

**BY ORDER OF THE COMMANDER
934TH AIRLIFT WING**

**934TH AIRLIFT WING INSTRUCTION
48-201**



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Aerospace Medicine

***RADIATION SAFETY FOR IONIZING,
EMF, AND LASERS***

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This instruction implements Installation specific Radiation Safety and Control requirements at Minneapolis Air Reserve Station (MARS) IAW AFMAN 40-201, *Radioactive Materials (RAM) Management*; AFI 48-109, *Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program*; AFMAN 48-148, *Ionizing Radiation Protection*, and AFI 48-139, *Laser and Optical Radiation Protection Program*. It establishes local procedures for the maintenance of a viable radioactive material and directed energy safety and control program. The major areas of concern associated with industrial and public health shall focus on ionizing radiation, electromagnetic field radiation (EMFR), and light amplification by stimulated emission of radiation (LASER) sources, equipment, and/or emitters. Bioenvironmental Engineering/Public Health Services (BE/PHS) personnel, under the direction of the Installation Radiation Safety Officer (IRSO) and/or the Installation Laser Safety Officer (ILSO), will ensure the safety procedures and preventive measures are observed in environments where potential ionizing radiation, EMFR, and laser hazards exist so that exposures are kept as low as reasonably achievable (ALARA). BE/PHS provides that 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 Information Management System (AFRIMS) Records Disposition Schedule (RDS). Refer recommendation changes and questions about this publication to the Office of Primary Responsibility (OPR) using the DAF Form 847, *Recommendation for Change of Publication*; route AF Form 847 to 934 MSG/SGPB, 760 Military Highway, Bldg. 752, Minneapolis, MN 55450-2100.

SUMMARY OF CHANGES

The publication is substantially revised and must be completely reviewed. This revision readjusts the requirements of these programs to be more in line with AFMAN 48-148, AFI 48-109 and AFI 48-139.

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1. ALARA. While ALARA principles are generally associated with ionizing radiation, EMFR emitters, and laser producing devices are also areas of concern for 934 AW personnel. Current Air Force policy dictates that all ionizing radiation, EMFR, and laser exposures be prevented or kept to an absolute minimum. The following paragraphs outline the procedures used to ensure ionizing radiation, EMFP, and laser producing sources, devices, and/or equipment are obtained, operated, utilized, stored, and disposed of, as applicable, in a manner that will minimize exposure. Therefore, the most stringent safety and health guidelines shall be utilized to prevent or limit ionizing radiation, EMFR, and laser exposures to 934 AW personnel and the general public. Each workplace identified in this instruction shall assign a Unit Radiation Safety Representative (URSO) and/or Unit Laser Safety Officer (ULSO) as directed by the IRSO/ILSO. The URSO shall act as the focal point for ionizing radiation, EMF and/or lasers within their unit.

2. Responsibilities.

2.1. **IRSO/ILSO.** The IRSO/ILSO is responsible for ensuring the completion or verification of all surveys, inventories, training, and education mentioned in this instruction. The IRSO/ILSO or designee will perform the surveys and maintain the data in a format consistent with DAFI 48-145, *Occupational Health Program* to include data maintenance in the Defense Occupational and Environmental Health Readiness System – Industrial Hygiene (DOEHRS-IH). The IRSO/ILSO shall verify that a URSO and/or a ULSO has been appointed by the organization or unit commander

as applicable, for all workplaces that store, maintain, use, or deploy ionizing radiation sources or equipment, EMFR emitters, and laser producing devices. The IRSO/ILSO ensures that workers are properly trained on the risks of ionizing radiation, EMFR, and lasers in addition to ensuring that all ionizing radiation sources or equipment, EMFR emitters, and laser producing devices are inventoried annually. 934th Aeromedical Staging Squadron (ASTS). The Reserve Medical Unit (RMU) is responsible for all occupational health examinations and testing required of workers potentially exposed to ionizing and non-ionizing radiation. Upon notification that a new worker has been added to a shop, the ASTS staff will update internal rosters and schedule the worker for all applicable occupational exam items as identified on the current shop Clinical Occupational Health Exam Requirements (COHER) document. ASTS staff will ensure that workers complete all baseline, surveillance, and termination items within appropriate timelines IAW the Code of Federal Regulations as specified in DAFMAN 48-146, 5.6.4.4., 1 Dec 2022. Baseline exam items typically must be completed prior to starting work in the designated shop.

2.2. URSO/ULSO. As identified in this instruction, a URSO and/or a ULSO shall be appointed for all workplaces that store, maintain, use, or deploy ionizing radiation sources or equipment, EMFR emitters, and laser producing devices. The URSO/ULSO ensures all safety, operational, and security procedures, notification, reporting, and training requirements IAW applicable regulations are adhered to. The URSO/ULSO shall notify the IRSO/ILSO in the event of any additions, deletions, or changes associated with ionizing radiation sources or equipment, EMFR emitters, and laser producing devices that are assigned to their workplace. The URSO/ULSO is also responsible for notifying the IRSO/ULSO prior to shipment and/or transfer of any RM/EMFR items. The URSO/ULSO also initiates the investigation process for known or potential exposures (incidents) to workers or in the event a device or item is lost, stolen or mission.

2.3. Supervisors. Supervisors shall ensure newly assigned activities that involve ionizing radiation sources or equipment, EMFR emitters, and laser producing devices are reported to the IRSO/ILSO prior to obtaining said equipment, material, and/or devices in accordance with applicable regulatory guidance. Coordinate with BEE/PH regarding pregnant females who work with ionizing radiation, EMFR, and/or lasers. Promptly notify ASTS staff of workers added to or removed from designated shop to ensure timely completion of baseline and termination exam requirements as required.

2.4. Ensure that a URSO and/or ULSO has been appointed for those areas identified by the IRSO/ILSO that store, maintain, use or deploy ionizing radiation sources or equipment, EMFR emitters, and/or laser producing devices. Immediately contact their supervisor and the IRSO/ILSO for known or potential exposures (incidents) to workers or in the event a device or item is lost, stolen, or missing.

2.5. Minneapolis ARS Personnel. 934 AW employees shall adhere to all security measures, safety controls, and audiovisual warning aids designed and/or implemented to prevent access to areas while ionizing radiation sources or equipment, EMFR emitters, and laser producing devices are in use. In addition, it is everyone's responsibility to report the presence of unauthorized personnel in identified restricted areas and workplaces that store, maintain, or use ionizing radiation sources or equipment, EMFR emitters, and/or laser producing devices.

3. RAM Storage Area Procedures. Currently, there is no permitted regulatory RAM on MARS and/or used by workplaces or tenant organizations on MARS. However, several organizations store, handle, and/or utilize General Licensed Devices (GLDs) containing RAM and or equipment covered under instruments and articles. Instruments, manufactured articles, or major end items

constructed of or having RAM as a component part is often assigned a National Stock Number (NSN), normally procured, stored, and distributed through USAF and DoD logistical supply systems. Items include but are not limited to such devices as Chemical Agent Detectors, RADIAC sets, Lensatic compasses, dials, and gauges. To ensure the highest level of control, a URSO may be assigned to these work centers to prevent misuse, improper handling, and loss or stolen instruments or manufactured articles. In addition, contractor use of RAM, permitted or otherwise, occurs on a regular basis and is addressed in section 7 of this AWI.

3.1. Notification. The IRSO shall be notified immediately of any mishap involving RAM to include damage, release, unauthorized use, or lost/stolen/missing item has occurred.

4. Incoming/Outgoing RAM Surveys.

4.1. Receipt Survey. All incoming packages containing radioactive materials will be inspected by a qualified individual per Technical Order (T.O.) 00-110N-3, *Requisition, Handling, Storage, and Identification of Radioactive Material*. Items destined for MARS arrive at 934 LRS/Base Supply. Base Supply will notify BE/PHS, who will perform a radiological survey.

4.2. Procedures. Upon notification by the 934th Logistics Readiness Squadron (934 LRS) a package containing RAM has arrived or is packaged to depart MARS, the following steps must be made to ensure that the RAM is handled properly.

4.2.1. Shipping of non-permitted RAM. The URSO shall notify the IRSO and the shipper prior to the shipment of any non-permitted RAM. In addition, the IRSO or designee will be dispatched to survey the package upon notification from 934 LRS Traffic Management Office (TMO). The individual performing the survey will note the contents of the package and the maximum emission rate after surveying all sides of the package. The measurements will be taken directly from the surface of the sealed package by the appropriate radiation meter. If applicable, a swipe sample will also be taken and then read with the appropriate radiation meter. If the maximum emission rate or removable surface contamination levels are exceeded, the package will either be repackaged by the shipper until the levels are not exceeded or the RAM can be shipped under the special procedures outlined in 49 CFR 173, *General Requirements for Shipments and Packaging*. The IRSO, in conjunction with the URSO, shall obtain written verification that the RAM was received by receiving organization (telephone verification is in accordance with AFMAN 40-201, *Radioactive Materials (RAM) Management* in the USAF is acceptable if written verification cannot be obtained).

4.2.2. Receipt of non-permitted RAM. The IRSO or designee will be dispatched to survey the package upon notification from Base Supply that the RAM has been received. Base Supply must notify the IRSO or designee within three hours of receipt of the RAM in order to meet the time constraints of 10 CFR 20, *Standards for protection against Radiation*. The survey of the RAM will be conducted similar to the shipping of the RAM listed above. Appropriate action will be taken if it appears the package was improperly shipped in accordance with 49 CFR 173.

4.2.3. Shipping and receipt of permitted RAM. Personnel owning a RAM permit must follow the permit's requirement and contact the IRSO prior to shipping or within three hours of receiving the permitted RAM.

4.3. Prior to ordering any RAM in any quantity, approval must be received from the IRSO. This includes permitted and non-permitted materials.

4.4. Shipment, transfer, disposal or any other movement of RAM on MARS must be accomplished

to ensure compliance with Air Force, Federal, and the State of Minnesota guidelines. Contact the IRSO at (612)713-1611 or (612)713-1608 prior to taking any RAM off of the installation.

5. Swipe Samples.

5.1. All sources which require swipe testing as a part of a RAM/GLD permit will be sampled as directed by the IRSO or designee. On behalf of the owning organization, the IRSO obtains and mails swipe samples to the United States Air Force School of Aerospace Medicine (USAFSAM) Occupational and Environmental Analytical Services Division (OEA), Radioanalytical Lab at Wright Patterson AFB per the applicable end item T.O. Upon receipt of abnormal results, the IRSO will notify the organizational permittee and provide recommendations for corrective actions.

5.2. The IRSO or designee will review the sample results and provide recommendations for all results not within acceptable limits as identified previously.

6. Medical, Security, and Industrial X-Rays.

6.1. BE/PHS surveillance of the Non-Destructive Inspection (NDI) Shop will be scheduled to coincide with routine and/or compliance surveillance whenever possible. All NDI shielded and unshielded sites shall be reviewed annually or sooner if processes or locations change to include procedures and practices, facility design and classification, training, exposure control, monitoring, and surveillance activities. Every effort shall be made by BE/PHS to evaluate new unshielded NSI processes when they occur. NDI personnel perform area monitoring using a Fluke 451P Pressurized Ion Chamber Survey Meter in addition to personal monitoring using electronic personal dosimeters (EPDs) for all unshielded x-ray operations and provide a summary of their exposure monitoring to BE/PHS. Based on potential for exposure, NDI personnel are required to participate in the USAF Thermoluminescent Dosimetry (TLD) Program. The action investigation level for TLD participants is 100 mREM per quarter. Quarterly and annual TLD reports are recorded and provided to participating members by BEE/PH. Individual TLD results will be provided to ASTS by BE/PHS to be uploaded to the electronic health record IAW DAFMAN 48-125, 2.5.3., 27 Oct 2020.

6.2. Dental X-ray facilities are operated by 934th Aeromedical Staging Squadron (934 ASTS) personnel in accordance with AFMAN 47-101, *Managing Air Force Dental Services* and AFMAN 48-148. The Dental x-ray program shall be reviewed annually or sooner if process changes or locations change to include procedures and practices, facility design and classification, training, exposure control, monitoring, and surveillance activities. Based on their potential for exposure, dental personnel are not required to participate in the TLD program.

6.3. An annual radiation review of the 934th Civil Engineering Squadron (934 CES) Explosive Ordnance Disposal (EOD) x-ray devices will be scheduled to coincide with the routine or compliance industrial hygiene survey whenever possible. The primary location, associated with worst case exposure, is Building 750 where semi-annual checks are performed. However, depending on the mission, x-ray devices can be used anywhere on the installation as directed by the installation commander. EOD personnel along with the IRSO will advise the installation commander on areas to evacuate prior to the use of the device. EOD personnel receive annual ionizing radiation safety training as determined by the IRSO.

6.4. GLDs stored, maintained, or used by various workplaces are identified in the BEE/PH EMR Inventory. BEE/PH personnel under the direction of the IRSO perform swipe testing of all GLDs IAW Manufacturers guidelines.

6.5. The 934 LRS uses an x-ray scanner in Bldg. 862 for luggage and packages of personnel

approved to fly military air. 934 LRS baggage and x-ray program shall be reviewed annually or sooner if process changes or locations change to include procedures and practices, facility design and classification, training, exposure control, monitoring, and surveillance activities.

7. Contractor Use of Radioactive Material.

7.1. The 934 Airlift Wing Commander (934 AW/CC) has designated the IRSO or alternate as the approval authority for bringing radioactive material onto MARS.

7.2. Contractor use of radioactive material must be approved by the Installation or alternate IRSO prior to bringing the equipment on base IAW AFMAN 40-201. These requirements are relayed to contractors via statements of work (SOW) and during the pre-construction conference established by Contracting (934 CONF/LGC).

7.3. When a contractor brings radioactive material onto MARS, the site, source, license and individual proof of training shall be provided to the IRSO at least 30 days prior to bringing radioactive material on base. All radioactive material events are documented by BEE/PH personnel.

8. EMFR. BEE/PH personnel evaluate all EMFR emitters to determine the hazards and recommend controls in accordance with AFI 48-109. All EMFR emitters are identified on the BEE/PH EMFR inventory in DOEHS-IH along with detailed theoretical and measurement data.

9. Lasers. BEE/PH personnel evaluate all industrial lasers utilized by MARS employees in accordance with AFI 48-139. All lasers with controls that are stored, utilized, or maintained on MARS are identified in the MARS laser inventory maintained in DOEHS-IH by BEE/PH.

10. Record Keeping.

10.1. Training documents for each respective work center are maintained by supervisor as directed by the most stringent regulation.

10.2. TLD records will be maintained in accordance with DAFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*. The TLD forms, AF Form 1527 *The Personnel Dosimetry Listing*, are maintained in BE/PHS, Building 752, file plan. AF-1527-1 will be maintained in individual medical records.

10.3. Records involving the investigation of radiation incidents/accidents will be maintained electronically in DOEHS-IH or other approved electronic records management system.

11. Emergency Procedures.

11.1. When personnel feel that they have been potentially exposed to ionizing radiation sources or equipment, EMFR emitters, and laser producing devices, intentional or unintentional, they are to contact their supervisor and URSO/ULSO, if applicable, immediately. The supervisor and/or URSO/ULSO in turn will contact the IRSO/ILSO at extension (612)713-1611 or (612)713-1608. Coordination for medical evaluation will be accomplished immediately and in accordance with MARS medical emergency procedures. The 934 ASTS RMU does not have the capability to evaluate or treat injuries or illnesses caused by exposure to ionizing or non-ionizing radiation. However, the 934 ASTS will be notified of all incidents and injuries affecting military personnel. The IRSO/ILSO will notify ASTS staff as soon as practicable to ensure that all medical records related to the incident are reviewed by a military medical provider, that Line-of-Duty determinations are made appropriately for members in-status at the time of exposure, and that any resulting limitations affecting duty/mobility/fitness are appropriately communicated to the unit.

Commander on an AF Form 469. This notification should not delay prompt emergency medical evaluation.

11.2. The IRSO/ILSO will interview all personnel involved in the incident and reconstruct the scenario with the assistance of shop personnel, supervision, and the URSO/ULSO, if applicable. The reconstruction will help to determine the intensity and duration of the exposure. The survey will be conducted by the IRSO/ILSO or radiation/EMFR/laser specialist from USAFSAM/OEH depending on the scenario. Higher headquarters reporting will be accomplished IAW all applicable USAF guidance and all applicable incident reports will be filed with the appropriate agencies.

SAMUEL J. KRAEMER, Colonel, USAF
Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

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

AFI 48-109, *Electromagnetic Field Radiation (EMFR) Occupational and Environmental Health Program*, 1 August 2014, Certified Current 21 April 2020

AFI 48-139, *Laser Radiation and Optical Radiation Protection Program*, 30 September 2014, Certified Current 21 April 2020

DAFI 48-145, *Occupational and Environmental Health Program*, 22 September 2022

T.O. 00-11ON-3, *Requisition, Handley, Storage and Identification of Radioactive Material*

49 CFR 173, *General Requirements for Shipments and Packaging*

10 CFR 21 *Standard for Protection against Radiation*, 21 May 1991

AFMAN 47-101, *Managing Air Force Dental Services*, 25 July 2018

DAFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*, 26 October 2020

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

T.O. C5M

Adopted Forms

DAF Form 847, *Recommendation for Change of Publication*

AF Form 1527-1, *Annual Occupational Exposure to Ionizing Radiation*

Abbreviations and Acronyms

AF—Air Force

AFRC—Air Force Reserve Command

AFSAS—Air Force Safety Automated System

ASTS—Aeromedical Staging Squadron

AWI—Air Wing Instruction

BE/PHS—Bioenvironmental Engineering & Public Health Services

CFR—Code of Federal Regulations

COTS—Commercial Off the Shelf

DoD—Department of Defense

DODI—Department of Defense Instruction

EMF – Electromagnetic Frequency
EMFR – Electromagnetic Frequency Radiation
FDA—Food and Drug Agency
HQ—Headquarters
ILSO—Installation Laser Safety Officer
IAW—In Accordance With
LSC—Laser Safety Council
LSSRB—Laser System Safety Review Board
OEHWG—Occupational and Environmental Health Working Group
PH—Public Health
SOP—Standard Operating Procedures
TO—Technical Orders
ULSO—Unit Laser Safety Officer