

Radiation Safety

This installation is committed to the operating philosophy of maintaining occupational radiation exposure as low as is reasonably achievable (ALARA); and to maintaining effective control of radioactive items to ensure that exposure to ionizing radiation and the possible release of airborne radioactive contaminants is as low as is reasonably achievable. The Installation Radiation Safety Officer (IRSO) will provide overall coordination, advice, and assistance for radiological safety, except for MEDDAC, which will be managed by the assigned medical RPO.

Control of Ionizing Radiation Sources

- a. No radioactive material (except hospital material) may be brought onto the installation unless it is:
 1. Incorporated in a standard issue item such as is defined in TB 43-0116, Identification of Radioactive Items in the Army Supply System.
 2. Covered by a specific or general license issued by the Nuclear Regulatory Commission (NRC) to an activity on the installation or,
 3. Authorized by a Department of the Army Radioactive Material Authorization (DARA) for Army-owned quantities exempt from NRC licensing or,
 4. Included in a DA radiation permit granted for the use, storage, possession, or disposal of any source by non-Army agencies or,
 5. Authorized by the Installation Commander (temporary use or storage only) for a maximum of 15 calendar day.
- b. Radiation-producing devices (i.e., industrial X-ray machines etc.) must be reported to the IRSO within 5 days of arrival on the installation.
- c. Inventories of all ionizing sources will be prepared by the IRSO of the owning activities and forwarded to the IRSO semiannually by 31 Jan. and 31 Jul.
- d. Areas where ionizing radiation sources are stored or used must be properly secured and marked. Areas must be surveyed with a radiation meter, which is marked ACTIVE and is properly calibrated to determine required precautions and applicable warning signs. This survey must be accomplished semiannually or whenever major changes are made in the quantity or type of radioactive source, the building or shielding in the area, or procedural changes for the use of the

source. The IRSO will conduct and document results of surveys.

- e. If warning signs are required, other documents may be required to provide information to workers, visitors, emergency rescue personnel, investigative authorities, etc. This includes, though may not be limited to:
 1. "No eating, drinking, smoking, or applying of cosmetics is permitted in this area."
 2. CAUTION – RADIOACTIVE MATERIAL
 3. Notice to employees: NRC Form 3.
 4. NRC Notice of Violations (NOV) – if any.
 5. Energy Reorganization Act of 1974: Section 206.
 6. Applicable licenses*
 7. Emergency procedures and SOPs*
 8. Title 10 CFR Parts 19, 20 and 21*

* If posting these documents is not practical, a notice may be posted with NRC Form 3 that describes the documents and states where they may be examined.
- f. Standard issue items (see TB 43-0116) containing radioactive material must be removed immediately from service when found to be broken, leaking, or unserviceable. Contact the IRSO or ARSO for removal action. Unauthorized personnel must not take apart or attempt to repair such items. Standard issue items must be used only for their intended propose and only under proper supervision.
- g. Any proposed transfer of radioactive material, sources, devices, or commodities outside the Army must be approved by the IRSO/ARSO.
- h. For technical or regulatory advice and assistance, the IRSO or ARSO may be contacted at the installation safety office.

Transportation of Radioactive Materials

- a. Upon receipt of a package containing radioactive material (in excess of Type A limits) the transportation officer will contact the IRSO/ARSO. The vehicle

(military or commercial) must be held until it is monitored and released by the IRSO/ARSO should that be determined as necessary by local SOP. Packages will be monitored within 3 hours of receipt (in excess of Type A limits) during normal duty hours and within 18 hours if received after normal duty hours. The IRSO/ARSO will monitor the package visually and with an appropriate survey meter to determine if any further action is necessary.

- b. Off-post shipments must comply with regulations established by the Department of Transportation (DOT), the Nuclear Regulatory Commission (NRC), affected states, and Army regulations. Packages will be monitored/wipe tested by the IRSO/ARSO to ensure appropriate information is placed on the shipping documents.
- c. Radioactive materials may be temporarily stored in connection with movement (transportation using standard procedures) as long as the following guidelines are followed.
- d. Standard issue items containing radioactive materials (except individual controlled items) may be moved and used anywhere on the installation, consistent with the owning activity's mission and the items intended purpose as specified in the applicable technical publications.
- e. Unsealed or leaking "sealed sources" will be moved only by the IRSO or ARSO.
- f. Drivers of vehicles carrying radioactive materials will adhere to the procedures governing transportation of hazardous materials.

Disposal of Radioactive waste

- a. When material has been determined (by radiac meter, AMDEF, or published TB) to be radioactive waste, the IRSO/ARSO will be notified. The following information must be provided:
 - 1. NSN.
 - 2. Number of items.
 - 3. Nomenclature.
 - 4. Other identifying information.
 - 5. Whether or not the device is leaking or suspected of leaking.

6. Serial numbers (if applicable).
 7. Radioactive isotope.
 8. Activity in millicuries or microcuries (mCi or uCi).
- b. Arrangements must be made by the owning activity to drop the items from accountability so that disposal actions can be accomplished.
 - c. The IPRO or AIRSO will provide instructions to the owning activity. Leaking sources will be picked up and moved only by the IRSO or AIRSO.
 - d. When sufficient material has been accumulated to make disposal desirable, the IRSO will request disposal instructions from the applicable license holder.

Emergencies

When any abnormal or emergency situation involving radioactive materials develops at Fort Knox, the IRSO or AIRSO must be notified immediately. A roster will be maintained in the staff duty officer's instruction book. The first few minutes after the discovery of a radiological accident can be the most critical if there are injuries involved. During this period, personnel present at the site must take immediate action (based on an assessment of the degree and nature of the hazard) to ensure appropriate lifesaving, control, and containment procedures are initiated.

- a. Actions taken should follow roughly in the order given:
 1. Administer lifesaving first aid.
 2. Remove injured personnel from radiation area.
 3. Notify the MEDDAC ASAP that personnel have been contaminated.
 4. Keep all unnecessary personnel out of the area.
 5. Administer first aid for lesser injuries.
 6. In case of fire, clear the downwind area as far as feasible, at least to a distance free from direct smoke inhalation.
 7. Decontaminate injured personnel as soon as possible.
 8. Do not allow any personnel, equipment etc., thought to be contaminated out of the area.

9. Identify and record names of affected personnel.
 10. Any action which increases the chance of radioactive materials entering the body must be prevented. Open wounds must be cleaned (decontaminated) thoroughly. Smoking, eating, and drinking will not be permitted in any area thought to be contaminated.
 11. Every attempt should be made to decontaminate individuals before they are transported to receive medical treatment.
- b. The following paragraphs provide some guidance for accomplishment of the actions above. Accurate assessments and good judgment however, must be exercised.
- c. Normal first aid procedures may be used with the following exceptions, modifications, and considerations.
1. Only those personnel with severe (i.e., life or limb endangering injuries) should be treated before removal from the immediate site of the accident. Once lifesaving procedures have been accomplished, the dangers of moving personnel from the site must be weighed against the danger of continuing radiation exposure from remaining at the site. Decontamination of injured personnel should begin as soon as possible with emphasis on removal of gross amounts of radioactive contaminants, especially from the vicinity of wounds.
 2. Personnel with minor injuries should be removed from the immediate site of the accident and decontaminated before treatment is given.
- d. The priority of radiation exposure control is second only to the preservation and safety of human life and limb. Therefore, after emergency first aid has been given, all efforts will be directed towards the reduction of exposure of personnel to radiation. Thus, it should be remembered that any unnecessary radiation exposure is considered excessive. The following guidance is provided.
1. Radiation exposure is reduced by minimizing exposure time by increasing the distance between the source of radiation and personnel and by shielding (dense materials, e.g., lead, cement, sand, plastics) between the radioactive source and personnel.
 2. All but the most severely injured personnel will be removed from the site of an accident at the earliest possible time. First aid for minor injuries should be delayed until the patient is decontaminated (if injury permits).

- e. Medical personnel at the hospital/clinic and ambulance personnel must be informed ASAP of the possibility of contamination to injured personnel. Information given should be as detailed and complete as can be provided.
- f. Prompt decontamination (removal of contaminants) can be accomplished in various ways. Methods selected will depend on the circumstances encountered at the site, i.e., location and concentration of contaminant on personnel, number involved, etc.
- g. Actions taken to decontaminate personnel can include:
 - 1. Removal of clothing (most contaminants are usually on clothing and shoes).
 - 2. Thorough washing with nonabrasive soap and lukewarm water. Avoid the use of organic solvents; they increase the probability of radioactive materials penetrating through the pores of the skin.
 - 3. Localized contaminated areas should be marked off and cleansed with swabs to minimize the danger of spreading contaminants by general washing.
 - 4. Showering under tepid water using a mild soap solution in the event contamination is not localized or several individuals have been contaminated.
- h. All materials used in the decontamination of personnel will be treated, handled, and disposed of as low-level radioactive waste under the supervision of the IRSO/AIRSO/MEDDAC RPO.
- i. If there has been a fire or if airborne release of radioactive contaminants is suspected, nose wipes will be taken from all personnel in the immediate vicinity of the accident before they are released from the site. Wipes will be protected from cross contamination and will be identified, as a minimum, with the name, SSN, unit, and telephone number of the individual.
- j. In any case, the name, SSN, address, unit, and telephone number (as applicable) will be obtained from each individual involved.
- k. Proper control and containment of radioactive contamination assists in minimizing personnel exposure and in the eventual task of area decontamination.
 - 1. Take all possible steps to isolate and close off the accident site to include sealing all windows and doorways, shutting down ventilation systems, and

limiting access to authorized personnel only (i.e., emergency response team members, fire fighters, military police, medical personnel). (2) If fire is involved, extinguish (if possible) as quickly as possible. Take precautions to prevent water run-off from leaving the area.

2. If fire is involved, extinguish (if possible) as quickly as possible. Take precautions to prevent water run-off from leaving the area.
 3. Contain and isolate all contaminated or possibly contaminated personnel and equipment until decontamination and monitoring operations are complete.
 4. If it is essential (loss of life or limb) to remove any individual or piece of equipment from the scene before decontamination is complete, take all prudent precautions to prevent the cross-contamination of otherwise uncontaminated personnel, areas, equipment, and vehicles.
 5. Suspect that everyone and everything involved with the accident is contaminated (worst case scenario) until it is shown by monitoring to be otherwise.
- I. The Installation RSO will advise the fire department of areas used to store radioactive material and the particular hazards associated with each area.
1. Radioactive materials will be stored strictly per published technical data to ensure prevention of any significant external dose under any conditions. Fire fighters should wear self-contained breathing apparatus and protective clothing while fighting fires that possibly involve radioactive materials.
 2. The IPRO will be informed of any fire involving an area where radioactive material is stored.