

Chapter 11 Radiation Safety Program

11-1. General

a. Command policies and procedures for the procurement, production, transfer, storage, use, and disposal of radioactive material and ionizing and non-ionizing producing devices will be developed.

b. Policies and procedures developed will delineate responsibilities to ensure that ionizing radiation hazards are minimized and that the control of these items are effectively maintained to ensure exposure to ionizing radiation and the release of radioactive effluents are as low as reasonably achievable (ALARA).

c. Guidance developed will identify and control potential health hazards resulting from the use of equipment capable of producing potentially hazardous non-ionizing radiation.

11-2. Ionizing radiation

a. The Garrison Commander shall:

(1) Ensure there are adequate resources to support the radiation safety program to include, but not limited to, the presence of a Radiation Safety Officer (RSO) or an Alternate RSO (ARSO) for duty during all normal duty hours.

(2) Ensure measures are established to control health and safety hazards from ionizing radiation sources and radioactive material.

(3) Ensure occupational exposures are maintained within regulatory limits as ALARA.

(4) Designate an RSO and one alternate ARSO.

(5) If the necessity arises for a Radiation Control Committee (RCC), designate members to the RSO.

b. The RSO and ARSO shall be designated in writing. The RSO shall not be assigned duties that will interfere with radiation safety duties. The RSO may be an officer, enlisted, or Civilian employee. When a Civilian employee is performing the duties of RSO, that employee's job description should be appropriately modified to reflect this additional duty. The RSO and the ARSO shall:

(1) Establish procedures that will assure the Garrison Commander, or the appointed designee, is advised of any anticipated use of radiation sources or operations other than scheduled calibration of radiac instruments or x-ray equipment used by the U.S. Army Medical Department Activity (MEDDAC) and tenant U.S. Army Forces Command (FORSCOM) units.

Routine x-ray procedures conducted by the MEDDAC/U.S. Army Dental Activity (DENTAC) are exempt from the reporting requirements of this paragraph.

- (2) Provide advice and instruction on radiological hazards.
- (3) Evaluate existing uses of radioactive materials.
- (4) Provide operating officials with advice on safety matters in carrying out the responsibilities for radiological safety.
- (5) Review all plans for the proposed use of radioisotopes and sources of ionizing radiation.
- (6) Be responsible for control of radioactive material. Maintain an inventory of all radioactive material and ionizing radiation producing devices.
- (7) Survey incoming and outgoing shipments of radioactive materials.
- (8) Recommend method of handling, shielding, storing, and disposing of radioactive materials.
- (9) Periodically monitor operations involving ionizing radiations; however, enforcement of rules and regulations is the responsibility of each individual user and his/her supervisor.
- (10) Supervise decontamination of all spills.
- (11) Perform annual checks to ensure all radiation detection equipment has been properly calibrated.
- (12) Consult with and maintain close liaison with IMCOM and mission headquarters' RSOs in connection with established controls relative to radiological safety.
- (13) Check the use and storage of radiation sources annually.
- (14) Review reports of safety violations and recommend corrective action.
- (15) In conjunction with the specific user, will provide assistance in completing the application for license to use, possess, handle, or transfer radioactive material or ionizing radiation-producing devices.

c. Principal users will:

- (1) Be selected from the organization to which the equipment is assigned.
- (2) Receive training IAW 10 CFR Part 19 prior to use of the radioactive material. This training will be verified by the RSO. Training will include:

- (a) Fundamentals of radiation safety.
- (b) Methods of controlling the radiation dose by time, distance, and shielding.
- (c) Operation, adjustment, and knowledge of the limitations of radiation survey instruments that are available for monitoring.
- (3) Be qualified to handle and use radioactive materials safely.
- (4) Ensure all personnel inform and coordinate with the RSO on matters involving ionizing radiation.
- (5) Ensure leak tests are performed annually by the RSO or other qualified individual. Records of such tests will be maintained.
- (6) Report all proposed changes in source location to the RSO prior to movement.
- (7) Ensure that SOPs are prepared and reviewed by the RSO.
- (8) Ensure radioactive material/source(s) are stored in a controlled area under principle user's supervision and are secured from unauthorized removal from the designated place of storage.
- (9) Ensure radiation exposure received by individuals under their supervision is maintained ALARA.
- (10) Notify the RSO whenever there are alleged items of noncompliance or any safety hazard.

d. *Control Procedures for Radioactive Material.* Any sources obtained that require a license, contact the RSO for assistance. Submit requests on NRC Form 313, Application for Material License, located on the NRC website, www.nrc.gov. MEDDAC requests for the procurement, possession, and use of radiation-producing equipment such as x-ray machines, particle generators and accelerators, and other equipment capable of producing x-rays will be submitted to the MEDDAC RSO and a copy furnished to the Installation RSO. MEDDAC radiation surveys will be forwarded to the Installation RSO annually.

e. *Procurement, shipment, transfer or loan, storage, and disposal.*

(1) *Procurement.*

(a) Requests for procurement of radioisotopes and ionizing radiation-producing machines will be forwarded to the RSO for review. All materials will be accrued and licensed in the name of the licensee, as provided in 10 CFR 30. Procurement will not be taken until the required NRC license is received.

(b) An SOP for each project involving ionizing radiation shall be submitted to the RSO. Include the following: subject, brief description of proposal, area/building/ room number, source of ionizing radiation and activity, and type of operation. General safety precautions will be included.

(2) Shipment of outgoing or incoming radioactive equipment.

(a) Outgoing equipment will be transported IAW 10 CFR 71 and/or 49 CFR 173, whichever is applicable.

(b) When transporting such equipment vehicle operators and/or escorts will be briefed as to the potential hazards, methods to minimize hazards, and emergency procedures. No passenger will be in the part of the vehicle containing the radioactive material, such as the body of truck, backseat, etc. If necessary to leave the radioactive equipment in an unattended vehicle, the container will be locked in or to the vehicle.

(c) When transporting such equipment, the vehicle operator and/or escorts will be briefed on the potential hazards, methods to minimize hazards, and emergency procedures.

(d) Incoming equipment shall be reported to the RSO. Notification will be made within 3 hours of receipt during duty hours or within 18 hours if received after duty hours.

(3) Transfer or Loan.

(a) Before any radioactive material can be transferred from one location to another, the RSO must be notified so the location can be properly surveyed and approved.

(b) Transfer or loan of any radioactive material outside the immediate command requires prior approval from the Garrison Commander. Requests are submitted through the RSO. Requests will include type/model of equipment, serial number, NRC license number, and justification for proposed transfer. Shipment documents and the NRC 314, Certification of Disposition of Materials, located on the NRC website, will be prepared by the owning installation.

(4) Storage.

(a) Store in a fire resistant building or within a fire resistant enclosure.

(b) Storage facility will be locked and access controlled at all times.

(c) Appropriate radiation signs will be posted.

(d) Only authorized personnel will be allowed to enter the storage area.

(e) Individual user of radioactive material that has temporary storage is directly responsible for the manner in which it is stored.

(5) *Disposal.*

(a) Incidents or losses involving radioactive materials will be reported immediately to the RSO/ARSO via telephone. The RSO will notify IMCOM, and mission headquarters RSOs, and commodity license holder.

(b) Unit responsible for equipment loss will conduct formal investigation. Report will be provided the RSO within 10 calendar days.

f. *Radiological hazards and personnel safety.*

(a) *External radiation or radiation from sources outside the body.* These sources may be radioactive materials emitting gamma rays, beta particles, or neutrons, or they may be machines producing radiation, such as x-rays. Since the body penetration by alpha particles is insignificant, they are not considered an external hazard. External radiation causes body damage due to tissue penetration.

(b) *Internal radiation or radiation from sources within the body.* This hazard is created by ingestion, inhalation, or through skin wounds and deposition of radiation material in the body organs. While alpha particles are not considered an external hazard, the internal hazard of these particles is extreme and considered to be 20 times as hazardous as beta or gamma radiation.

(c) *Types of personal safety.* The safety of personnel is the foremost consideration in any operation involving ionizing radiation. Projects requiring the use of radioactive materials should be well planned. Prepare written job hazard analysis and risk assessment prior to operation.

(1) Safety from external radiation consists of three factors: time, distance, and shielding. Exposure time is determined by the radiation intensity, which is radiation exposure rate multiplied by time. Intensity of radiation decreases as the square of the distance increases from the source. Shielding materials are selected with reference to the type of radiation involved: lead used for gamma and x-ray, plastics for beta, and paraffin or water for neutrons.

(2) Safety from internal radiation requires the prevention of radioactive materials from entering the body through ingestion, inhalation, or wounds. This may be accomplished by the use of protective clothing, masks, or respirators and by preventing contamination. Do not smoke, drink, or eat in radiation areas.

(3) Personnel are also protected from radiation hazards by the erection of barriers, posting of signs in radiation areas, and by labeling all radioactive equipment. Written and verbal instructions will be given to personnel involved in the handling of radioactive equipment. Keep contaminated clothing and equipment in marked containers in radiation area until proper disposal can be made. Good housekeeping rules will greatly decrease occurrence of contamination.

(4) Decontamination procedures will depend upon the type and degree of contamination and material contaminated. In minor spills, the person using the radioisotope will confine the contamination of liquids by using absorbent paper. Contaminated dry material will be confined by wetting and using absorbent paper. It is most important that the user be familiar not only with all rules and regulations concerning the handling of radioactive materials, but also with the immediate steps to be taken in case of serious contamination. These steps apply not only to confining and removing the contamination, but also include actions that will protect the user and all other personnel.

g. *Emergency procedures.* Immediately notify the RSO, 765-3124 or Alternate RSO 765-3127 in case of contamination.

(1) All cases involving personal injury will be reported to the RSO. This covers accidental overexposure of external radiation, ingestion or inhalation of radioactive materials, and wounds, including minor scratches.

(2) In case of liquid spills, don protective rubber gloves and drop absorbent paper on spills. In case of dry spills, don protective rubber gloves and dampen spill thoroughly taking care not to spread the contamination. Water may generally be used except where chemical reaction with water would generate an air contaminant. Oil should not be used.

(3) When spills involve no immediate radiation hazard to personnel, notify all personnel to leave the room and confine the spill. Notify the RSO.

(4) When spills pose radiation hazard to personnel, the device operator or senior person present will notify all persons not involved to leave the room. If the spill is on the skin, flush immediately. If spill is on clothing, discard outer or protective clothing. Notify the RSO.

(5) Wounds affected by radiation must be washed immediately under running water, spreading the edge of the gash. Do not use oil or solvents – they increase skin absorption.

(6) Permit no person involved in a radiation injury to return to work without clearance from a Radiological Health Officer.

(7) Report all radiation accidents to the RSO. If injury, contact 911.

(8) The RSO will notify IMCOM and mission headquarters RSOs, and commodity license holder point-of-contact of any incident involving radiation.

(9) Supervisors will prepare a complete history of the emergency and subsequent related activity for the RSO records.

(10) The RSO shall inform firefighters of the amounts and types of radioactive material stored in buildings.

11-3. Non-ionizing radiation

a. The Garrison Commander will designate in writing a radiation safety officer and alternate radiation safety officer whose duties are to manage the non-ionizing radiation safety program. The RSO will be provided training, equipment, and support staff commensurate with the extent of his/her responsibilities. Complete program files will be maintained by the RSO to include current records of inventory, SOPs, and records related to safety instruction.

b. Medical activities with nuclear medicine services require a full-time RSO qualified under DA PAM 385-24.

c. Exposure to radiofrequency radiation (RFR) will be controlled to ensure that persons are not subjected to the DOD RFR permissible exposure limits, American National Standards Institute (ANSI), ANSI/IEEE Standard C95.1-2005, and American Conference of Governmental Industrial Hygienists (ACGIH).

d. RFR sources will be in place and operated so as to prevent exposure of persons within the hazard distance of the sources.

e. RFR hazard assessments will be performed according to TB Med 523.

f. RFR workers consist of two categories.

(1) Low-risk workers have a possible, but unlikely, risk or overexposure such as, operators of currently fielded systems. This class requires pre-placement and termination examinations using the screening protocol listed below.

(2) High-risk workers routinely work in research development, test, and evaluation (RDTE), or maintenance and are subject to significant risk of overexposure in the workplace. This group will require pre-placement and termination examinations using the diagnostic protocol described below.

g. Medical surveillance programs will be performed as established in AR 40-5.

(1) DOD 6055.5-M standardizes the medical surveillance procedures.

(2) Four categories of ocular surveillance examinations are pre-placement, periodic, immediate, and termination.

(3) The screening protocol for biennial examinations will consist of those procedures described in DA Pamphlet 40-506 for the applicable job standard, unless modified locally per AR 40-5. If the distance visual acuity, with correction, on the biennial examination is less than that on the pre-placement examination, the worker will be referred to an optometrist or ophthalmologist to determine if there is an actual loss of acuity and, if so, to ascertain its cause.

(4) The diagnostic protocol is used for some pre-placement and termination examinations and for immediate examinations. An optometrist, ophthalmologist, or physician possessing the necessary skills must perform it.

h. Directors/chiefs will ensure:

(1) SOPs are published and enforced. They will specify the safety policies concerning operational limitations placed upon equipment and the control of the movement of personnel to ensure that the exposure of personnel is minimized. Under no circumstances should exposure exceed established limits in DA Pam 385-24. Copies of these SOPs will be forwarded to the RSO.

(2) SOPs should include:

(a) Safe working techniques.

(b) Proper use of protective equipment and devices.

(c) Procedures to be followed when an accident or incident occurs.

(d) Daily preoperational, operational, and post-operational checks to ensure proper radiation safety.

(e) The proper markings for controlled areas (29 CFR 1910 and TB Med 521).

(f) Inventory of equipment capable of producing radiation.

(g) *Proper personal protective equipment.* Electrically-insulated gloves and shoes for safety against electrical shock and RFR burn or insulation from the ground plane, are authorized.

(h) Requirement for annual safety briefings and training regarding the RFR safety needs of individual units. A record of attendees is required and kept on file for 2 years.