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Course 8774

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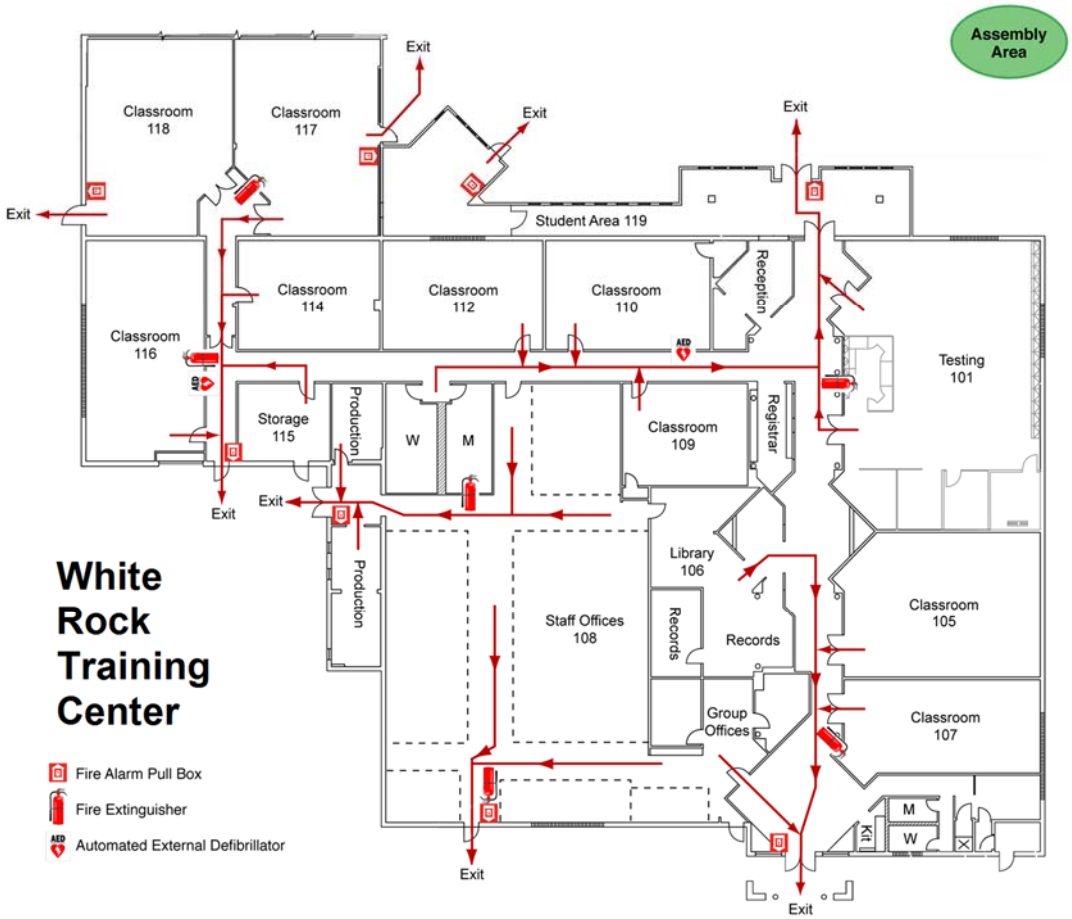

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Introduction

Course Overview

A radioactive source is material used for its emitted radiation. Sources are sealed or unsealed and are classified as accountable or exempt. Radioactive sources are used for response checks, functional checks, and the 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 to minimize the potential for

- the spread of contamination,
- unnecessary exposure to personnel,
- loss or theft, and
- improper disposal.

This course will prepare the student with the skills necessary for RCT qualification by passing quizzes, tests, and the RCT Comprehensive Phase 1, Unit 2 Examination (TEST 27566) and will provide in-the-field skills.

Course 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 LANL.

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 LANL for storage and accountability of radioactive sources.

Target Audience

This course is designed for LANL new-hire radiological control technician (RCT) employees with no operational experience.

Acronyms

ANSI	American National Standards Institute
ARA	airborne radioactivity area
DESH	Environment, Safety, and Health Deployed Services
DOE	Department of Energy
DOT	Department of Transportation
FOD	facility operations director
GC	gas chromatograph
IWM	integrated work management
LRACS	Los Alamos National Laboratory Radioactive Sealed Source Accountability and Control System
PPE	personal protective equipment
RBA	radiological buffer area
RCA	radiological control area
RCT	radiological control technician
RLM	responsible line manager
RMA	radiological material area
RP	radiation protection
RPP	Radiation Protection Program
RPSME	radiation protection subject matter expert
RSS	radioactive sealed source
RSSDMS	Radioactive Sealed Source Data Management System
RWP	radiological work permit
SCO	Source Control Office
TLD	thermoluminescent device

P121, Radiation Protection—Definitions

Definitions are provided below.

- Radioactive Sealed Source (RSS)—a radioactive source that is manufactured, obtained, or retained for the purpose of using the emitted radiation. The RSS consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layer(s) of nonradioactive material, or firmly fixed to a nonradioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material.

- Accountable Sealed Radioactive Source—an RSS 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 P121, *Radiation Protection*, Appendix 16A.

  – Also gas chromatographs containing radioactive material, regardless of the amount of radioactivity contained in the gas chromatograph, and any machine neutron generator as defined in P121.

- Nonaccountable RSS—an RSS with an isotopic activity less than the corresponding value provided in P121, Appendix 16A.

- Source Leak Test—also referred to as an “integrity test,” determines if an RSS is leaking radioactive material; a procedure used to evaluate whether the integrity of the RSS bonding or encapsulation has been breached in such a way that radioactive material can escape.

- Radioactive Material Area—any accessible area within a radiological controlled area (RCA), in which items or containers of radioactive material are present and the total activity of radioactive material exceeds the applicable values provided in P121, Appendix 16A.

- Radioactive Sealed Source Data Management System (RSSDMS)—an unclassified database system managed by the Source Control Office (SCO). It is the single, official Laboratory-wide means of accounting and controlling RSSs, gas chromatographs (GCs) containing radioactive material, and machine neutron generators. This system replaced the Los Alamos National Laboratory Radioactive Sealed Source Accountability and Control System (LRACS).

Notes. . . .

10 CFR 835

2.08.01 – Describe the requirements for radioactive sources per 10 CFR 835.

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

Sealed Radioactive Source Control

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

Accountable Sealed Radioactive Sources

Each accountable RSS shall be inventoried at intervals not to exceed 6 months. This inventory shall

- establish the physical location of each accountable RSS;
- verify the presence and adequacy of associated postings and labels; and
- establish the adequacy of storage locations, containers, and devices.

Except for sealed sources consisting solely of gaseous radioactive material or tritium, each accountable RSS shall be subject to a source leak test upon receipt, when damage is suspected, and at intervals not to exceed 6 months. Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 µCi.

An accountable RSS 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 before being returned to service.

An accountable RSS 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.

An accountable RSS found to be leaking radioactive material shall be controlled in a manner that minimizes the spread of radioactive contamination.

Control of Sources

Types of sources to be controlled include

- accountable RSSs,
- RSSs, and
- source leak tests.

RSSs must be tracked in the LANL institutional source program if the following three conditions exist:

- radioactive material is used for its emitted radiation;
- activity levels are equal to or greater than P121, Appendix A 16A limits; and
- the half-life is equal to or greater than 30 days.

Responsibilities for controlling sources include the following:

- Establish the program.
- Maintain records related to the accountability and control of accountable RSSs for a facility.
- Provide each source custodian with an inventory list of accountable RSSs assigned to him or her.
- Assist the source custodians in training source users.

The source custodian:

- Ensures that the group-owned accountable RSSs are logged into the source control database.
- Provides guidance on implementing the requirements specified in this chapter to the responsible line manager (RLM)/facility operations director (FOD), including the names of workers who will require radiological worker and RSS training.
- Ensures that all accountable RSSs are leak tested at intervals not to exceed 6 months.
- Ensures that the Source Control database contains the current accountable RSS information.

- Provides a copy of the accountable RSS American National Standards Institute (ANSI) certificate and/or other relevant source information to the Source Control Office.

- Engages the SCO when planning the transfer or disposal of accountable RSSs.

- Completes and remains current in radiological worker and RSS training. For training requirements for users of nonaccountable RSSs, see P121, Chapter 8.

- Uses only sources that they are authorized to use, such as high-activity RSSs, which require a radiological work permit (RWP) for use.

Sources are controlled using the following precautions:

- Inspect each source before each use.

- Remove damaged sources from service.

- Prevent fingers, gloved or not, or other objects from touching the active surface of unsealed sources.

- Protect the source from being contaminated when used in a surface contamination area.

Notes. . . .

Receipt

2.08.02 – Identify the characteristics of radioactive sources that must be controlled at LANL.

Upon receipt of accountable RSSs, the SCO should be notified to assign the sources to the proper source custodians. The packaging should be inspected for damage, and a contamination and radiation survey should be performed.

An RCT must perform receipt surveys. 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.

LANL Requirements

Each group leader who owns RSSs, GCs containing radioactive material, and/or machine neutron generators shall designate at least one source custodian who is responsible for RSSs. RSSDMS shall be used to demonstrate accountability and control of accountable RSSs.

The source custodian shall perform a physical inventory of all accountable RSSs that are located in areas *not* deemed unsafe or inaccessible. All accountable RSSs located in active RSS storage locations shall be leak tested at 6-month intervals.

An accountable RSS must be leak tested before it is placed in a segregated, long-term RSS storage area, and the RSSDMS must be updated on the long-term storage status and location of the RSS. Once the RSS is in the long-term storage area, semiannual leak tests shall not be required until it is removed from the long-term RSS storage area.

Once an accountable RSS decays below its isotopic accountable threshold activity (listed in P121, Appendix 16A), it shall become a “nonaccountable” RSS. Nonaccountable RSSs shall be used, handled, and stored commensurate with the radiological hazard created by such activity.

An operating group shall implement its own program to demonstrate its control of nonaccountable RSSs.

Notes. . . .

Labeling and Storage of Radioactive Sources

2.08.03 – Identify the packaging, marking, and labeling requirements for radioactive

Packaging – P151-1, *LANL Packaging and Transportation Program Procedure* shall be referred to for packaging and transportation of RSSs.

Labeling – All RSSs shall be labeled “Caution—Radioactive Material” in accordance with P121, *Radiation Protection* (RP), Chapter 17. Items and containers do not require labeling when one or more of the conditions in P121, Table 17-2 exist:

Table 17-2. Exceptions from Requirements for Labeling Radioactive Material

Exception Criteria	Examples
Material that is used, handled, or stored in radiological areas, Radioactive Material Areas (RMAs), Radiological Buffer Areas (RBAs), or Radiological Controlled Areas (RCAs) and enough information is provided (through established controls) to permit individuals to take precautions or control exposures [see 835.606(a)(1)]. This exception must not be applied to items that have accessible, removable, surface contamination exceeding Table 14-2 values outside of Contamination, High Contamination, or Airborne Radioactivity Areas (ARAs).	Gloveboxes in established RCAs, containers of materials stored in hot cells, containers of radioactive material in areas posted according to RP requirements.
Material having a total quantity of radioactive material below one tenth of Appendix 16A values and less than 0.1 Ci [see 835.606(a)(2)]. ***Guidance Note***: Even when labels are not required (i.e., below the threshold), it is good practice to identify any radioactive material (e.g., with tape containing the trefoil).	Items having low levels of radioactive material content, such as instrument check sources or laundered personal protective equipment (PPE).
Material that has been packaged, labeled, and marked in accordance with Department of Transportation (DOT) requirements or Department of Energy (DOE) Orders governing radioactive material transportation [see 835.606(a)(3)].	Radioactive material packages awaiting shipment, in transit, or before opening (as long as all transportation requirements are met).

Table 17-2. Exceptions from Requirements for Labeling Radioactive Material	
Exception Criteria	**Examples**
Material that is inaccessible or accessible only to individuals authorized to handle or use it or work in its vicinity [see 835.606(a)(4)].	Material stored in areas having access, engineered, and administrative controls that preclude unauthorized entry, radioactive material handling, or transportation (e.g., buried contaminated systems, materials in controlled vaults, radioactive materials in open-front hoods or gloveboxes).
Items installed in manufacturing, process, or other equipment in systems that are operational such as reactor components, piping, and tanks [see 835.606(a)(5)]. Integrated Work Management (IWM) must be implemented to ensure radiological control during any breach or disturbing of such systems.	Piping, ductwork, tanks, valves, instrument sensors, test sources installed in immobile systems.
Material that consists solely of nuclear weapons or their components [see 835.606(a)(6)].	
Consumer items[a]	Exit signs, thoriated welding rods, lenses, radium dial watches.
[a] While not regulated under the Radiation Protection Program (RPP), consumer items can complicate contamination control, and any dispersal of this radioactive material should be reported to a Radiation Protection Subject Matter Expert (RPSME).	

Items and containers may be excepted from the radioactive material labeling requirements of 10 CFR 835.605 when

- they are used, handled, or stored in areas posted and controlled in accordance with this subpart and sufficient information is provided to permit individuals to take precautions to avoid or control exposures; or
- the quantity of radioactive material is less than one tenth of the values specified in Appendix E of 10 CFR 835; or
- they are packaged, labeled, and marked in accordance with the regulations of the DOT or DOE Orders governing radioactive material transportation; or
- they are inaccessible or accessible only to individuals authorized to handle or use them, or to work in the vicinity; or
- they are installed in manufacturing, process, or other equipment, such as reactor components, piping, and tanks; or
- the radioactive material consists solely of nuclear weapons or their components.

Radioactive material labels applied to RSSs may be excepted from the color specifications of §835.601(a).

RSSs not located in storage containers or devices and not labeled by the manufacturer must be clearly marked with a radiation symbol and have a durable label/tag containing the following information:

- Radionuclide
- Amount of activity
- Name of manufacturer
- Date of assay
- Model and serial numbers (where available)

Notes. . . .

Radioactive Material Areas

2.08.04 – Describe the approval and posting requirements for radioactive material areas.

P121, *Radiation Protection*, Article 726, states:

1. Accessible areas where radioactive materials are used, handled, or stored must be identified with the posting CAUTION, RADIOACTIVE MATERIAL(S), except under any of the following circumstances:

    a. The radioactive material does not exceed the values in Appendix 16A;

    b. The area is posted as a radiological area in accordance with Articles 724 or 725;

    c. Each item or container of radioactive material in the area is labeled according to requirements in Article 1721; or

    d. The radioactive material of concern consists solely of structures or installed components that have been activated.

2. RMAs must be posted by Environment, Safety, and Health Deployed Services (DESH) only, considering the above exceptions and other area designations; radioactive material users are responsible for labeling radioactive materials in accordance with Article 1721.

Definitions from 10 CFR 835 for posting of radioactive materials areas include the following.

- 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.

- Radioactive Material Area Posting: The words “Caution, Radioactive Material(s)” shall be posted at each radioactive material area. (§835.603(g))

§835.604 Exceptions to posting requirements are as follows.

- Areas may be excepted from the posting requirements of §835.603 for periods of less than 8 continuous hours when placed under the continuous observation and control of an individual knowledgeable of and empowered to implement required access and exposure control measures.

- Areas may be excepted from the radioactive material area posting requirements of §835.603(g) when they are

  – Posted in accordance with §§835.603(a) through (f); or

  – Each item or container of radioactive material is labeled in accordance with this subpart such that individuals entering the area are made aware of the hazard; or

  – The radioactive material of concern consists solely of structures or installed components that have been activated (i.e., such as by being exposed to neutron radiation or particles produced by an accelerator).

- Areas containing only packages received from radioactive material transportation labeled and in nondegraded condition need not be posted in accordance with §835.603 until the packages are monitored in accordance with §835.405.

In addition, storage rooms or cabinets containing radioactive sources should

- be locked and posted;

- be located to minimize damage from fire;

- be free of flammable substances;

- be isolated from occupied areas or located in radiological areas or radiological buffer areas; and

- not be in excess of 0.5 millirem per hour on average when selected in continuously occupied controlled areas and the radiation level at the closest approach is as low as reasonably achievable.

Gamma radioactive sources (except small counting radioactive sources that are low energy and low activity or well shielded) should be stored separately from locations where radiation detection/counting equipment is present.

Storage and Accountability of Radioactive Sources

2.08.05 – Describe the process and procedures used at LANL for storage and accountability of radioactive sources.

LANL Source Storage Requirements

RSSs that are routinely used and accessible shall be stored and secured in active RSS storage areas when not in actual use. Radioactive material in quantities exceeding the Appendix 16A, Chapter 16, quantities shall be used, handled, and stored in an RMA or other area posted in accordance with Articles 724 or 725, except as noted in Article 726 [see 835.2(a), radioactive material area, and 835.603].

Quantities of radioactive material stored in RMAs located outside RCAs shall be limited to the amount of material presenting an external radiation hazard such that the dose expectations of an RCA are not exceeded as a result of storing the material in the RMA. In addition, only radioactive material that does not present a contamination hazard by the inherent nature of its form or packaging (for example, encapsulated sources or activated metals) shall be allowed in these areas.

Operating groups that own RSSs shall store them such that personnel radiation dosimetry [thermoluminescent dosimeters (TLDs)] that are in storage will not be exposed. Storage rooms, cabinets, or other containers in which RSSs are stored shall be secured and labeled and posted as required, located in areas where the risk of fire damage is low, and stored in areas free from flammable material.

LANL Accountability Requirements

RSSDMS shall be used to demonstrate accountability and control of accountable RSSs. Once an accountable RSS decays below its isotopic accountable threshold activity (listed in P121, Appendix 16A), it shall become a nonaccountable RSS.

Notes. . . .

Source Disposal

Obsolete, excess, or leaking accountable RSSs should be disposed of according to SCO instructions.

Notes. . . .

Summary

Sources may be sealed or unsealed, accountable or nonaccountable. Controls for sources are governed by DOE requirements. Responsibility for source control is delineated in contractor procedures. The RCT must be knowledgeable of controls used to prevent contamination and minimize exposure. All onsite sources require prior written approval.

Accountable sources are identified, inventoried, surveyed, and tested (sealed only). The use and disposition of sources are maintained in records.

RCT: MODULE 2.08, RADIOLOGICAL SOURCE CONTROL

Course 8774

July 2017

Overview

A radioactive source is material used for its emitted radiation. Sources are sealed or unsealed and are classified as accountable or exempt.

Radioactive sources are used for response checks, functional checks, and the 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 to minimize the potential for

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

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 LANL.

2.08.03 – Identify the packaging, marking, and labeling requirements for radioactive sources.

2.08.04 – Describe the approval and posting requirements for radioactive material areas.

2.08.05 – Describe the process and procedures used at LANL for storage and accountability of radioactive sources.

P121, Radiation Protection - Definitions

- Radioactive Sealed Source (RSS)—a radioactive source that is manufactured, obtained, or retained for the purpose of using the emitted radiation. The RSS consists of a known or estimated quantity of radioactive material contained within a sealed capsule, sealed between layer(s) of nonradioactive material, or firmly fixed to a nonradioactive surface by electroplating or other means intended to prevent leakage or escape of the radioactive material.

Note: definitions, source program requirements, and other course source material can be found in 10 CFR 835 and P-121 or the are part of RP-PROG-06-PR-06 or RP-DP-001 procedures

P121, Radiation Protection - Definitions

- Accountable Sealed Radioactive Source—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 P121, *Radiation Protection*, Appendix 16A.
  - Also gas chromatographs containing radioactive material, regardless of the amount of radioactivity contained in the gas chromatograph, and any machine neutron generator as defined in P121.

P121, Radiation Protection - Definitions

- Non-accountable RSS — an RSS with an isotopic activity less than the corresponding value provided in P121, Appendix 16A.
- Source Leak Test—also referred to as an “integrity test,” determines if an RSS is leaking radioactive material; a procedure used to evaluate whether the integrity of the RSS bonding or encapsulation has been breached in such a way that radioactive material can escape.

P121, Radiation Protection - Definitions

- Radioactive Material Area—any accessible area within a radiological controlled area (RCA), in which items or containers of radioactive material are present and the total activity of radioactive material exceeds the applicable values provided in P121, Appendix 16A.

P121, Radiation Protection - Definitions

- Radioactive Sealed Source Data Management System (RSSDMS) —an unclassified database system managed by the Source Control Office (SCO). It is the single, official Laboratory-wide means of accounting and controlling RSSs, gas chromatographs (GCs) containing radioactive material, and machine neutron generators. This system replaced LRACS.

2.08.01 – 10 CFR 835

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

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.

2.08.01 – 10 CFR 835

Accountable Sealed Radioactive Sources

- Each accountable sealed radioactive source shall be inventoried at intervals not to exceed 6 months. This inventory shall
  - Establish the physical location of each accountable sealed radioactive source;
  - Verify the presence and adequacy of associated postings and labels; and
  - Establish the adequacy of storage locations, containers, and devices.

2.08.01 – 10 CFR 835

Accountable Sealed Radioactive Sources *(continued)*

- Except for sealed sources consisting solely of gaseous radioactive material or tritium, each accountable RSS shall be subject to a source leak test upon receipt, when damage is suspected, and at intervals not to exceed 6 months. Source leak tests shall be capable of detecting radioactive material leakage equal to or exceeding 0.005 µCi.

2.08.01 – 10 CFR 835

Accountable Sealed Radioactive Sources *(continued)*

- An accountable RSS 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 before being returned to service.
- An accountable RSS 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.

2.08.01 – 10 CFR 835

Accountable Sealed Radioactive Sources *(continued)*

- An accountable RSS found to be leaking radioactive material shall be controlled in a manner that minimizes the spread of radioactive contamination.

2.08.01 – Control of Sources

Types of sources to be controlled include

- Accountable RSSs
- Sealed radioactive sources
- Source leak tests

2.08.01 – Control of Sources

RSSs must be tracked in the LANL institutional source program (RSSDMS) if the following three conditions exist:

- Radioactive material is used for its emitted radiation.
- Activity levels are equal to or greater than P121, Appendix 16A limits.
- The half-life is equal to or greater than 30 days.

2.08.01 – Control of Sources

Responsibilities for controlling sources include the following:

- Establish the program.
- Maintain records related to the accountability and control of accountable RSSs for a facility.
- Provide each source custodian with an inventory list of accountable RSSs assigned to him or her.
- Assist the source custodians in training source users.

2.08.01 – Control of Sources

The source custodian:

- Ensures that the group-owned accountable RSSs are logged into the source control database.
- Provides guidance on implementing the requirements specified in this chapter to the RLM/FOD, including the names of workers who will require radiological worker and RSS training.
- Ensures that all accountable RSSs are leak tested at intervals not to exceed 6 months.
- Ensures that the Source Control database contains the current accountable RSS information.

2.08.01 – Control of Sources

The source custodian *(continued)*:

- Provides a copy of the accountable RSS ANSI certificate and/or other relevant source information to the Source Control Office.
- Engages the Source Control Office when planning transfer or disposal of accountable RSSs.
- Completes and remains current in radiological worker and RSS training. For training requirements for users of nonaccountable RSSs, see P121, Chapter 8.
- Uses only sources that they are authorized to use, such as high-activity RSSs, which require a RWP for use.

2.08.01 – Control of Sources

Sources are controlled using the following precautions:

- Inspect each source before each use.
- Remove damaged sources from service.
- Prevent fingers, gloved or not, or other objects from touching the active surface of unsealed sources.
- Protect the source from being contaminated when used in a surface contamination area.

2.08.02 – Receipt

Upon receipt of accountable sealed radioactive sources, the SCO should be notified to assign the sources to the proper source custodians.

The packaging should be inspected for damage, and a contamination and radiation survey should be performed.

An RCT must perform receipt surveys.

2.08.02 – Receipt

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.

2.08.02 – Receipt

LANL Requirements

- Each group leader who owns RSSs, GCs containing radioactive material, and/or machine neutron generators shall designate at least one source custodian who is responsible for RSSs.
- RSSDMS shall be used to demonstrate accountability and control of accountable RSSs.
- The source custodian shall perform a physical inventory of all accountable RSSs that are located in areas *not* deemed unsafe or inaccessible.

2.08.02 – Receipt

LANL Requirements *(continued)*

- All accountable RSSs located in active RSS storage locations shall be leak-tested at 6-month intervals.
- An accountable RSS must be leak tested before it is placed in a segregated, long-term RSS storage area, and the RSSDMS must be updated on the long-term storage status and location of the RSS. Once the RSS is in the long-term storage area, semiannual leak tests shall not be required until it is removed from the long-term RSS storage area.

2.08.02 – Receipt

LANL Requirements *(continued)*

- Once an accountable RSS decays below its isotopic accountable threshold activity (listed in P121, Appendix 16A), it shall become a “nonaccountable” RSS.
- Nonaccountable RSSs shall be used, handled, and stored commensurate with the radiological hazard created by such activity.
- An operating group shall implement its own program to demonstrate control of nonaccountable RSSs.

2.08.03 – Labeling and Storage of Radioactive Sources

Packaging – P151-1, *LANL Packaging and Transportation Program Procedure* shall be referred to for packaging and transportation of RSSs.

Labeling – All RSSs shall be labeled “Caution—Radioactive Material” in accordance with P121, *Radiation Protection*, Chapter 17.

Items and containers do not require labeling when one or more of the conditions in P121, Table 17-2 exist:

2.08.03 – Labeling and Storage of Radioactive Sources

Table 17-2. Exceptions from Requirements for Labeling Radioactive Material	
Exception Criteria	**Examples**
Material that is used, handled, or stored in radiological areas, Radioactive Material Areas (RMAs), Radiological Buffer Areas (RBAs), or Radiological Controlled Areas (RCAs) and enough information is provided (through established controls) to permit individuals to take precautions or control exposures [see 835.606(a)(1)]. This exception must not be applied to items that have accessible, removable, surface contamination exceeding Table 14-2 values outside of Contamination, High Contamination, or Airborne Radioactivity Areas (ARAs).	Gloveboxes in established RCAs, containers of materials stored in hot cells, containers of radioactive material in areas posted according to RP requirements.
Material having a total quantity of radioactive material below one tenth of Appendix 16A values and less than 0.1 Ci [see 835.606(a)(2)]. ***Guidance Note***: Even when labels are not required (i.e., below the threshold), it is good practice to identify any radioactive material (e.g., with tape containing the trefoil).	Items having low levels of radioactive material content, such as instrument check sources or laundered personal protective equipment (PPE).
Material that has been packaged, labeled, and marked in accordance with Department of Transportation (DOT) requirements or Department of Energy (DOE) Orders governing radioactive material transportation [see 835.606(a)(3)].	Radioactive material packages awaiting shipment, in transit, or before opening (as long as all transportation requirements are met).

2.08.03 – Labeling and Storage of Radioactive Sources

Table 17-2. Exceptions from Requirements for Labeling Radioactive Material	
Exception Criteria	**Examples**
Material that is inaccessible or accessible only to individuals authorized to handle or use it or work in its vicinity [see 835.606(a)(4)].	Material stored in areas having access, engineered, and administrative controls that preclude unauthorized entry, radioactive material handling, or transportation (e.g., buried contaminated systems, materials in controlled vaults, radioactive materials in open-front hoods or gloveboxes).
Items installed in manufacturing, process, or other equipment in systems that are operational such as reactor components, piping, and tanks [see 835.606(a)(5)]. Integrated Work Management (IWM) must be implemented to ensure radiological control during any breach or disturbing of such systems.	Piping, ductwork, tanks, valves, instrument sensors, test sources installed in immobile systems.
Material that consists solely of nuclear weapons or their components [see 835.606(a)(6)].	
Consumer items[a]	Exit signs, thoriated welding rods, lenses, radium dial watches.
[a] While not regulated under the Radiation Protection Program (RPP), consumer items can complicate contamination control, and any dispersal of this radioactive material should be reported to a Radiation Protection Subject Matter Expert (RPSME).	

2.08.03 – Labeling and Storage of Radioactive Sources

Items and containers may be excepted from the radioactive material labeling requirements of 10 CFR 835.605 when

- They are used, handled, or stored in areas posted and controlled in accordance with this subpart and sufficient information is provided to permit individuals to take precautions to avoid or control exposures; or
- The quantity of radioactive material is less than one tenth of the values specified in Appendix E of 10 CFR 835; or

2.08.03 – Labeling and Storage of Radioactive Sources

- They are packaged, labeled, and marked in accordance with the regulations of the DOT or DOE Orders governing radioactive material transportation; or
- They are inaccessible or accessible only to individuals authorized to handle or use them, or to work in the vicinity; or
- They are installed in manufacturing, process, or other equipment, such as reactor components, piping, and tanks; or
- The radioactive material consists solely of nuclear weapons or their components.

2.08.03 – Labeling and Storage of Radioactive Sources

Radioactive material labels applied to RSSs may be excepted from the color specifications of §835.601(a).

2.08.03 – Labeling and Storage of Radioactive Sources

Sealed radioactive sources not in storage containers or devices and not labeled by the manufacturer must be clearly marked with a radiation symbol and have a durable label/tag containing the following information:

- Radionuclide
- Amount of activity
- Name of manufacturer
- Date of assay
- Model and serial numbers (where available)

2.08.04 –Radioactive Material Areas

P121, *Radiation Protection*, Article 726, states:

1. Accessible areas where radioactive materials are used, handled, or stored must be identified with the posting CAUTION, RADIOACTIVE MATERIAL(S), except under any of the following circumstances:
   a. The radioactive material does not exceed the values in Appendix 16A;
   b. The area is posted as a radiological area in accordance with Articles 724 or 725;

2.08.04 –Radioactive Material Areas

c. Each item or container of radioactive material in the area is labeled according to requirements in Article 1721; or

d. The radioactive material of concern consists solely of structures or installed components that have been activated.

2. RMAs must be posted by DESH only, considering the above exceptions and other area designations; radioactive material users are responsible for labeling radioactive materials in accordance with Article 1721.

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Definitions from 10 CFR 835 for posting of radioactive materials areas include:

- 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.
- Radioactive Material Area Posting: The words “Caution, Radioactive Material(s)” shall be posted at each radioactive material area. (§835.603(g))

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§835.604 exceptions to posting requirements are:

- 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.

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- Areas may be excepted from the radioactive material area posting requirements of §835.603(g) when:
  - Posted in accordance with §§835.603(a) through (f); or
  - Each item or container of radioactive material is labeled in accordance with this subpart such that individuals entering the area are made aware of the hazard; or

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- The radioactive material of concern consists solely of structures or installed components that have been activated (i.e., such as by being exposed to neutron radiation or particles produced by an accelerator).

- Areas containing only packages received from radioactive material transportation labeled and in nondegraded condition need not be posted in accordance with §835.603 until the packages are monitored in accordance with §835.405.

2.08.04 – Radioactive Material Areas

In addition, storage rooms or cabinets containing radioactive sources should be

- Locked and posted.
- Located to minimize damage from fire.
- Free of flammable substances.
- Isolated from occupied areas or located in radiological areas or radiological buffer areas.
- 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.

2.08.04 – Radioactive Material Areas

Gamma radioactive sources (except small counting radioactive sources that are low energy and low activity or well shielded) should be stored separately from locations where radiation detection/counting equipment is present.

2.08.05 – Storage and Accountability of Radioactive Sources

LANL Source Storage Requirements

- RSSs that are routinely used and accessible shall be stored and secured in active RSS storage areas when not in actual use.
- Radioactive material in quantities exceeding the Appendix 16A, Chapter 16, quantities shall be used, handled, and stored in an RMA or other area posted in accordance with Articles 724 or 725 except as noted in Article 726 [see 835.2(a), radioactive material area, and 835.603].

2.08.05 – Storage and Accountability of Radioactive Sources

LANL Source Storage Requirements *(continued)*

- Quantities of radioactive material stored in RMAs located outside RCAs shall be limited to the amount of material presenting an external radiation hazard such that the dose expectations of an RCA are not exceeded as a result of storing the material in the RMA. In addition, only radioactive material that does not present a contamination hazard by the inherent nature of its form or packaging (for example, encapsulated sources or activated metals) shall be allowed in these areas.

2.08.05 – Storage and Accountability of Radioactive Sources

LANL Source Storage Requirements *(continued)*

- Operating groups that own RSSs shall store them in such a way that personnel radiation dosimetry (TLDs) that are in storage will not be exposed.
- Storage rooms, cabinets, or other containers in which RSSs are stored shall be secured and labeled and posted as required, located in areas where the risk of fire damage is low, and stored in areas free from flammable material.

2.08.05 – Storage and Accountability of Radioactive Sources

LANL Accountability Requirements

- RSSDMS shall be used to demonstrate accountability and control of accountable RSSs.
- Once an accountable RSS decays below its isotopic accountable threshold activity (listed in P121, Appendix 16A), it shall become a nonaccountable RSS.

Source Disposal

Obsolete, excess, or leaking accountable RSSs should be disposed of according to the Source Control Office instructions.

SUMMARY

Sources may be sealed or unsealed, accountable or non-accountable. Controls for sources are governed by DOE requirements. Responsibility for source control is delineated in contractor procedures. The RCT must be knowledgeable of controls used to prevent contamination and minimize exposure. All onsite sources require prior written approval.

Accountable sources are identified, inventoried, surveyed, and tested (sealed only). The use and disposition of sources are maintained in records.