

CHAPTER 19

RADIATION SAFETY

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CHAPTER 19

RADIATION SAFETY

19000. GENERAL. All personnel who work or received exposure to sources of ionizing radiation are required to be instructed in the basic principles of radiation protection and the potential risks of ionizing radiation.

19001. PURPOSE AND SCOPE. This program establishes The Basic School (TBS) procedures for handling, storing, disposing, and emergency response of tritium containing devices. Strict adherence to these procedures ensures TBS personnel, the general public, and property exposure to ionizing radiation is maintained “As Low As Reasonably Achievable” (ALARA).

19002. TRITIUM. Tritium is a radioactive isotope that emits low energy beta. Tritium is the heaviest isotope of the element hydrogen and it is widely used in both civilian and military applications. In military applications, such as dials, compasses, fire control devices, and aiming sights, the tritium is contained in a Pyrex glass tube that has been lined with phosphor. The interaction between the phosphor and the beta particles emitted by the tritium gas produces visible light.

19003. HAZARDS OF TRITIUM. The low beta energy of tritium cannot penetrate an intact Pyrex tube; however, if the tube breaks, the tritium gas will dissipate and the outer surface of the device as well as surfaces in the vicinity of the break may become contaminated. Because of its weak beta radiation, tritium is not readily measured by traditional fielded radiac instruments and requires wipe-testing to determine any level of contamination. The hazardous properties of tritium are due to its ability to combine with other materials, such as water. Tritium water vapor is readily absorbed by the body, both through inhalation and skin absorption. Tritium presents the biggest risk to personnel once it enters the body.

19004. STORAGE, LABELING, EMERGENCY ACTION AND DISPOSAL.

1. Storage

- a. Tritium devices shall be stored in secure areas to prevent unauthorized removal or access.
- b. When not in storage, control and constant surveillance of tritium devices shall be maintained at all times.
- c. Tritium devices shall not be stored in office spaces, food storage areas or berthing areas.
- d. Tritium devices shall not be stored in the same room or warehouse section with explosives or flammable materials.
- e. Storage areas shall be free from flooding and adverse weather conditions.

f. Storage areas shall be well ventilated.

2. Postings Requirements

a. All tritium devices shall be labeled as radioactive.

b. All storage areas containing tritium devices shall also be labeled as radioactive.

c. The label shall be clearly visible and bear the three-bladed radiation symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL". The standard radiation symbol shall use the colors magenta, purple, or black on a yellow background, unless otherwise authorized; see figure 19.1.

d. In addition, the following signs shall be posted at the entrance of the area where tritium devices are stored:

(1) NRC Form 3, Notice to Employees dated 5-2012 (Figure 19.2).

(2) Section 206 of the Energy Reorganization Act of 1974 (Figure 19.3).

(3) A placard stating "NO EATING, DRINKING, SMOKING" in areas where radioactive material is stored or used (Figure 19.4).

(4) Notice of Availability of Documents (Figure 19.5).

e. If the labels are missing or illegible, these must be replaced in a timely manner.

3. Emergency Action. In the event of an emergency involving a tritium device, actions to save life, aid the injured, fight fires, or control further spread of damage, takes precedence over concerns for radiological contamination. To minimize personnel exposure from possible internal contamination, take the following steps:

a. Sound the alarm. Vacate the immediate area and remain upwind for at least 30 minutes or until directed by the unit RPA, RSM, or emergency services to re-enter.

b. As soon as possible, notify your RPA, Safety Officer and the Installation RSM.

c. In case of fire, stay away from the downwind smoke. Move upwind a minimum of 100 meters or as directed by emergency response personnel.

d. To maintain control of contamination, devices with broken sources and any resulting debris should only be handled by trained personnel, while wearing Personal Protective Equipment (PPE: Latex or Nitrile gloves).

e. Devices with broken sources and any resulting debris shall be double bagged in plastic and sealed with tape. Clearly label the outside of the package "BROKEN TRITIUM DEVICE—DO

NOT OPEN"; if available, include the specific device information such as National Stock Number (NSN) or (and) Part Numbers.

f. Personnel who may have handled the broken device shall wash, as soon as possible, with a non-abrasive soap and luke-warm water.

g. Contaminated clothing should be removed, double bagged in plastic and sealed with tape indicating the type of device handled and the date of the exposure.

h. Swipe tests shall be performed after cleanup efforts are made to verify decontamination efforts have been successful in removing as much of the radioactive material as possible. The location of the spill/incident needs to be physically blocked off and/or covered with plastic to avoid spreading the contamination until directed by the Safety Officer or the IRSM to remove the barrier only after the results of the swipe-test have returned from RADCOM and there is no contamination present.

4. Disposal of Tritium Devices. The following guidelines are provided for properly disposing of broken, unserviceable, unwanted or surplus tritium devices.

a. Under no circumstance shall any tritium device be disposed of in the trash or through DRMO. All tritium devices shall be disposed of through the Installation Low Level Radioactive Waste (LLRW) disposal program managed by NAVSEADET RASO via the IRSM or through the Installation's repairable issue point (RIP) depending on the type of device.

b. Broken Devices. The handling of broken devices shall adhere to the emergency action section of this SOP, paragraph 19004.

c. Surplus Radioactive Commodities. Surplus tritium devices, also referred to as Unwanted Radioactive Materials (URM), although serviceable, shall not be transferred to DRMO but will be retained until disposition instructions are received from the inventory control point. Make all efforts to locate a unit that may be able to use the item and properly transfer the item to that unit. If all resources have been exhausted to find new users for the item, it can be disposed of as LLRW via the IRSM or through the RIP. To dispose or transfer the item to the IRSM, prepare DD Form 1348, Issue Release/Receipt Document, per local instructions for each item or NSN to be turned in. An example DD Form 1348 is provided as figure 19-6, along with the following additional instructions:

(1) In data block 4, the "MARK FOR" block annotate "LLRW" or in data block 27, the "ADDITIONAL DATA" block, annotate "Mark For: Low Level Radioactive Waste."

(2) In data block 3. "SHIP TO" block, annotate "M3002, Base Safety, IRSM."

(3) In data block 27, the "ADDITIONAL DATA" block, annotate the name of Responsible Officer (RO) authorizing the transfer of the compasses with a signature, phone number and date.

d. Lensatic Compasses. Compasses containing Tritium that are determined unserviceable

shall be disposed of as LLRW via the IRSM. Procedures for disposing of applicable compasses are as follows:

(1) Determine if the compass is unserviceable per applicable technical instructions, supply instructions, equipment manuals, naval messages, and (or) physical inspection.

(2) Unserviceable compasses include:

- a. Damaged or defective compasses containing tritium, NSN 6605-01-196-6971.
- b. Compasses no longer authorized for use, NSN 6605-00-151-5337 or 6605-00-846-7618.
- c. Compasses that exceed the 12-year shelf life from the date stamped in ink inside the compass cover.

(3) Once the compass has been determined unserviceable and deemed as LLRW, complete the following:

- a. Remove the lanyard and pouch from each compass.
- b. Prepare a DD Form 1348, and follow the instructions in paragraph C above.
- c. Contact the MCAF Safety Office at 703-432-1365, 703-898-9672 or via email at michael.hancock@usmc.mil and state your need for the disposal of tritium devices.
- d. Any compasses suspected of being damaged shall be double bagged in plastic and marked per the guidance in paragraph 19004.

5. Turn-in of radioactive commodities. When turning-in radioactive commodities to the IRSM, ensure to provide the following documents, as applicable, at the turn-in:

- a. DD Form 1348, Issue Release and Receipt Document.
- b. USMC Radioactive Material Movement (RAM) Form. Provide a completed copy of the RAM form. All radioactive commodities movements must include this form.
- c. Once the material has been turned-in, ensure to provide a copy of the turn-in documents to TBS Safety and to maintain a copy in the shop's turnover binder. These records must be maintained for a minimum of three years.

19005. INSPECTIONS. In order to ensure the safety of personnel and compliance with established radiation safety standards, tritium devices storage areas shall be inspected by the RPA quarterly.

19006. TRAINING

1. RPAs shall attend training provided by the unit RSM or by the IRSM within three months of appointment.
2. Other personnel working in the areas where tritium devices are stored shall attend annual radiation awareness training provided by the unit RSM or the IRSM.
3. Coordinate training with the MCAF Safety Office.

19007. INVENTORY. On an annual basis, the MCAF Supply section will provide the RSM a complete inventory of radioactive components complete with National Stock Number (SNS), nomenclature, serial number of each item, total quantity, and physical address of location. Current inventory at MCAF includes the M150 Rifle Combat Optic (RCO) NSN 1240015251648, and the Magnetic Compass, NSN 660501196971.

19008. SIGNAGE AND REGULATORY MARKINGS

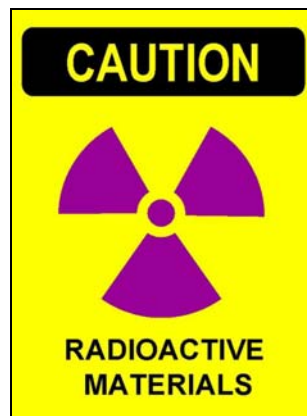


Figure 19.1 Caution Radioactive Material

UNITED STATES NUCLEAR REGULATORY COMMISSION
Washington, DC 20555-0001

NOTICE TO EMPLOYEES

STANDARDS FOR PROTECTION AGAINST RADIATION (PART 20), NOTICE, INSTRUCTIONS AND REPORTS TO WORKERS, INSPECTIONS (PART 19), EMPLOYEE PROTECTION

WHAT IS THE NUCLEAR REGULATORY COMMISSION?
The Nuclear Regulatory Commission (NRC) is an independent Federal agency...
WHAT DOES THE NRC DO?
The NRC is responsible for...
WHAT RESPONSIBILITIES DOES AN EMPLOYEE HAVE?
An employee's responsibilities...
WHAT IS AN EMPLOYEE'S RESPONSIBILITY?
An employee's responsibility...
WHAT IS A VIOLATION?
A violation is...
WHAT ARE VIOLATIONS OF NRC REQUIREMENTS IDENTIFIED?
NRC requires...
WHAT IS THE NRC'S POLICY ON VIOLATIONS?
The NRC's policy...
HOW CAN I FILE A COMPLAINT?
A complaint...
HOW CAN I CONTACT THE NRC?
You can contact...
WHAT ARE THE NRC'S OFFICE LOCATIONS?
The NRC has...
WHAT ARE THE NRC'S REGIONAL OFFICES?
The NRC has...
WHAT ARE THE NRC'S REGIONAL OFFICE LOCATIONS?
The NRC has...
WHAT ARE THE NRC'S REGIONAL OFFICE TELEPHONE NUMBERS?
The NRC has...
WHAT ARE THE NRC'S REGIONAL OFFICE FAX NUMBERS?
The NRC has...
WHAT ARE THE NRC'S REGIONAL OFFICE WEBSITE ADDRESSES?
The NRC has...

Figure 19.2 NRC FORM 3

**Section 206, Energy Reorganization Act, 1974
NONCOMPLIANCE**

(a) Any individual director or responsible officer of a firm constructing, owning, or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act, who has information reasonable indicating that such a facility or activity or basic components of such facility or activity—

(1) fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable regulation, order or license of the Commission relating to substantial safety hazards, or

(2) contains a defect which could create a substantial safety hazard, as defined by regulation, which the Commission shall promulgate,

shall immediately notify the Commission of such failure to comply, or of such defect, unless such individual has actual knowledge that the Commission has been adequately informed of such defect.

Any person who knowingly and consciously fails to provide notice required by subsection (a) shall be subject to a civil penalty in an amount equal to the amount provided by section 208 of the Atomic Energy Act of 1954, as amended.

The requirements of this section shall be prominently posted on the premises of any facility or activity regulated pursuant to the Atomic Energy Act of 1954, as amended.

The Commission is authorized to conduct such reasonable inspections and other activities as needed to insure compliance with the provisions of this section.

Figure 19.3 Section 206 of the Energy Reorganization Act of 1974



Figure 19.4 No Eating, Drinking, Chewing Gum, Smoking, or Applying Makeup

