (RPDs) and material. A properly managed radiation protection program will minimize the incidence of exposures to radiation to workers and the public, ensure a knowledgeable workforce exists, and maintain compliance with all federal, DoD, Air Force, and state regulations.

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

2. Responsibilities.

2.1. The 35 Fighter Wing Commander (35 FW/CC) is the overall authority for the Installation Radiation Safety Program. He will appoint in writing an Installation Radiation Safety Officer (IRSO). The 35 FW/CC:

2.1.1. Delegates the authority to the IRSO to suspend installation operations involving radioactive materials that pose a significant health risk to personnel, are in clear violation of regulations or requirements, or can negatively impact AF operations, materiel, or real estate.

2.1.2. Shall afford the Air Force Inspection Agency (AFIA) at all reasonable times, opportunity to inspect all radioactive material and the premises and facilities wherein such is used or stored. Each commander shall make available to the AFIA for inspection, upon reasonable notice, records kept by the unit pursuant to federal, DoD and AFIs.

2.2. The Medical Treatment Facility Commander (35 MDG/CC) will:

2.2.1. Support the Installation Radiation Safety Program by:

2.2.1.1. Providing Public Health to facilitate necessary education of personnel occupationally exposed to radiation.

2.2.1.2. In the event of suspected exposures, provide capabilities for medical investigations and monitoring of victims.

2.2.2. Maintain programs for pre-employment and termination physical examinations to all persons assigned to duties involving potential exposure to laser radiation as required by AFI 48-139, Laser Radiation Protection Program.

2.2.3. Provide medical examinations.

2.2.4. Maintain medical records of personnel involved in occupational practices and contingency operations dealing with radiation as determined by the IRSO or BE.

2.2.5. Recommend to the 35 FW/CC, and other unit commanders as applicable, that personnel be relieved from duties that could involve further radiation exposure when individuals have been, or are likely to be, exposed to ionizing radiation more than regulated limits.

2.3. The IRSO shall:

- 2.3.1. Act as installation point of contact for unit safety representatives, unit radiation safety officers (if applicable), permit holders, radioactive material users, and commanders regarding this program.
- 2.3.2. Exercise authority to terminate operations when imminent danger exists.
- 2.3.3. Brief the Environmental, Safety, and Occupational Health Council on installation radiation uses, RAM, permitted RAM, and program reviews.
- 2.3.4. Establish investigation action levels (IALs) for personnel participating in monthly and quarterly dosimetry to ensure exposure is maintained ALARA. IALs are developed to identify adverse trends and implement appropriate corrective actions.
- 2.3.5. Provide consultant support to the installation commander on radiation protection issues. Keep installation commanders informed about radiation health and safety issues and effectiveness of measures to control ionizing radiation hazards.
- 2.3.6. Establish and manage the base radiation safety program to include review of procedures and practices regarding radiation; applicable facility design reviews; radiation classification; ALARA training, exposure control activities and monitoring/surveillance activities (e.g., personal dosimetry program).
- 2.3.7. Act as primary advisor on radiation emergency procedures and liaison to other disaster response force units. Provide the Fire Chief with a list of facilities containing radioactive materials that are deemed potential hazards during firefighting. Provide technical advice on emergency procedures (in the event of spills, explosions, or fire involving radioactive materials).
- 2.3.8. Maintain an inventory of all installation activities using, storing, or handling radioactive material, x-ray emitters, and lasers.
- 2.3.9. Perform health hazard evaluation of new RF emitters and lasers to ensure the safety and health of personnel.
- 2.3.10. Investigate, evaluate and report alleged and suspected overexposures and provide copies of the report to appropriate agencies, as required.

2.4. Bioenvironmental Engineering will:

- 2.4.1. Manage the installation personnel dosimetry program.
- 2.4.2. Coordinate with Civil Engineering Emergency Management (CEX) and Fire Department (CEF) on base emergency response plans and checklists related to radiation.
- 2.4.3. Provide radiation safety training and materials for URSOs and for users of RAM and RPDs through as low as reasonably achievable (ALARA) training. Approve radiation safety training plans for training provided by others, such as permit RSOs or URSOs.
- 2.4.4. Conduct the installation radiation dosimetry program and non-ionizing radiation programs in accordance with federal, DoD, and Air Force requirements.

2.5. Unit Radiation Safety Officer (URSO):

2.5.1. Must be appointed, in writing, by the unit commander to ensure compliance with applicable regulations. The URSO appointment letter required by Wing Safety meets this requirement. This individual should have the authority to execute the necessary actions to ensure compliance. The appointed individual shall work with the BE/IRSO to ensure compliance with applicable regulations.

2.5.2. Must be responsible for management/handling regarding RAM and X-ray producing equipment.

2.5.3. Is responsible for all safety requirements regarding hazard class 3B and 4 lasers operated by their unit, to include conducting and documenting initial and annual training regarding the proper use of lasers and the hazards of lasers. BE/ILSO can assist with development of training material.

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

2.5.5. Prepares a written Radiological and Safety Operating Instruction and submit to IRSO for review.

2.6. Supervisors will:

2.6.1. **If applicable.** Enforce the rules and regulations stated on all current permits for radioactive materials which list the permit and IRSOs.

2.6.2. Be responsible for training/documenting and implementing the ALARA concept when dealing with ionizing radiation.

2.6.3. Immediately notify the IRSO or alternate IRSO of any equipment, personnel, or procedural changes regarding ionizing or non-ionizing radiation.

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

2.6.5. Immediately notify Public Health (PH, 35 OMRS/SGXM) and BE of pregnant women assigned to work involving ionizing radiation.

2.6.6. Ensure suspected or known overexposures are reported to the IRSO immediately.

2.6.7. 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 BE.

2.6.8. Ensure personnel are given pre-employment evaluations through the 35th Medical Group occupational health examination process, prior to assignment to duties involving laser radiation and request termination physicals when no longer working in radiation area.

2.6.9. Document initial and annual worker training on hazards associated with radiation on AF Form 55 or equivalent.

2.7. Installation Contracting Office:

2.7.1. Ensures that all contracts contain the terms and conditions in compliance with all applicable statutes, regulations and instructions for managing RAM in the Air Force and acquisition of FDA compliant lasers. Contractors will include a current USNRC Materials License (NRC Form 374), leak test report if applicable for the contractor's equipment, equipment information (serial no., calibration dates, etc.), identify personnel certified to use equipment, including their training dates and Radioactive Materials License. This will include the requirement that non-Air Force organizations, including other DoD organizations, Department of Energy (DoE) organizations, DoE prime contractors and other contractors that need to use RAM must have the following:

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

2.7.1.2. A valid US Navy RAM permit.

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

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

2.7.2. Will inform requiring agencies of their responsibility during design reviews and work order requests to submit formal approval prior to allowing work to commence on contracts for which they oversee. Without prior written approval from BE/IRSO work requests will be denied.

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

2.8. 35 LRS/LGRDD (Cargo Movement) will:

2.8.1. Prepare and transport RAM shipments in accordance with 10 CFR 71, Packaging and Transportation of Radioactive Material; 49 CFR, Transportation; and Defense Transportation Regulation (DTR) DoD 4500.9-R-Part II, Cargo Movement, as applicable.

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

2.8.3. Not transfer any RAM to units on the installation without prior coordination with IRSO. Permitted RAM will not be transferred to any organizations without an up-to-date permit, a permit RSO, or the proper identification of radionuclide/quantities of material/devices as authorized on the permit.

2.8.4. Develop and implements procedures to prevent the unauthorized transfer of RAM/items of supply containing RAM/or any item of suspect through the Defense Logistics Agency Disposition Services (DLADS) system. Establish procedures to notify BE/IRSO in the event of an incident(s) or the need to perform radiological survey(s) of material that are suspected to have RAM.

3. Optically Stimulated Luminescence (OSL) Program.

3.1. Dosimeters will be issued before personnel begin duties in ionizing radiation areas. The supervisor will have the individual report to BE, building 1760, for issuance of a personal dosimeter. When personnel are removed from duties within the radiation areas, the supervisor will notify BE and return the personal dosimeter.

3.2. The wearing of dosimeters will be as follows:

3.2.1. The OSL issued by BE will be worn by all workers entering a radiation area. Never place the OSL inside the pocket or behind cloth, cigarettes, coins, or any obstruction whatsoever. The following OSLs will be worn in the appropriate locations:

3.2.1.1. Whole Body OSL: This dosimeter is clipped on the outer clothing in the front part of the body below the shoulders and above the hips. When worn with a collar dosimeter, the whole-body dosimeter is always worn underneath any lead apron. When worn WITHOUT a collar dosimeter and a lead apron is worn, the whole-body dosimeter is worn on the individual's collar, outside any protective shielding.

3.2.1.2. Collar OSL: This dosimeter should be worn near the thyroid. OUTSIDE ANY SHIELDED PROTECTIVE COVERING.

3.2.1.3. Finger Ring OSL: This dosimeter is worn on the finger that will receive the highest dose of radiation from the source and must be oriented so that the circular indentation is facing the radiation source. If this dosimeter is worn with leaded gloves, it is worn under the shielded gloves.

3.2.2. When OSLs are not being worn, it must be stored with the area control dosimeter. Never take the dosimeter out of the radiation area of operation (i.e., home, car, etc....).

3.2.3. Supervisors or designated personnel for each work section must ensure the OSLs are available during the routine dosimeter exchange, usually the first day of each month (for monthly) or quarter (for quarterly). If not available, the individual is required to take the OSL(s) to Building 1760 for the periodic exchange.

3.2.4. Supervisors must ensure personnel don't tamper with the OSLs. If these devices are accidentally damaged or exposed, the wearer must immediately notify BE. The wearer will provide a written explanation of the nature of the accident, signed by him/her and supervisor, to aid in the evaluation of the OSL.

3.2.5. Personnel working with industrial x-ray equipment or adjacent to high radiation areas will wear two self-reading pocket dosimeters or a personal dosimeter 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 material such as coins or other metallic objects in the pocket.

3.2.6. When visitors enter a radiation area, they are required to register with the supervisor before entry. The supervisor will issue personal dosimeter to the visitor and maintain Dosimeter Results Log, with the visitor's name, address, date, time in and out, dosimeter serial number, and the initial and final readings on the dosimeter. The RSO will designate those areas and circumstances in which OSLs must be worn by visitors in addition to the dosimeter.

3.2.7. Lost OSL must be reported immediately to BE and workplace supervisor for initiation of an investigation.

3.3. Investigation Action Levels have been established for Misawa AB and are based on guidance from the AFIOH's —Bioenvironmental Engineer's Guide to Ionizing Radiation and historical dosimetry data. IALs are dose equivalent values that require further investigation by the IRSO when exceeded.

3.3.1. The IALs are a guide; the IRSO can initiate further investigation anytime exposures occur that deviate from ALARA.

4. Procurement of Radioactive Materials or Equipment.

4.1. All requests for radiation producing materials or equipment will be submitted to BE for review and approval.

4.1.1. The user will prepare a letter of justification and supporting documentation indicating the materials or equipment desired.

4.1.2. Requests to BE will include, as a minimum, the following information:

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

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

4.1.2.3. Brief outline or procedure to be followed and any other special requirements.

4.2. The application will not be approved if:

4.2.1. It is determined the applicant is not equipped to observe the health and safety standards established by the NRC, HQ AFMSA/SGPR, 35 MDG/CC, or the criteria established within the NRC licenses applicable to the material or equipment involved.

4.2.2. It is determined the applicant is not qualified to use radioisotopes or the equipment for the purpose requested.

4.2.3. Past records indicate the applicant has neglected to observe necessary health and safety standards resulting in over exposure or injury.

4.3. The IRSO may forward to higher headquarters at the request of the applicant, applications that are controversial in nature and cannot be resolved at installation level.

4.4. The IRSO will submit the application, to HQ AFMSA/SGPR.

4.5. IRSO and users will apply for permit amendments to BE. Radioisotopes may not be procured until the applicant has received written approval from the IRSO.

5. Transport of Radioactive Materials.

5.1. Radioactive materials received on installation will be handled in the following manner:

5.1.1. When any radioactive materials are received, the receiving agency will contact the IRSO for a receipt survey of the material within 72 hours.

5.1.2. The IRSO or his/her designated representative, will survey the package at the receiving agency and verify radiation levels at surface and one meter from container do not exceed levels in 49 CFR 173.422. If discrepancies are found, the IRSO will have the shipment placed at the radioactive storage area and will notify the sender. The IRSO will consult with Defense Center for Public Health – Dayton (DCPH-D) to determine proper follow-up action.

5.1.3. The receiving agency and the IRSO will log all radioactive material arriving on MAB.

5.1.4. If the material is a permitted sealed source, the IRSO will be required to perform a leak test (swipe sample) semi-annually or in accordance with permit conditions.

5.2. Users of radioactive materials must coordinate with the IRSO, or alternate IRSO, BE, building 1760, before any radioactive materials are shipped out of MAB. 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 AFMAN 40-201.

5.3. Traffic Management Office (TMO) prepares and transports radioactive material shipments in accordance with 10 CFR 71, Packaging and Transportation of Radioactive Material, 49 CFR, Transportation, and Defense Transportation Regulation (DTR) DOD 4500.9-R-Part II, Cargo Movement, as applicable and otherwise compliant.

5.3.1. All licensed/permitted radioactive materials must be shipped with a tracking number/system while in transit.

5.3.2. Use the checklist at [Attachment 2](#) to prepare the radioactive material package for shipment.

6. Storage of Radioactive Materials.

6.1. Store all radioactive materials in safe and secure locations to prevent removal by unauthorized personnel. All machines producing ionizing radiation may be stored in convenient locations provided they are in a configuration to preclude inadvertent operation.

6.1.1. Shielding should be such that the exposure rate on the outside of the areas does not exceed 2 milliroentgen per hour (mR/hr) and 100 milliroentgen per year (mR/yr).

6.1.2. Post appropriate standard radiation warning signs.

6.1.3. Make sure the area is uncluttered and in an orderly arrangement.

6.1.4. Post the names and telephone numbers of responsible individuals in a conspicuous location.

6.1.5. Maintain an inventory log of all RAM stored in the facility.

7. Disposal or Recycle of Radioactive Materials.

7.1. The IRSO is responsible for ensuring the proper disposal of all radioactive materials on the installation. The owner of the RAM is responsible for coordinating all disposal actions concerning radioactive materials through the IRSO. The owner of the RAM maintains physical accountability for the radioactive waste until written disposition instructions have been received from the Air Force Radioactive and Mixed Waste Office.

7.2. The IRSO will coordinate the disposal of all RAM through AFRAD and ensure to follow the guidelines provided by them. Upon receipt of the disposal instructions by the RSO, the owner of the RAM will contact TMO to arrange packing and shipment of radioactive assets for disposal.

7.3. The owner of the RAM and IRSO will take the radioactive assets to TMO for shipment. The IRSO and owner of the RAM will ensure materials are properly packed, weighed, marked, tested, and labeled in accordance with provisions outlined in the disposal instructions. The TMO representative will verify all paperwork for accuracy and make the necessary arrangements to have a commercial carrier pick up the radioactive waste as per disposal instructions.

7.4. The IRSO will keep disposal records according to 10 CFR, Part 20.2108, Records of Waste Disposal, or other directives as applicable.

8. Radiation Surveys.

8.1. The IRSO or delegated alternate will conduct routine surveys and schedule shielding surveys. The IRSO will conduct special surveys at the request of using organizations. For these special surveys, contact BE.

8.2. Types of surveys are direct measurement surveys, surface contamination swipes, administration evaluation, and leak testing of sealed sources and devices.

8.3. If the above tests reveal the presence of 0.005 microcuries or more of removable contamination, the device is withdrawn from use and arrange for it to be decontaminated and repaired or disposed of in accordance with the waste disposal procedures.

9. Emergency Procedures.

9.1. Emergencies include uncontrolled radiation environments. These environments may include garrison or deployed locations where known or suspected nuclear or radiological hazards exist and radiological environments created by hostile action or industrial, medical, nuclear incident or accident. BE must be notified immediately.

9.2. BE will be directly involved with all investigations and reporting of accidents and incidents involving radioactive materials. All reporting and investigations will be per the applicable sections of DAFI 91-202, The US Air Force Mishap Prevention Program; DAFI 91-204, Safety Investigations and Reports and AFMAN 40-201. Reporting under DAFI 91-204 does not negate the reporting requirements of AFMAN 40-201 and the NRC.

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

9.4. Firefighting procedures where known RAM is stored are as follows:

9.4.1. 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 is contained.

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

9.4.3. If a fire breaks out, sound the evacuation alarm, call 911, and notify BE 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, and secure the material; then, close the windows and doors, and shut off the ventilation system before leaving the area.

9.5. A person who ingests radioactive material should be transported immediately for medical treatment and BE notified of the incident.

9.6. A person who has inhaled radioactive material should be removed to an uncontaminated area immediately. The patient should be transported for medical treatment and BE notified of the incident.

10. Laser Safety Procedures.

10.1. Before starting any operation involving laser operations, adequate safe operating procedures will be developed. BE will inspect the operation area for hazards. All work with lasers will be done in accordance with AFI 48-139. BE will have final approval authority for laser operations.

10.2. The using organization will provide the following when requesting approval of laser operations:

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

10.2.1.1. Personal hazards including safe eye exposure distance.

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

10.2.1.3. Sequence of operations.

10.2.1.4. Individual (name) assigned as laser safety officer.

10.2.2. Send the following information to BE:

10.2.2.1. Location (building and room number).

10.2.2.2. Type of laser.

10.2.2.3. Wavelength. Output power.

10.2.2.4. Mode of operation.

10.2.2.5. Pulse duration (if applicable).

10.2.2.6. Beam diameter in millimeters or centimeters.

10.2.2.7. Beam divergence in radians.

10.2.2.8. Transverse electromagnetic modes (if applicable).

10.2.2.9. Pulse repetition rate.

10.2.2.10. List of operational personnel giving the last, first, and middle name, rank or civil service rating, and Last 4 (SSN).

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

10.3. Inspections of laser operations will be accomplished as follows:

10.3.1. The initial inspections are normally conducted by BE in conjunction with the unit safety officer and 35 FW/SEG representative:

10.3.1.1. The BE Chief or designated alternate is the inspection leader and will ensure laser safety, as prescribed in AFI 48-139 and standards set by the Public Health Service, as required by Public Law 90-602, Radiation Control for Health and Safety Act of 1968.

10.3.1.2. 35 FW/SEG or designated alternate will inspect for compliance with applicable provisions of DAFMAN 91-203, Air Force Occupational Safety Fire and Health Standards, Fire Protection, and Health Standards, and other applicable safety regulations.

10.3.1.3. The unit safety representative will accompany the inspectors and make notes as to the deficiencies found. This individual has the responsibility for ensuring compliance with safe operating procedures.

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

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

10.6. Supervisors shall conduct initial and annual laser safety training and document training on AF IMT 55 or equivalent.

11. Electromagnetic Field Radiation (EMFR) Safety Procedure.

11.1. BE should assess installation EMFR emitters IAW AFI 48-109.

11.2. Supervisors will coordinate all modifications and additions to EMFR emitters with BE. Supervisors are responsible for ensuring their workers are aware of and follow the safety procedures outlined in AFI 48-109, equipment technical manuals, and unit safety awareness training. Supervisors will review and implement their responsibilities as explained in AFI 48-109.

11.3. Supervisors shall conduct initial and annual radio frequency radiation safety training and document training on AF Form 55 or equivalent.

12. Records Management.

12.1. Radioactive materials records will be maintained as follows:

12.1.1. The user and BE will maintain records on all Air Force permits and, on all materials licenses, as required by the AFI 33-322, Records Management and Information Governance Program.

12.1.2. The inventory records will list the isotope, activity, item description, date of original activity, model number, serial number and storage location.

12.2. The user and BE will maintain survey records on equipment producing ionizing radiation.

12.3. The users and BE will maintain survey records on equipment producing non-ionizing radiation that may be hazardous to personnel.

12.4. Exposure records, SDRD Listing 1527, History of Occupational Exposure to Ionizing Radiation or equivalent, will be filed in medical records and available to members on request.

MICHAEL P. RICHARD, Colonel, USAF
Commander, 35th Fighter Wing

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

AFMAN 48-148, *Ionizing Radiation Protection*, 20 July 2020

AFI 48-139, *Laser Radiation Protection Program*, 30 September 2014

AFMAN 40-201, *Radioactive Materials (RAM) Management*, 29 March 2019

10 CFR 71, *Packaging and Transportation of Radioactive Material*, 30 December 2021

49 CFR Part 173, *Shippers—General Requirements for Shipments and Packaging*, 1 October 2010

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Bioenvironmental *Engineer's Guide to Ionizing Radiation*, AFIOH, October 2005

DAFI 91-202, *The US Air Force Mishap Prevention Program*, 12 March 2020

DAFI 91-204, *Safety Investigations and Reports*, 10 March 2021

Public Law 90-602, *Radiation Control for Health and Safety Act of 1968*, 18 October 1968

DAFMAN 91-203, *Air Force Occupational Safety Fire and Health Standards, Fire Protection, and Health Standards*, 25 March 2022

MIL-STD-1425, *Military Lasers and Associated Support Equipment*, 30 August 1991

AFI 48-109, *Electro-Magnetic Field Radiation (EMFR) Occupational and Environmental Health Program*, 1 August 2014

AFI 33-322, *Records Management and Information Governance Program*. 28 Jul 2021

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

AF Form 55, *Employee Safety and Health Record*

Abbreviations and Acronyms

AF—Air Force

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFMRA—Air Force Medical Readiness Agency

ALARA—As Low As Reasonably Achievable

Bq—Becquerel

CFR—Code of Federal Regulations

Ci—Curie

DoD—Department of Defense

DoDI—Department of Defense Instruction

DoDM—Department of Defense Manual

IRSO—Installation Radiation Safety Officer

JP—Joint Publication

MAJCOM—Major Command

MTF—Military Treatment Facility

pCi/L—picoCurie/Liter

PPE—Personal Protective Equipment

RAM—Radioactive Material

rem—Roentgen Equivalent Man

RPD—Radiation Producing Device(s)

RSC—Radiation Safety Committee

RSO—Radiation Safety Officer

SI—International System of Units

SORN—System of Records Notice

mSv—milliSievert

URSO—Unit Radiation Safety Officer

USAFSAM—United States Air Force School of Aerospace Medicine

U.S.C.—United States Code

Terms

ALARA—As Low As Reasonable Achievable 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 *AFI 48-109, Electro-Magnetic Field Radiation (EMFR) Occupational and Environmental Health Program*, 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).

Investigation Action Levels—A dose equivalent value or radionuclide intake activity set by the installation RSO that requires further investigation when exceeded. Levels are normally tailored to historical dosimetry data in order to promptly identify and correct adverse trends.

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.

OSL—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.

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, The US Air Force Personnel Dosimetry Program*, 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.

RAM—Abbreviation for radioactive material.

Restricted area—An area having access limited to protect individual against undue risks from exposure to radiation or radioactive material.

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 (TLD), but they are read by the wearer and give a good indication of the radiation dose received by the wearer. 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.

Attachment 2

LICENSED/PERMITTED RADIOACTIVE MATERIAL SHIPMENT CHECKLIST

Table A2.1. General Requirements for Packages and Packaging.

	Yes	No	Remarks
1. Designed in relation to its mass, volume/shape that can be easily and safely handled/transported			
2. Designed so it can be properly secured in or on the conveyance during transport			
3. Design such that any lifting attachments on the package will not fail			
4. Packaging is such that the external surfaces are free from protruding features and can be easily decontaminated			
5. The outer layer of the package is so designed as to prevent the collection and retention of water			
6. Package is capable of withstanding the effects encountered in transport			
7. Securing devices are designed to prevent becoming loose or being released intentionally			
8. Continue to tables below if shipment is: a. Type A packages, go to Table-B b. Excepted packages/Instruments and articles, go to Table-C			

Table A2.2. Type A Packages.

(a) Additional General Requirements	Yes	No	Remarks
1. The smallest overall external dimension is not less than 10 cm (4 in)			
2. The outside shall incorporate a security seal			
3. The non-fixed radioactive contamination on any external surface of the package shall not exceed 0.4 Bq/cm ² (10 ⁻⁵ μCi) beta-gamma and 0.04 Bq/cm ² (10 ⁻⁶ μCi/cm ²) alpha			
(b) Content Limits			
4. Type A package contains RAM(s) less than or equal to A ₁ /A ₂ activity limits: Am-241: A ₁ = 10 TBq (270 Ci) A ₂ = 0.001 TBq (0.027 Ci) Cs 137: A ₁ = 2 TBq (54 Ci) A ₂ = 0.6 TBq (16 Ci) Ni-63: A ₁ = 40 TBq (1100 Ci) A ₂ = 30 TBq (810 Ci) Th-232: A ₁ = Unlimited A ₂ = Unlimited			
(c) Labeling Requirements	Yes	No	Remarks
5. Survey performed to determine proper label Surface: ≤ 0.005 mSv/hr (≤ 0.5 mRem/hr) / T.I. None Required Cat-II-Yellow-Surface: > 0.005; ≤ 0.5 mSv/hr (> 0.5 mRem/hr; ≤ 50 mRem/hr) / T.I. ≥ 0; ≤ 1.0 Cat-III-Yellow-Surface: > 0.5; ≤ 2.0 mSv/hr (> 50.0 mRem/hr; ≤ 200 mRem/hr) / T.I. ≥ 1.0; ≤ 10.0			
6. Label include contents: Radionuclide(s); Activity (Bq); T.I.-(Cat II-Yellow and III-Yellow ONLY)			
7. Labels affixed to two opposite sides of the package			
(d) Marking Requirements	Yes	No	Remarks
8. Outside package marked with consignor, consignee or both			
9. Outside of package marked with appropriate UN# and proper shipping name (i.e., UN2915, RADIOACTIVE MATERIAL, TYPE A PACKAGE)			

10. Outside package marked with gross mass, if package exceeds 50 Kg (110 lbs)			
(e) Transport Document Requirements	Yes	No	Remarks
11. Proper shipping name (i.e., RADIOACTIVE MATERIAL, TYPE A PACKAGE)			
12. United Nation Class Number —7II			
13. United Nation Number (i.e., UN2915)			
14. Name or symbol of radionuclide(s)			
15. Physical and chemical form of material			
17. Maximum activity for each radionuclide expressed in units of (Bq) with an appropriate (SI) prefix			
18. Category of package (I-White, II-Yellow, III-Yellow)			
19. Transport index (Cat II-Yellow and III-Yellow ONLY)			
20. Certification statement: —I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and are in all aspects in proper condition for transport by (insert mode of travel) according to the applicable international and national governmental regulations. I			
21. The document is signed and dated			
22. Supplemental information for loading, stowage, carriage, handling and unloading provided to carrier			
(f) Transporting by Road Requirements	Yes	No	Remarks
23. Labeled package, PLACARDS REQUIRED on two external walls and the external rear wall of vehicle			
24. Nonexclusive use radiation levels exterior surface of the vehicle ≤ 2 mSv/hr (≤ 200 mRem/hr)			

Table A2.3. Excepted Packages/Instruments and Articles.

(a) Content Limits	Yes	No	Remarks																																																			
<p>1. Is the material enclosed in or included as a component part of an instrument or other manufactured article</p> <p>a. Radiation level at 10 cm from external surface of any unpackaged instrument or article is not greater than 0.1 mSv/hr (10 mRem/hr)</p> <p>b. Each instrument or article (except radioluminescent timepieces or devices) bears the marking —Radioactive </p> <p>c. Item and package limits: See table B, item (b) 4, for A₁ and A₂ values</p> <div style="text-align: center;"> <p>Activity Limits For EXCEPTED PACKAGES (IAEA Safety Standards Series No. TS-R-1, Section IV, Table III)</p> <table border="1" data-bbox="256 787 870 1150"> <thead> <tr> <th rowspan="2">PHYSICAL STATE OF CONTENTS</th> <th colspan="2">INSTRUMENT & ARTICLES</th> <th>MATERIALS</th> </tr> <tr> <th>Item Limits*</th> <th>Package Limits*</th> <th>Package Limits*</th> </tr> </thead> <tbody> <tr> <td colspan="4" style="text-align: center;">SOLIDS</td> </tr> <tr> <td>Special Form</td> <td>10⁻² A₁</td> <td>A₁</td> <td>10⁻³ A₁</td> </tr> <tr> <td>Other Form</td> <td>10⁻² A₂</td> <td>A₂</td> <td>10⁻³ A₂</td> </tr> <tr> <td colspan="4" style="text-align: center;">LIQUIDS</td> </tr> <tr> <td>Liquids</td> <td>10⁻³ A₂</td> <td>10⁻¹ A₂</td> <td>10⁻⁴ A₂</td> </tr> <tr> <td colspan="4" style="text-align: center;">GASES</td> </tr> <tr> <td>Tritium</td> <td>2x10⁻² A₂</td> <td>2x10⁻³ A₂</td> <td>2x10⁻² A₂</td> </tr> <tr> <td>Special Form</td> <td>10⁻³ A₁</td> <td>10⁻² A₁</td> <td>10⁻³ A₁</td> </tr> <tr> <td>Other From</td> <td>10⁻³ A₂</td> <td>10⁻² A₂</td> <td>10⁻³ A₂</td> </tr> <tr> <td colspan="4" style="text-align: center;">NOTES:</td> </tr> <tr> <td colspan="4">* For mixture of Radionuclides, see §404-406</td> </tr> </tbody> </table> <p style="text-align: center;">PACKAGE RADIATION LEVEL LIMITS (IAEA Safety Standards Series No. TS-R-1)</p> <p>LIMITED QUANTITY = ≤ 0.5 mrem/hr on any surface. INSTRUMENTS & ARTICLES = ≤ 0.5 mrem/hr on any surface. ≤ 10 mrem/hr at 4 inches from external surface of instrument.)</p> </div>	PHYSICAL STATE OF CONTENTS	INSTRUMENT & ARTICLES		MATERIALS	Item Limits*	Package Limits*	Package Limits*	SOLIDS				Special Form	10 ⁻² A ₁	A ₁	10 ⁻³ A ₁	Other Form	10 ⁻² A ₂	A ₂	10 ⁻³ A ₂	LIQUIDS				Liquids	10 ⁻³ A ₂	10 ⁻¹ A ₂	10 ⁻⁴ A ₂	GASES				Tritium	2x10 ⁻² A ₂	2x10 ⁻³ A ₂	2x10 ⁻² A ₂	Special Form	10 ⁻³ A ₁	10 ⁻² A ₁	10 ⁻³ A ₁	Other From	10 ⁻³ A ₂	10 ⁻² A ₂	10 ⁻³ A ₂	NOTES:				* For mixture of Radionuclides, see §404-406						
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<p>2. If the material is not enclosed or manufactured, the following apply:</p> <p>a. The package retains its content under routine conditions of transport</p>																																																						
<p>b. The internal surface of the package bears the marking —Radioactive such that is visible on opening the package</p> <p>c. Package limits: See table C, item (a)1.c.</p>																																																						

(b) Requirements and Controls	Yes	No	Remarks
3. Markings: a. Each package durably marked on the outside with either the consignor or consignee b. United Nation number preceded by the letters —UNI (UN2910 for Limited Quantities; UN2911 for Instruments or Articles) c. Gross mass exceeding 50 kgs (110 lbs) durably marked			
4. Other dangerous properties are taken into account			
5. The non-fixed radioactive contamination on any external surface of the package shall not exceed 0.4 Bq/cm ² (10 ⁻⁵ μCi) beta-gamma and 0.04 Bq/cm ² (10 ⁻⁶ μCi/cm ²) alpha			
6. The transport document includes: The appropriate United Nation number			