

**Course Title:** Radiological Control Technician  
**Module Title:** Radioactive Source Control  
**Module Number:** 2.08

**Objectives:**

- 2.08.01 Describe the requirements for radioactive sources per 10 CFR 835.
- ☞ 2.08.02 Identify the characteristics of radioactive sources that must be controlled at your site.
- ☞ 2.08.03 Identify the packaging, marking, and labeling requirements for radioactive sources.
- ☞ 2.08.04 Describe the approval and posting requirements for radioactive materials areas.
- ☞ 2.08.05 Describe the process and procedures used at your site for storage and accountability of radioactive sources.

**References:**

- 1. 10 CFR 835, "Occupational Radiation Protection," (1998)

**Instructional Aids:**

- 1. Overheads
- 2. Overhead projector and screen
- 3. Chalkboard/whiteboard
- 4. Lessons learned

**I. MODULE INTRODUCTION**

O.H.: Objectives

## A. Self Introduction

1. Name
2. Phone Number
3. Background
4. Emergency procedure review

## B. Motivation

Radioactive sources are used for response checks in the field, functional checks, and calibration of instruments and monitors to traceable standards. To ensure the safety and welfare of all personnel it is important to maintain control of radioactive sources. Radioactive sources are controlled to minimize the potential for:

- Spread of contamination
- Unnecessary exposure to personnel
- Loss or theft
- Improper disposal

## C. Overview of Lesson

1. Requirements
2. Control of sources
3. Receipt
4. Radioactive Materials Storage Areas
5. Inventory and transfer
6. Surveys
7. Leak test
8. Source disposal

## D. Introduce Objectives

**II. MODULE OUTLINE**

## A. 10 CFR 835

In accordance with the 10 CFR 835 Subpart M, the following provisions apply to sealed sources:

## 1. §835.1201 Sealed Radioactive Source Control

Sealed radioactive sources shall be used, handled, and stored in a manner commensurate with the hazards associated with operations involving the sources.

## 2. §835.1202 Accountable Sealed Radioactive Sources

(a) Each accountable sealed radioactive source shall be inventoried at intervals no to exceed six months. This inventory shall:

- (1) Establish the physical location of each accountable sealed radioactive source;
- (2) Verify the presence and adequacy of associated postings and labels; and
- (3) Establish the adequacy of storage locations, containers, and devices.

(b) Except for sealed radioactive sources consisting solely of gaseous radioactive material or tritium, each accountable sealed radioactive source shall be subject to a source leak test upon receipt, when damage is suspected, and at intervals not to exceed six months. Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 microcurie.

(c) An accountable sealed radioactive source is not subject to periodic source leak testing if that source has been removed from service. Such sources shall be stored in a controlled location, subject to periodic inventory and subject to source leak testing prior to being returned to service.

Objective 2.08.01

- (d) An accountable sealed radioactive source is not subject to periodic inventory and source leak testing if that source is located in an area that is unsafe for human entry or otherwise inaccessible.
- (e) An accountable sealed radioactive source found to be leaking radioactive material shall be controlled in a manner that minimizes the spread of radioactive contamination.

## B. CONTROL OF SOURCES

*(Insert site specific information here)*

### 1. Types of Sources:

- a. Accountable sealed radioactive source means a sealed radioactive source having a half-life equal to or greater than 30 days and an isotopic activity equal to or greater than the corresponding value provided in Appendix E of 10 CFR 835.
- b. Sealed radioactive source means a radioactive source manufactured, obtained, or retained for the purpose of utilizing the emitted radiation. The sealed radioactive source consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layer(s) of non-radioactive material, or firmly fixed to a non-radioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material.
- c. Source leak test means a test to determine if a sealed radioactive source is leaking radioactive material.

### 2. Responsibilities:

- a. It is important that the following actions be done:
  - 1) Establishing the program,
  - 2) maintaining records related to the accountability and control of accountable sealed radioactive sources for a facility,

Objective 2.08.02

- 3) providing each source custodian with an inventory list of accountable sealed radioactive sources assigned to him or her, and
  - 4) assisting the source custodian in training source users.
- b. The source custodian:
- 1) Should be responsible for ensuring that tests to establish the integrity of an accountable sealed radioactive source are conducted and inventory checks are performed at least every 6 months.
  - 2) Should maintain records of the storage and use locations of all assigned accountable sealed radioactive sources.
  - 3) Should be trained as a radiological worker prior to being designated as a source custodian.
  - 4) Should notify and obtain approval of the RCO prior to:
    - a) any major changes in the use of a sealed radioactive source
    - b) on-site transfer of a sealed radioactive source to a new permanent storage location
    - c) modification of a device containing a sealed radioactive source
    - d) disposal or off-site transfer of a sealed radioactive source
    - e) any procurement or acquisition of additional sealed radioactive sources
  - 5) Should also notify the RCO in the event of the loss or damage to any accountable sealed radioactive source.
- c. The source user:

- 1) Should be an individual trained by the RCO and the source custodian to use either accountable or exempt sealed radioactive sources.
- 2) Should be trained as a radiological worker and receive appropriate training on handling their specific sealed radioactive source(s).

### C. RECEIPT

Prior to receipt of accountable sealed radioactive sources, the RCO should assign the sources to the proper source custodians. Immediately upon receipt of accountable sealed radioactive sources, the RCO should be notified. The packaging should be inspected for damage and a contamination and radiation survey performed. The RCO should perform receipt surveys (RCS 431.3). A source integrity test shall be performed upon receipt if visible damage to the package exists (10 CFR 835.405), or prior to initial use. The source custodian should be notified of the arrival of the sealed sources to ensure that proper accountability and control are initiated. The sources should be placed into storage or into the device in which they will be used. The source custodian and site's records should be updated to include the new sources received.

### D. LABELING AND STORAGE OF RADIOACTIVE MATERIAL

*(Insert site specific information here)*

#### 1. §835.605 Labeling items and containers.

Except as provided in §835.606, each item or container of radioactive material shall bear a durable, clearly visible label bearing the standard radiation warning trefoil and the words "Caution Radioactive Material" or "Danger", Radioactive Material." The label shall also provide sufficient information to permit individuals handling or using the items or containers, or working in the vicinity of the items or containers, to take precautions to avoid or minimize exposures.

#### 2. §835.606 Exceptions to labeling requirements.

Objective: 2.08.03

- (a) Items and containers may be excepted from the radioactive material labeling requirements of §835.605 when:
- (1) Used handled, or stored in areas posted and controlled in accordance with this subpart and sufficient information is provided to permit individuals to take appropriate protective actions to avoid or control exposures; or
  - (2) The quantity of radioactive material is below the values specified in Appendix E to 10 CFR 835; or
  - (3) Packaged, labeled, and marked in accordance with the regulations of the Department of Transportation or DOE Orders governing radioactive material transportation; or
  - (4) Inaccessible, or accessible only to individuals authorized to handle or use them, or to work in the vicinity; or
  - (5) Installed in manufacturing, process, or other equipment, such as reactor components, piping, and tanks; or
  - (6) The radioactive material consists solely of nuclear weapons or their components.
- (b) Radioactive material labels applied to sealed radioactive sources may be excepted from the color specifications of 10 CFR 835.601 (a).

## E. RADIOACTIVE MATERIAL AREAS

*(Insert site specific information here)*

### 1. Definitions

- (a) Radioactive Material Area means any area within a Controlled Area, accessible to individuals, in which items or containers of radioactive material exist and the total activity of radioactive material exceeds the applicable values provided in Appendix E to 10 CFR 835.

Objective: 2.08.04

- (b) Radioactive Material Area Posting The words “Caution, Radioactive Material(s)” shall be posted at each Radioactive Material Area [835.603(g)].
2. §835.604 Exceptions to posting requirements
- (a) Areas may be excepted from the posting requirements of §835.603 for periods of less than 8 continuous hours when placed under continuous observation and control of an individual knowledgeable of, and empowered to implement, required access and exposure control measures.
- (b) The following areas may be excepted from the radioactive material area posting requirement of §835.603(g) when:
- (1) Posted in accordance with §835.603(a) through (f); or
  - (2) Each item or container of radioactive material is labeled in accordance with requirements in 10 CFR 835 such that individuals entering the area are made aware of the hazard; or
  - (3) The radioactive material of concern consists solely of structures or installed components which have been activated (i.e., such as by being exposed to neutron radiation or particles produced by an accelerator).
- (c) Areas containing only packages received from radioactive material transportation need not be posted in accordance §835.603 until the packages are monitored in accordance with §835.405.
3. In addition, storage rooms or cabinets containing radioactive sources should meet the following requirements:
- a. Locked and posted
  - b. Located to minimize damage from fire
  - c. Free of flammable substances



- d. Isolated from occupied areas or located in radiological areas or radiological buffer areas
- e. When selected in continuously occupied controlled areas, the radiation level at the closest approach is as low as reasonably achievable and does not exceed 0.5 millirem per hour on average

#### F. SOURCE DISPOSAL

Obsolete, excess, or leaking accountable sealed radioactive sources should be disposed of according to RCO instructions.

### III. SUMMARY

#### A. Review major points

1. Requirements
2. Control of sources
3. Receipt
4. Radioactive Materials Storage Areas
5. Inventory and transfer
6. Surveys
7. Leak test
8. Source disposal

#### B. Review learning objectives

### IV. EVALUATION

Evaluation should consist of a written examination comprised of multiple choice, fill-in the blank, matching and/or short answer questions. 80% should be the minimum passing criteria for examinations.

*This page intentionally left blank.*