BY ORDER OF THE COMMANDER
914TH AIRLIFT WING

914TH AIRLIFT WING INSTRUCTION 40-201

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Medical Command

RADIATION PROTECTION PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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OPR: 914 SPTG/SGPB (Mr. Edward J. Primeau)

Certified by: 914 SPTG/SGPB (Mr. Edward J. Primeau)
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This instruction implements AFPD 40-2, *Radioactive Materials (Non-nuclear Weapons)*, Air Force Policy AFMSC/SGPA Letter, 17 October 1984, and AFI 40-201, *Managing Radioactive Materials in the USAF*. It establishes responsibilities and procedures for managing the base radiation protection program. It prescribes guidelines for personnel to keep exposure to radiation as low as reasonably achievable (ALARA). This instruction applies to all units assigned or attached to the 914 Airlift Wing (AW), Base Operating Services (BOS) contractor, and tenant units who acquire or possess radioactive materials, or equipment that produces radiation. It also applies to any agency or person who brings radioactive materials, or radiation producing equipment, onto this installation.

1. Definitions:

1.1. As Low As Reasonably Achievable (ALARA). The set of actions taken by the Radiation Safety Officer (RSO) to reduce personnel exposures to as low as possible, given the existing technology, cost, and operational requirements.

1.2. Control Dosimeter. A dosimeter that measures the background radiation accumulated during the transit and storage of personnel dosimeters.

1.3. Dosimeter. A device that detects and measures accumulated radiation exposure to personnel.

1.4. Ionizing Radiation. Particles or photons that have sufficient energy to produce direct ionization in their passage through a substance (i.e., x-rays, gamma rays, alpha particles).

1.5. Laser. A device that utilizes the natural oscillations or atoms or molecules between energy levels for generating coherent electromagnetic radiation in the ultraviolet, visible, or infrared regions of the spectrum.

1.6. Non-Ionizing Radiation. Electromagnetic radiation at wavelengths who's corresponding photon energy is not high enough to ionize an absorbing molecule. All radio frequency, infrared, visible, and near ultraviolet radiation is non-ionizing.

1.7. Radiation Safety Officer (RSO). An individual with specific education, military training, and professional experience in radiation protection practice, designated by the installation commander to manage radiation safety programs.

1.8. Radioactive Material (RAM). Materials whose nuclei, because of their unstable nature, decay by emission of ionizing radiation. The radiation emitted may be alpha or beta particles, gamma or X-rays, or neutrons.

1.9. Radio Frequency. A frequency at which coherent electromagnetic radiated energy is useful for communication purposes, defined as 10 KHz to 300 GHz.

1.10. Roentgen Equivalent Man (REM). The fraction of the radiation energy that a person is exposed to that is absorbed by the body. The unit used to equalize the biological consequences that result from equal absorbed doses of radiation.

1.11. Sievert (Sv). Standard international unit. One sievert equals 100 rem.

1.12. US Air Force Radioactive Material Permit. Written authorization from the US Air Force Radioisotope Committee (RIC) for Air Force organizations to receive, possess, distribute, use, transfer, or dispose of radioactive materials.

1.13. US Air Force Radioisotope Committee (RIC). A committee established according to, and the named licensee on, the Air Force Master Materials License to coordinate the administrative and regulatory aspects of licensing, possessing, distributing, using, transferring, transporting, and disposing of all radioactive material in the Air Force.

2. Responsibilities:

2.1. Commander: Ensures only authorized activities are conducted, establish programs to ensure activities are safely done and in compliance with requirements.

2.2. Base RSO. Must be appointed, in writing, by the installation commander. Sets up the overall installation radiation program and keeps the installation, tenant and subordinate commanders informed about radiation health and safety issues and effectiveness of measures to control radiation hazards.

2.3. Permit RSO. Listed in the permit by name. Check the receipt, storage, distribution, use, transfer, and disposal of radioactive materials for compliance with approved rules, AFI 40-201, *Managing Radioactive Materials in the USAF*, and permit conditions.

2.4. Unit RSO: Must be appointed, in writing, by the unit commander. A person from the unit who is most knowledgeable on operational characteristics of the radiation source used by the unit and the hazards to personnel from radiation. This includes all units, to include tenants, which use radioactive material or radioactive producing equipment.

2.5. Workers: All personnel, including tenants, who use radioactive materials or equipment that produces radiation, must obey the permit authorizing the material, the directives listed in the instruction, local operating instructions, and the ALARA principles.

3. Personnel Dosimetry Program:

3.1. Monitoring Criteria. Dosimetry will be performed on personnel who are likely to exceed 10 percent of the occupational exposure limit. The personnel dosimetry program will be conducted in accordance with AFI 48-125, *The US Air Force Personnel Dosimetry Program*, and local base policies. Copies of personnel dosimetry results will be distributed to the respective functional areas RSOs for review and appropriate action.

3.2. Wearing the Whole Body Dosimeter. Wear the whole body dosimeter on the front of the body, below the shoulders and above the hips, on the outside of clothing. Ensure the front surface of the dosimeter faces away from the body. When using a lead apron or similar protective garment, wear the whole body dosimeter on the outside of the basic clothing but beneath the protective garment.

3.3. Securing the Dosimeter. Secure the dosimeter in the proper position on your body before entering a radiation area or handling radioactive materials. Remove the dosimeter when you leave and store it in the area with the control dosimeter.

3.4. Storing the Dosimeter. Designate a dosimeter storage area that's as remote from ionizing radiation sources as practicable. Be sure the area is free of oil, dust, or other contaminants. Don't store dosimeters in areas of high temperature and moisture. Keep a control dosimeter in the dosimeter storage area for the entire monitoring period.

4. Radiation Surveys:

4.1. Ionizing Radiation Sources. All x-ray equipment, radioactive material storage locations and areas using permitted radioactive materials will be surveyed annually by Bioenvironmental Engineering in accordance with AFI 40-201, *Managing Radioactive Materials in the USAF*. If possible, the surveys are encouraged to be scheduled during the annual industrial hygiene surveys.

4.2. Non-ionizing Radiation Sources. Bioenvironmental Engineering compiles and keeps a current inventory of Air Force owned or operated Radio frequency (RF) emitters. In accordance with AFOSH Standard 161-9, *Exposure to Radio Frequency Radiation*, Bioenvironmental Engineering will perform periodic evaluations of the hazard potential of each emitter.

4.3. Laser Sources. Bioenvironmental Engineering compiles and keeps a current inventory of all Class IIIa, IIIb, and IV lasers operated on the installation. In-accordance-with AFOSH Std 161-10, *Health Hazards Control for Laser Radiation*, Bioenvironmental Engineering will periodically perform surveys to determine hazards and needed protective controls.

5. Leak Testing Procedures. Leak testing of radioactive material sources will be done by the radioactive material permittee, in accordance with TO 00-110N-3, and the respective radioisotope permit. The RSO will monitor compliance.

6. Receiving and Shipping of Radioactive Materials:

6.1. Base Organization. All requests for new radioactive materials, or ionizing producing devices, are reviewed by the base RSO before use. The Individual Exemption Codes (IEX) codes and permit/license system will be used to control issues.

6.2. Non-Air Force Organizations. According to AFI 40-201, non-Air Force organizations that bring radioactive materials or radiation producing devices (ionizing or radio frequency producing devices to

include, but not limited to, the following items, x-ray producing devices, electron beams, neutron utilizing devices, lasers, radar or other devices radiating electromagnetic energy, excluding communication radios), on Air Force installations, or conduct operations using radioactive materials on Air Force installations, must get the approval of the installation commander. To get this approval, the non-Air Force organization must send a request to the base RSO at least 30 calendar days before bringing the materials onto the installation. For contractors, these requirements must be included in the statement of work. The items required in the request are outlined in AFI 40-201, section 3.4.18.2.

7. Permit or License Procedures:

7.1. Stock Listed Items and Commodities. The RSO will send an application in letter format to the RIC (AFMOA/SGPR) through their MAJCOM. The letter should include the following.

7.1.1. Name, mailing address and telephone number of the applicant and using organization (facsimile number and e-mail address, if applicable). Applicant must be a commander, or supervisor (branch chief or above).

7.1.2. Item name, stock number, number of items needed, intended use of the desired item.

7.2. Non-Stock Listed Items. Permit applicant prepares the application. The RSO reviews the permit and forwards to MAJCOM, who forwards it to AFMOA/SGPR).

7.2.1. Include the information outlined in AFI 40-201, attachment 3. Identify the item by manufacturer and model number. Each radioactive source in the item by specific radioisotope, chemical or physical form, and maximum activity. Indicate the numbers of each source needed, including spares. The intended use of the desired item.

7.3. Application Process. In response to the initial application, the applicant will receive a list of conditions that the organization commander must review, sign and return to the RIC. The RIC will countersign the list of conditions and return it to the applicant as a valid permit.

7.4. Permit Amendments. Needed for changes in users, RSOs, facilities, or procedures (types and quantities of materials, shielding).

7.4.1. For termination's, or name changes, inform the RIC within 15 calendar days.

7.4.2. Send the request to arrive at AFMOA/SGPR no later than 30 days prior to when you need the changes.

7.5. Transfer, Disposal, and Transportation of RAM and Waste:

7.5.1. For disposal the generator, or user, will initiate a written request for disposal instructions.

7.5.1.1. The request will contain, the national stock number, nomenclature, quantity, type of radionuclide, physical form, chemical form, activity per item in curies, intensity in milliroentgen (mR)/hr at 4 inches from surface of unpackaged article, and point of contact.

7.5.1.2. The generator will forward the request to the base RSO for review and approval (first endorsement). The generator will then forward the request to AL/OEBZ (AFRMW), 2402 E Drive, Brooks AFB, Texas 78235-5114, DSN 240-3486, Commercial 210-536-3486.

7.5.1.3. AL/OEBZ will provide written instructions concerning disposal for the waste. They will provide guidance for disposal of all radioactive waste.

7.5.2. The user must tell the transportation office (freight) the radionuclide, activity, chemical and physical form, item nomenclature, and stock number.

7.6. Radioactive Materials Incidents and Accidents. When in doubt, report any incident to the RSO. The RSO will then report it to the RIC. The time limit for compliance starts from the time of discovery.

8. Quality Assurance:

8.1. Personnel Dosimetry. The following are the action levels that will serve as a guide in determining surveillance and control requirements.

8.1.1. Overexposure Action Level (Whole Body), 5 rem (0.05 Sv) per year.

8.1.2. Abnormal Exposure Action Level, 417 mrem (4.17 mSv) per month, 1250 mrem (12.5 mSv) per quarter.

8.1.3. Investigation Action Level.

8.1.3.1. Medical X-Ray, 17 mrem (0.17 mSv) per year.

8.1.3.2. Non-Destructive Inspection, 10 mrem (0.1 mSv) per year.

8.1.4. Pregnant Female Action Level, 50 mrem (0.5 mSv) per month.

8.2. Pregnant Workers. Personnel dosimetry results for pregnant female workers will be reviewed by the RSO monthly and documentation maintained on actions taken to ensure that the total dose to the fetus does not exceed 500 mrem during the term of pregnancy. Positive efforts should be made to limit the dose to no more than 50 mrem per month.

8.3. Quarterly Radiation Protection Program Reviews. These reviews will be presented to the Aerospace Medicine Council. Review:

8.3.1. All personnel dosimetry results for the previous quarter, to ensure that adverse trends are noted and that all personnel dosimetry results which exceed action levels are acted upon.

8.3.2. All radiation survey results for the previous quarter, to ensure that all required surveys have been performed and documented properly, and that corrective action, if necessary, has been accomplished.

8.4. Annual Radiation Protection Program Reviews. These reviews will be accomplished by the RSO and documented (reviews will be presented to the Aeromedical Medicine Council).

8.4.1. A review of all local implementing directives, to ensure they are correct.

8.4.2. A review of all radiation survey results for the past year, to ensure that all required surveys have been performed and documented properly and that corrective action, if necessary, has been accomplished.

8.4.3. A review of all personnel dosimetry results for the past year, to ensure that adverse trends are noted and appropriate action has been taken on results that exceed standards or action levels.

8.4.4. An update of the radiation source and radioactive material inventory.

8.4.5. A review of all USAF Radioactive Materials Permits and NRC licenses, to ensure currency and compliance with requirements.

9. Pregnant Workers:

9.1. Medical Providers and Supervisors. Refer pregnant workers, whose duties involve exposure to ionizing radiation, to Bioenvironmental Engineering for counseling and additional actions as may be appropriate. Civilian pregnant workers, not followed by Air Force medical providers, should report directly to Bioenvironmental Engineering.

9.2. RSO. The RSO, upon notification, evaluates the exposure potential for each pregnant worker and advises on protective measures to be taken to protect the mother and fetus.

10. Review of Plans for Modifications and New Facilities. The RSO must review all plans and specifications for modification of facilities that involve the use of radioactive material or radiation producing devices, to ensure that ALARA is considered. The review will be conducted during Bioenvionmental Engineering's normal engineering review procedure.

11. Radiation Safety Training. Training will be accomplished by the SGPB office for employees exposed to radiation sources. Initial training will be conducted before, or as soon as possible after, assignment to work areas involving radiation exposure. Annual refresher training will be conducted to reemphasize and reinforce training objectives. The level of training should be tailored to the specific category of personnel and the hazard presented. Documentation of the training will be maintained locally by the respective functional area RSO and a copy will be forwarded to the Bioenvironmental Engineering Section for inclusion in Tab F of the industrial case file. Such training shall, as a minimum, include instructions in the following areas.

11.1. Risk from radiation exposure.

11.2. Health risks to children of women who are occupationally exposed to radiation during pregnancy.

11.3. Maximum permissible dose limits.

11.4. Protective measures required (tailored to specific radiation work).

11.5. ALARA philosophy and practice.

GERALD C. VONBERGE, Col, USAFR
Commander