LA-UR-24-23223

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Title:	RCT Continuing Training - Radioactive Sealed Sources
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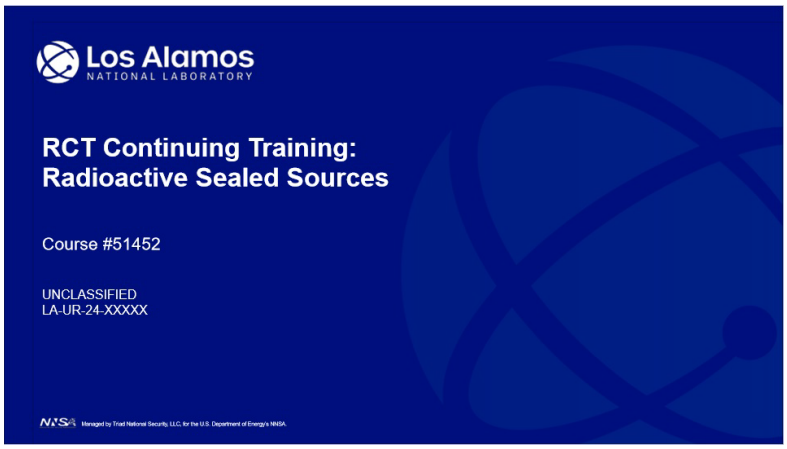
Intended for:	Web
Issued:	2024-04-09

RCT Continuing Training: Radioactive Sealed Sources

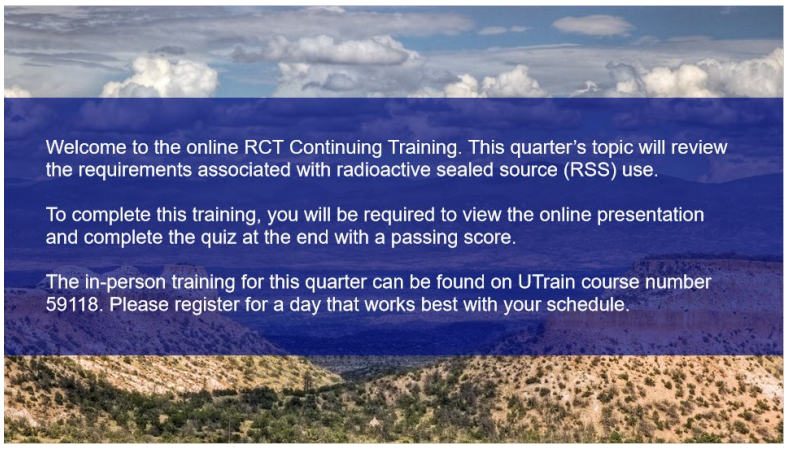
1. RCT Continuing Training Radioactive Sealed Sources

1.1 RCT Continuing Training: Radioactive Sealed Sources



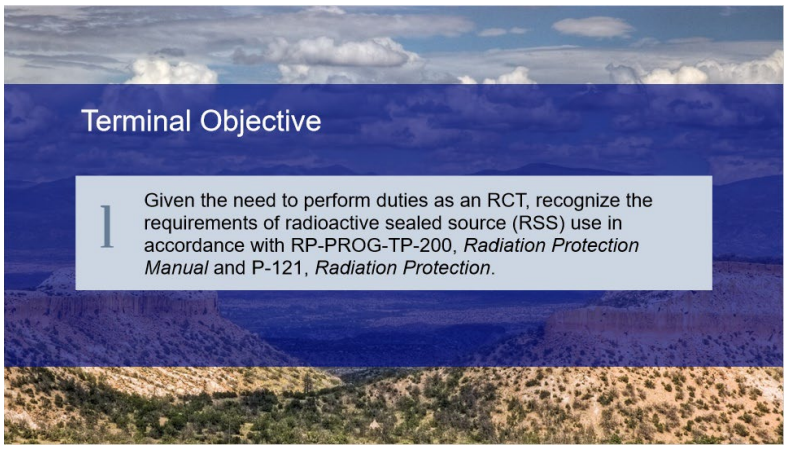
Notes:

1.2 Introduction

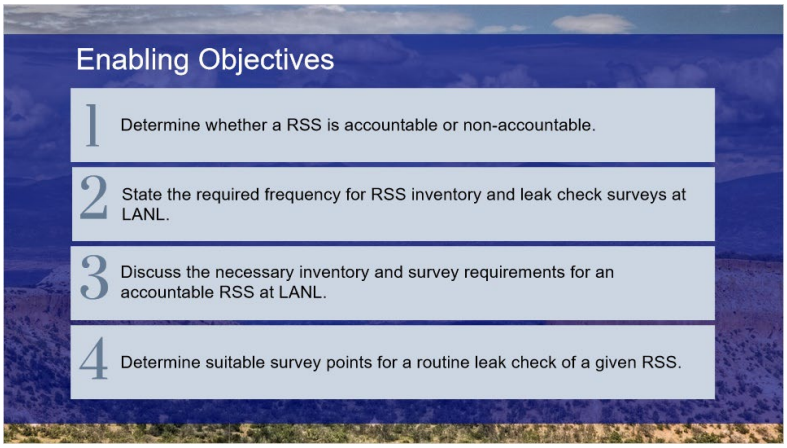


Notes:

1.3 Terminal Objective

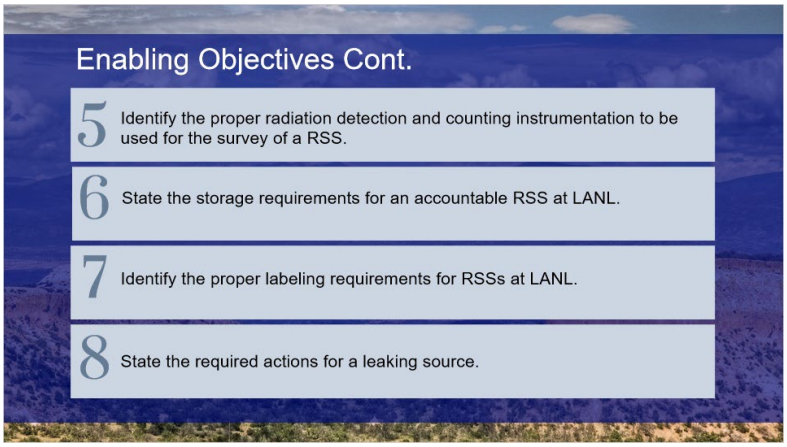


1.4 Enabling Objectives



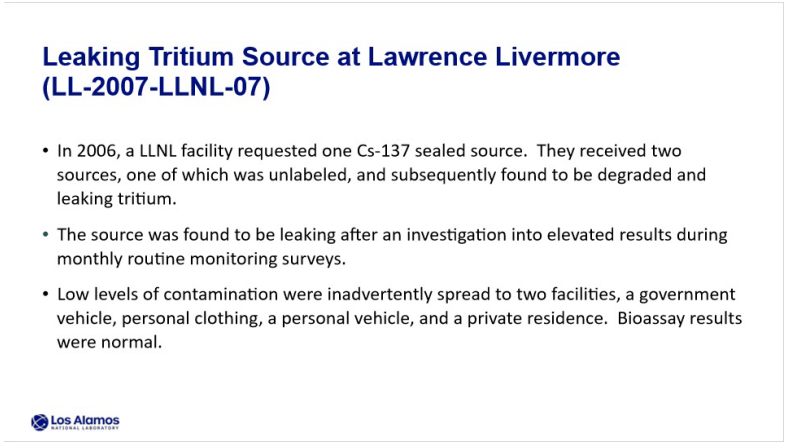
Notes:

1.5 Enabling Objectives Cont.

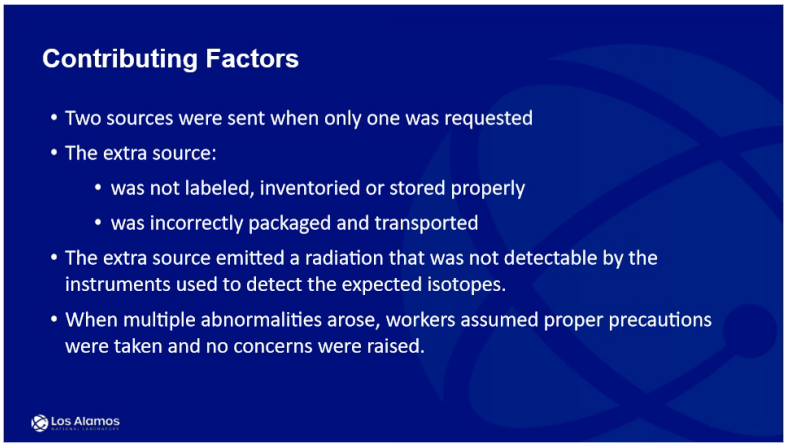


1.6 Why RSS Control is Important

1.7 Event Summary

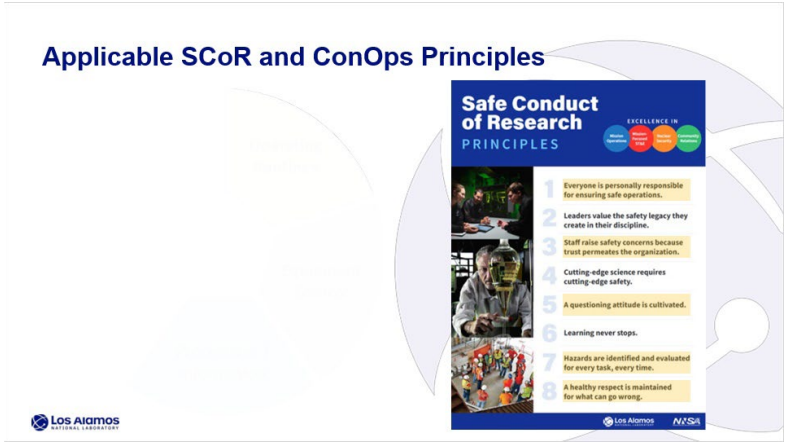


1.8 Contributing Factors

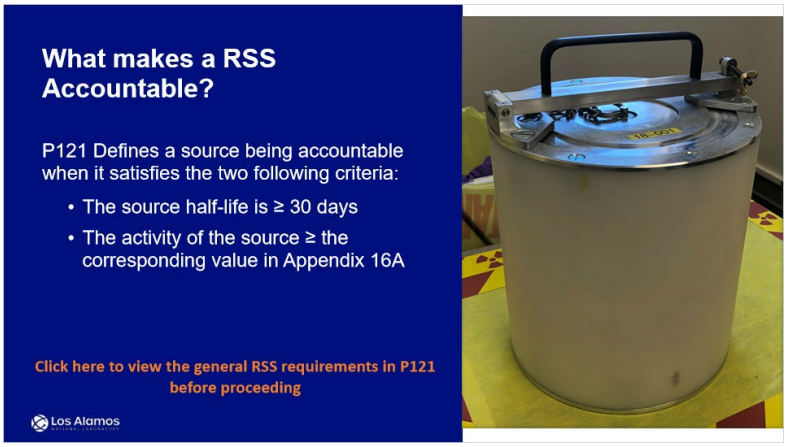


1.9 Lessons Learned

1.10 SCoR and ConOps Principles

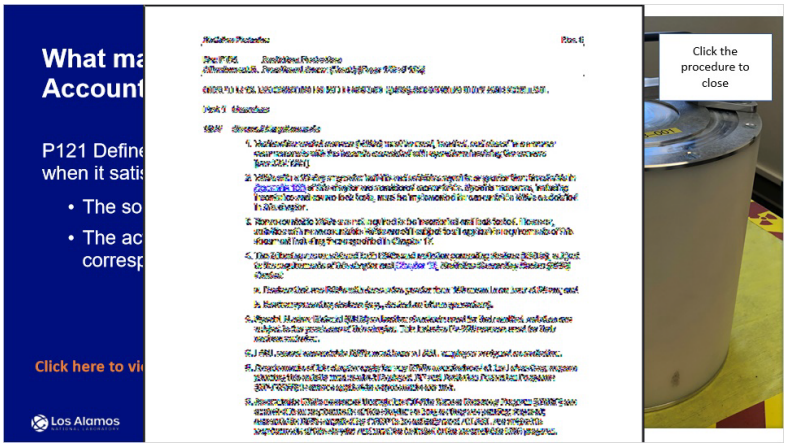


1.11 What makes a RSS Accountable?

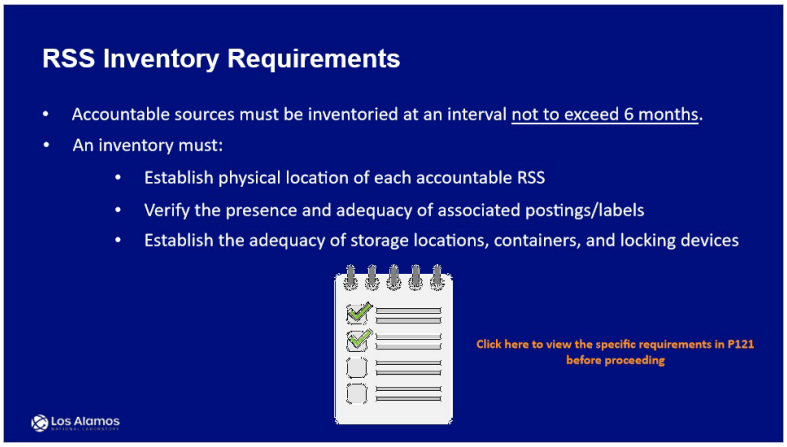


Notes:

Untitled Layer 1 (Slide Layer)



1.12 Inventory Requirements



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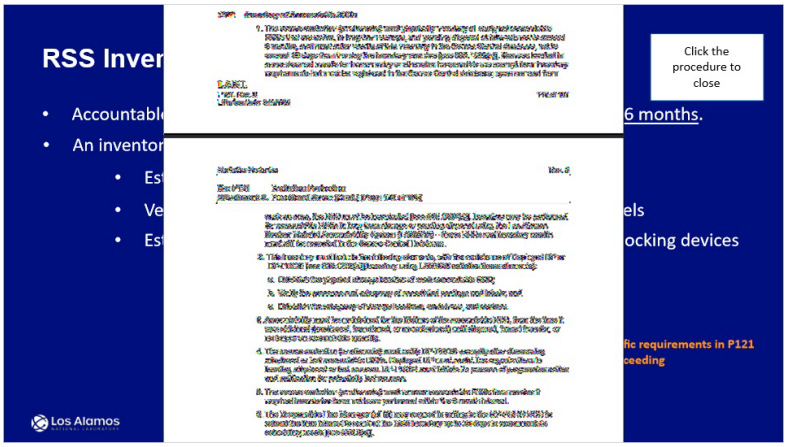
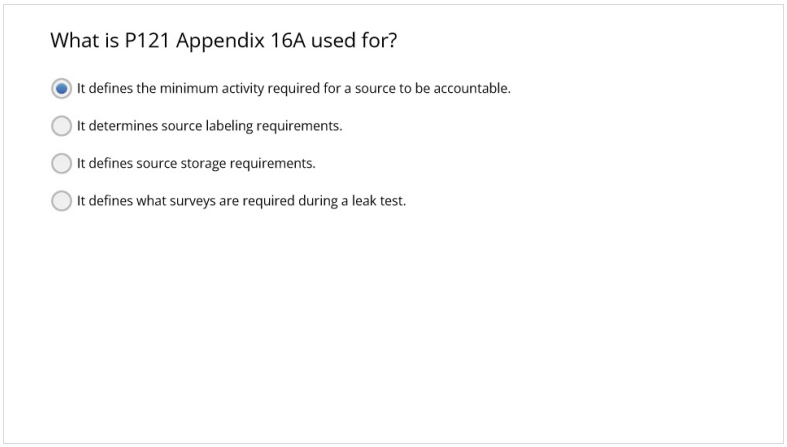


1.13 Knowledge Chek #1

(Multiple Choice, 10 points, unlimited attempts permitted)



Correct	Choice
X	It defines the minimum activity required for a source to be accountable.
	It determines source labeling requirements.
	It defines source storage requirements.
	It defines what surveys are required during a leak test.

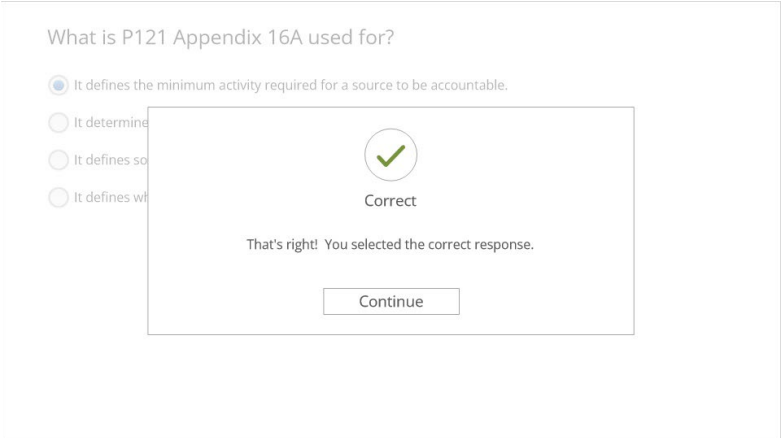
Feedback when correct:

That's right! You selected the correct response.

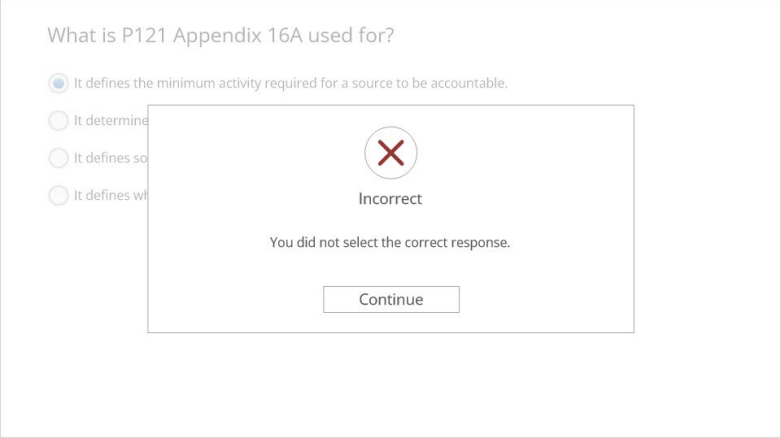
Feedback when incorrect:

You did not select the correct response.

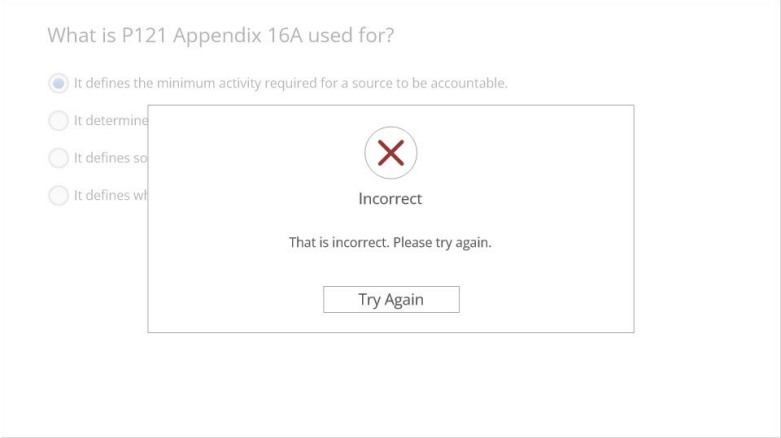
Correct (Slide Layer)



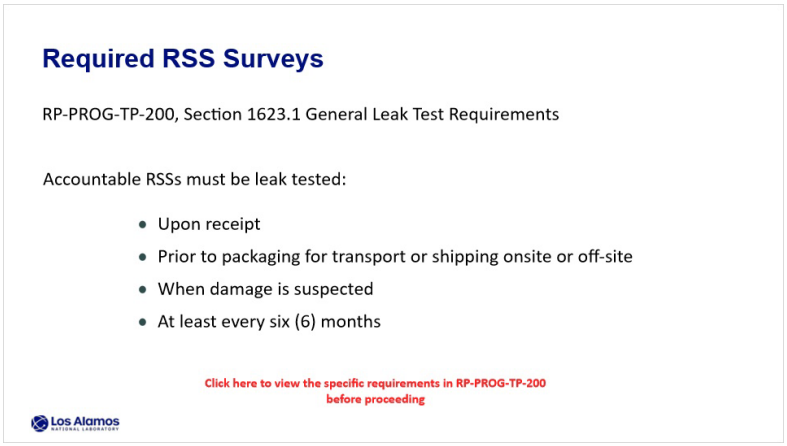
Incorrect (Slide Layer)



Try Again (Slide Layer)

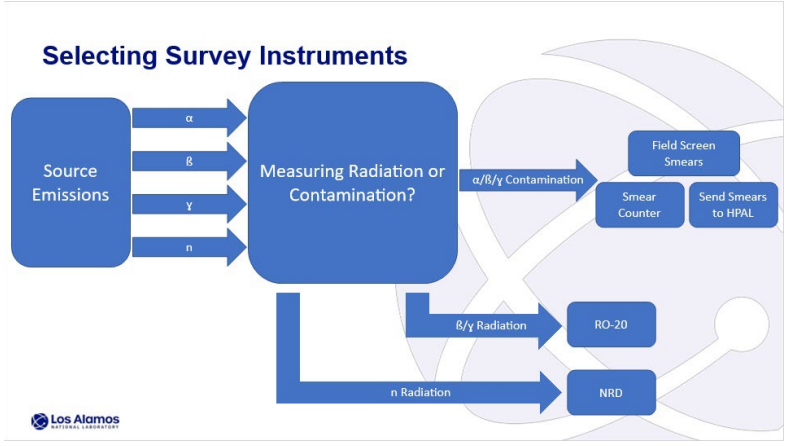


1.14 Survey Requirements

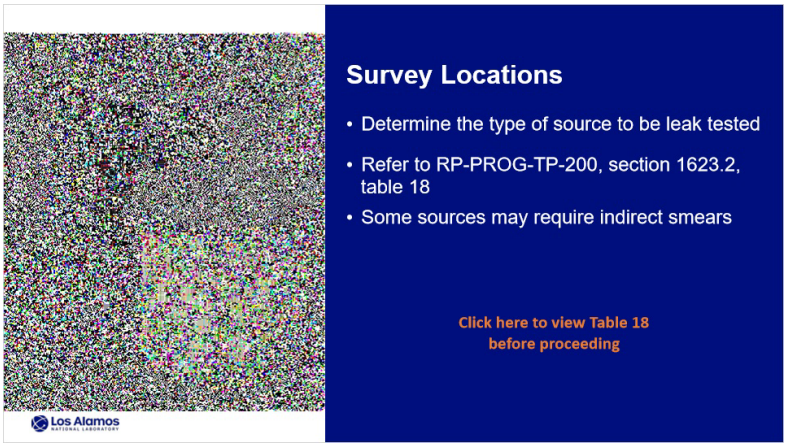


Untitled Layer 1 (Slide Layer)

1.15 Survey Instrument Selection



1.16 Survey Locations



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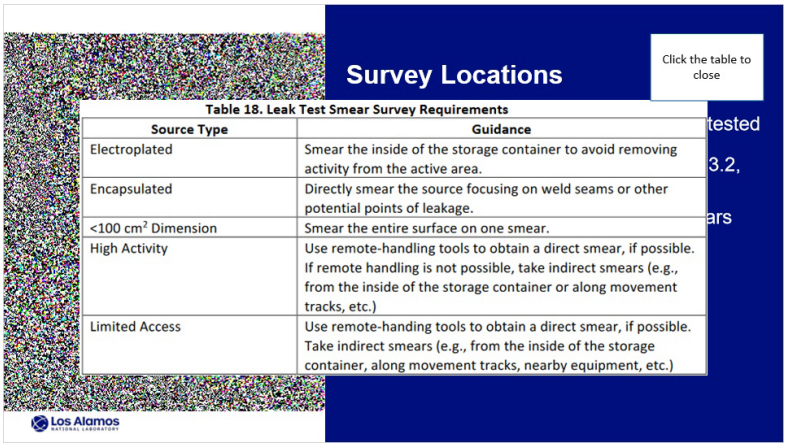
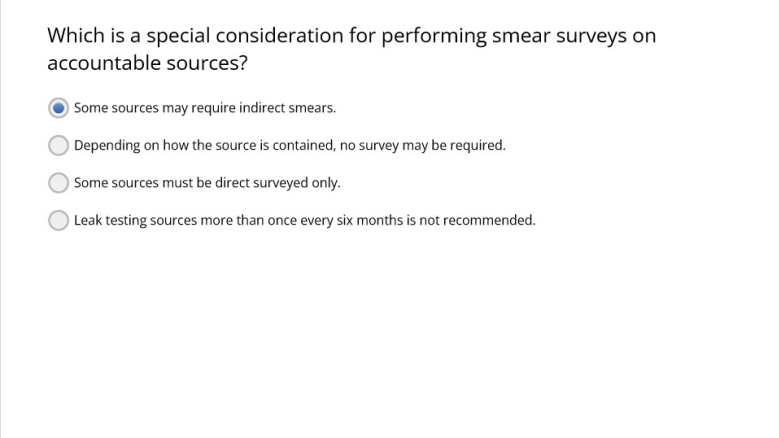


1.17 RSS Leak Test Demonstration Video

1.18 Knowledge Check #2

(Multiple Choice, 10 points, unlimited attempts permitted)



Correct	Choice
X	Some sources may require indirect smears.
	Depending on how the source is contained, no survey may be required.
	Some sources must be direct surveyed only.
	Leak testing sources more than once every six months is not recommended.

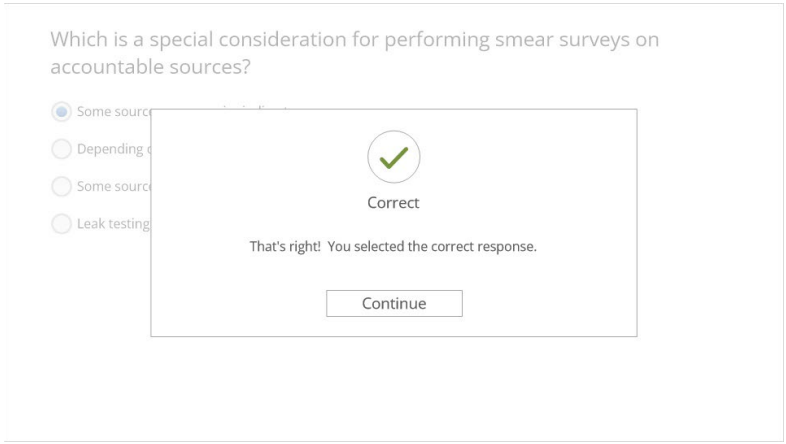
Feedback when correct:

That's right! You selected the correct response.

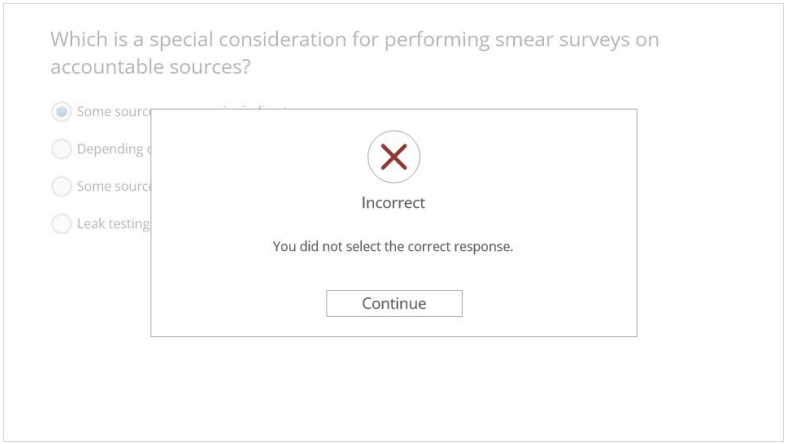
Feedback when incorrect:

You did not select the correct response.

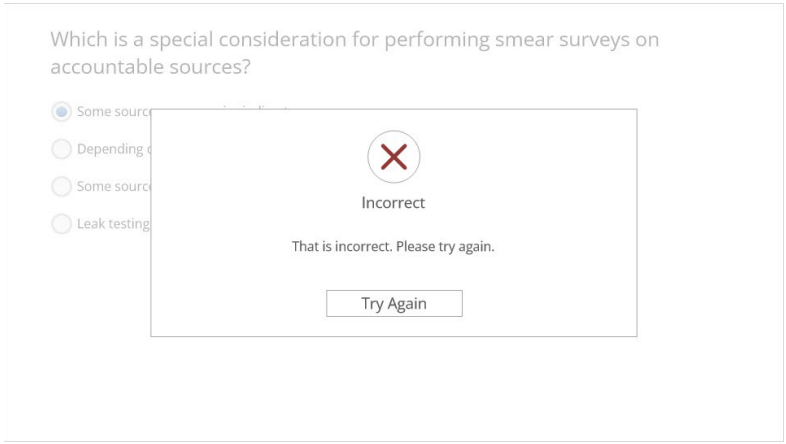
Correct (Slide Layer)



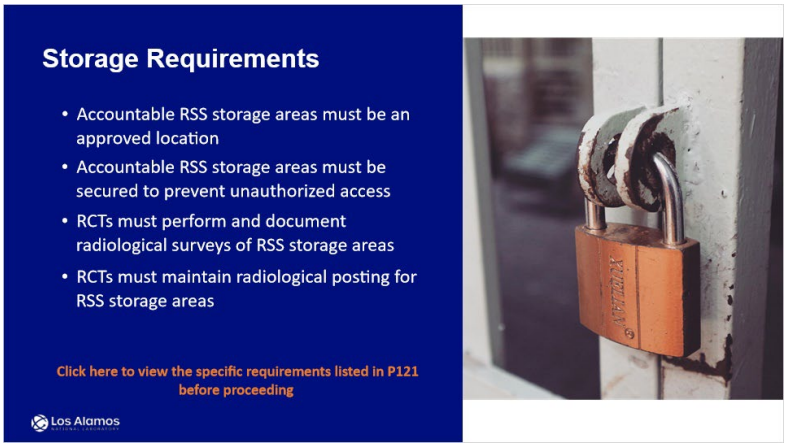
Incorrect (Slide Layer)



Try Again (Slide Layer)



1.19 Storage Requirements



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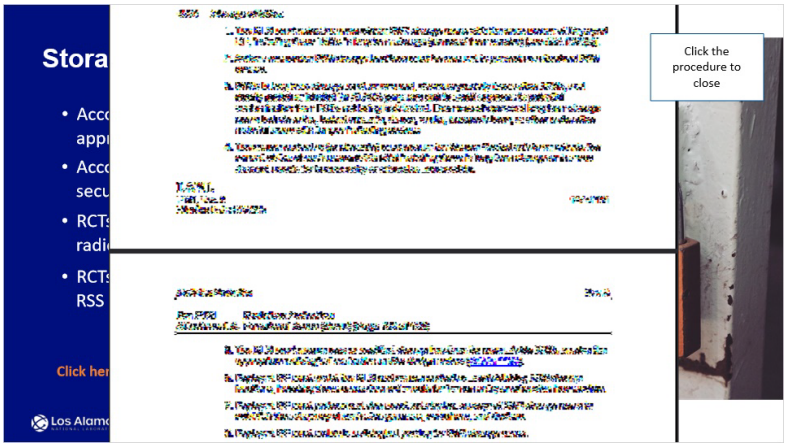
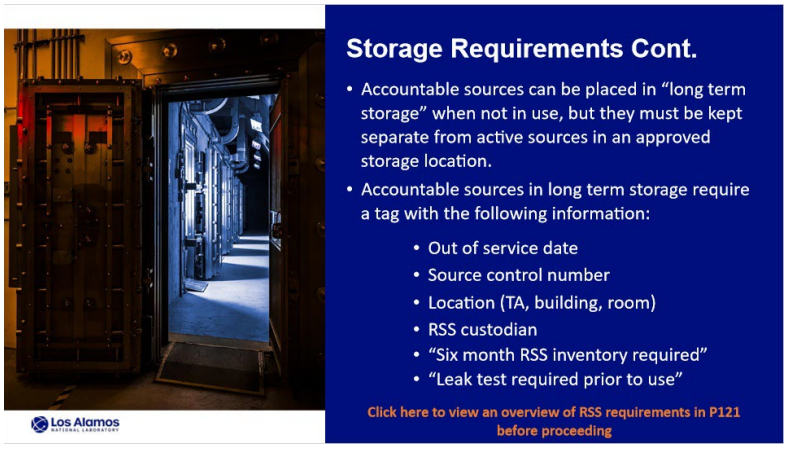
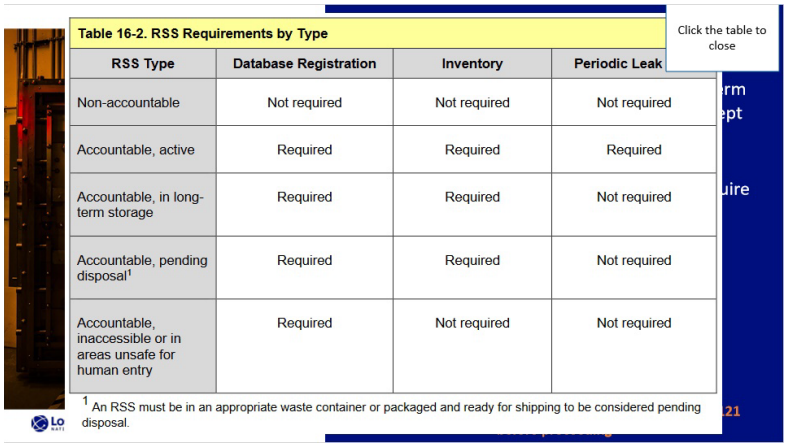


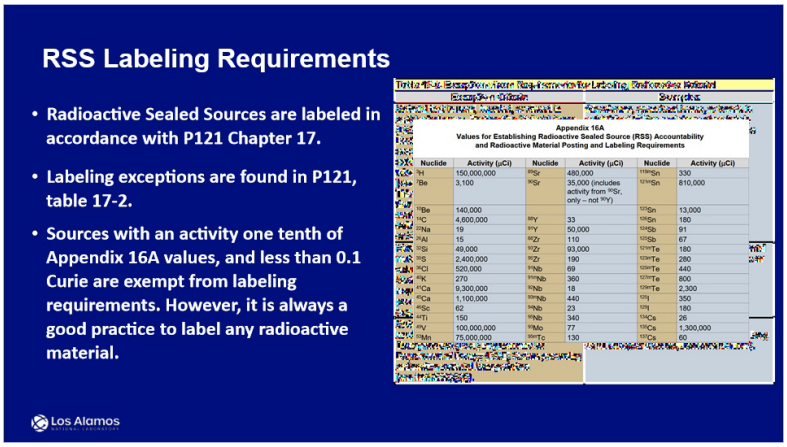
1.20 Storage Requirements Cont.



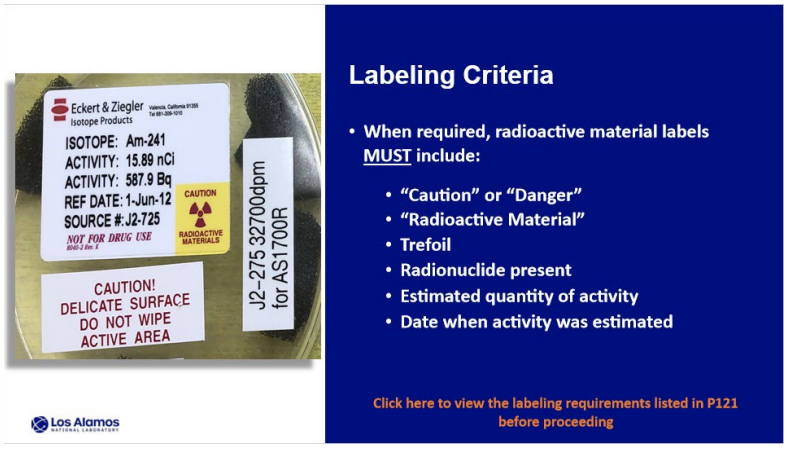
Untitled Layer 1 (Slide Layer)



1.21 Labeling Requirements



1.22 Labeling Criteria



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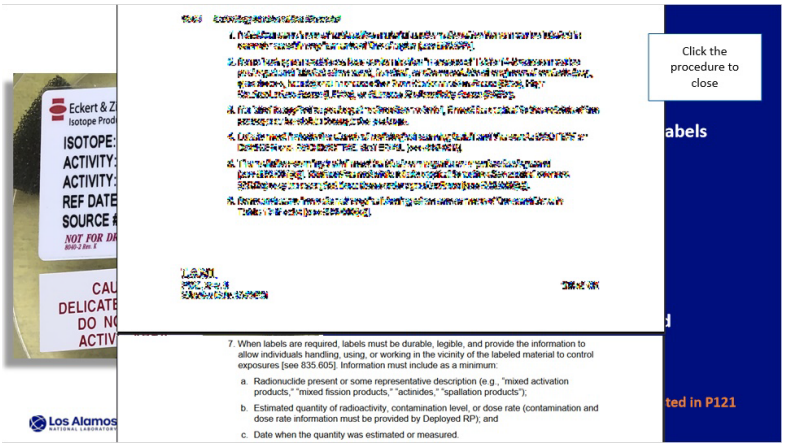
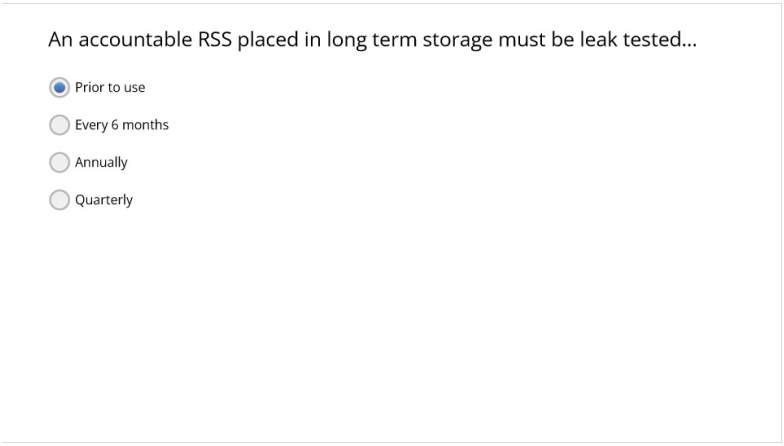


1.23 Knowledge Check #3

(Multiple Choice, 10 points, unlimited attempts permitted)



Correct	Choice
X	Prior to use
	Every 6 months
	Annually
	Quarterly

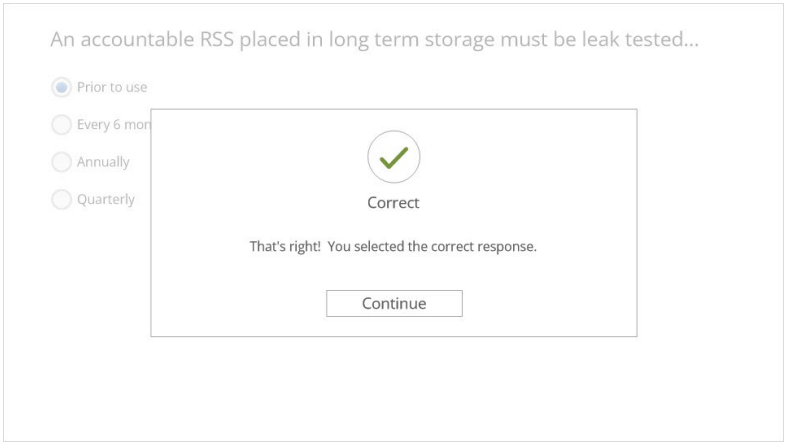
Feedback when correct:

That's right! You selected the correct response.

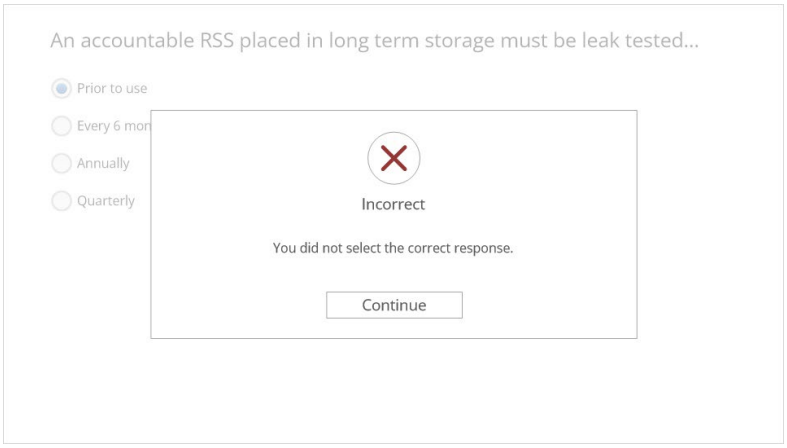
Feedback when incorrect:

You did not select the correct response.

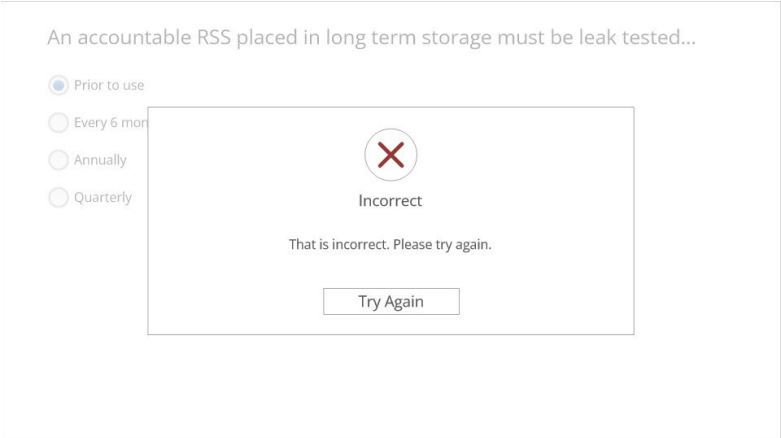
Correct (Slide Layer)



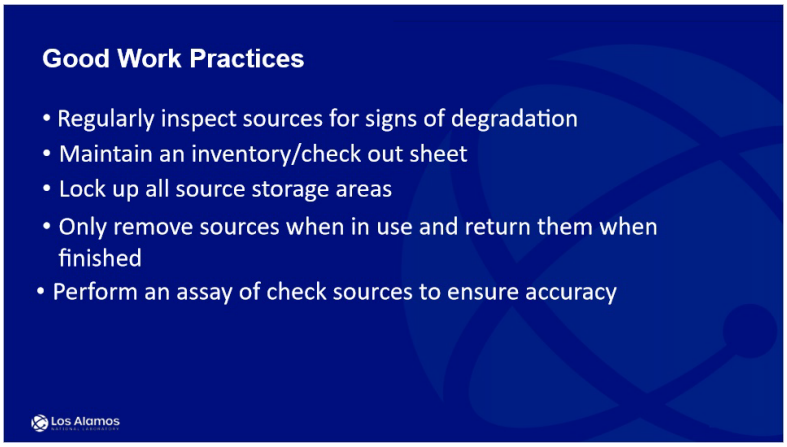
Incorrect (Slide Layer)



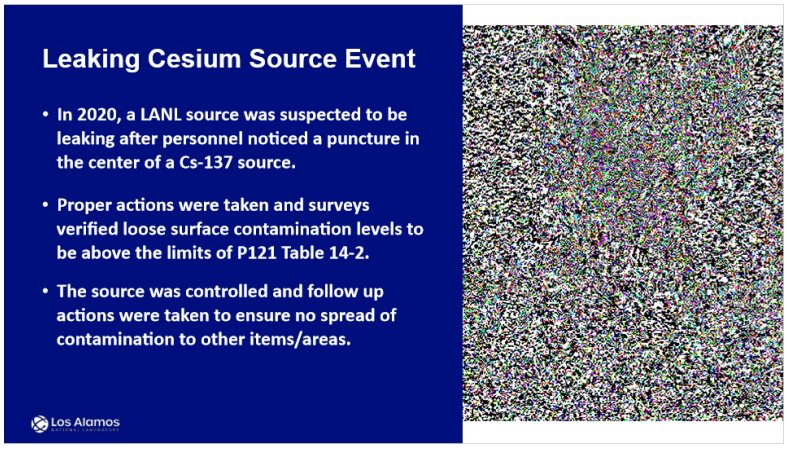
Try Again (Slide Layer)



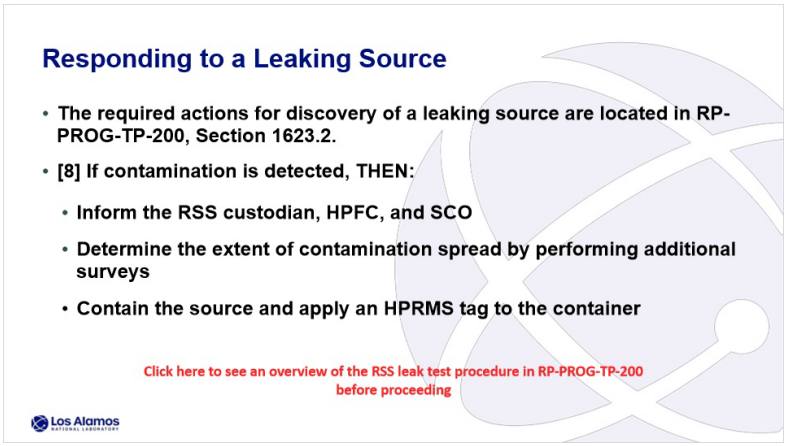
1.24 Good Work Practices



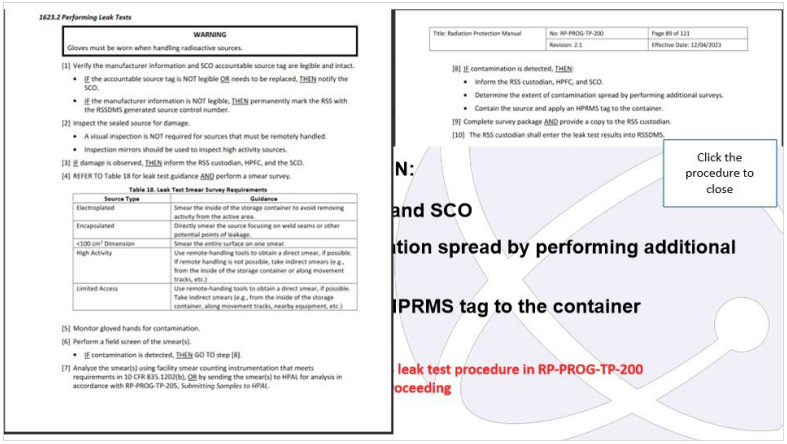
1.25 Leaking Cesium Source Event



1.26 Response to Leaking Sources

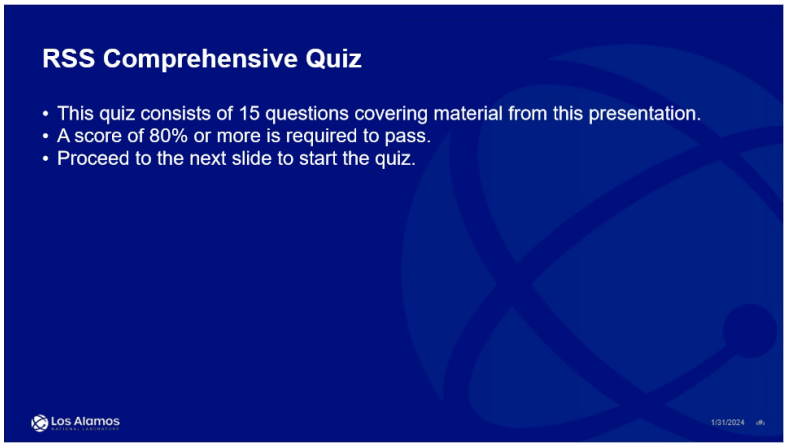


Untitled Layer 1 (Slide Layer)



2. Quiz

2.1 Quiz Introduction



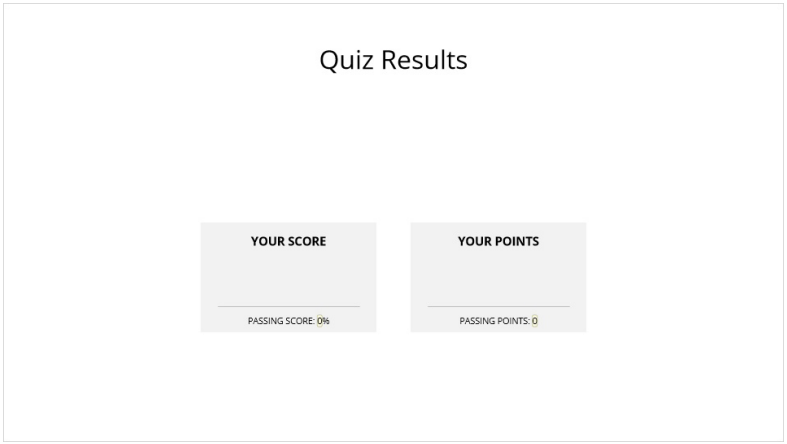
Notes:

2.2 Draw from RSS Quiz Bank

Draw all questions randomly from RSS Quiz Bank

2.3 Quiz Results

(Results Slide, 0 points, 1 attempt permitted)

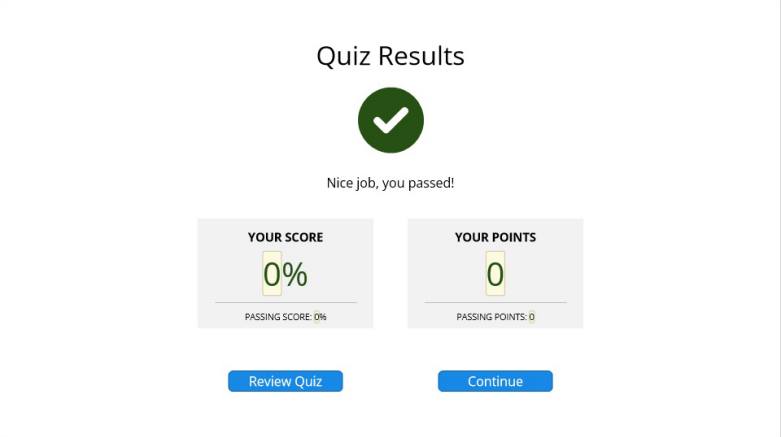


Results for
2.2 Draw from RSS Quiz Bank

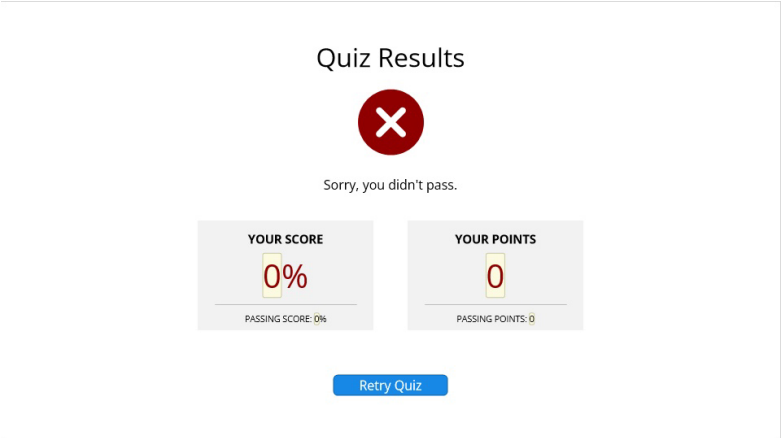
Result slide properties

Passing	80%
Score	

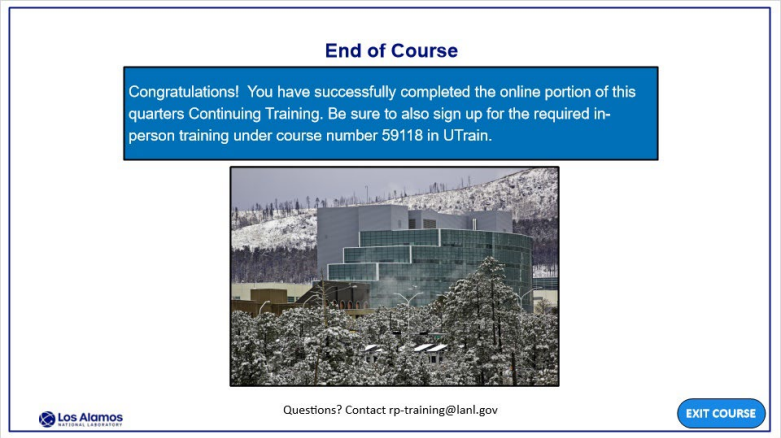
Success (Slide Layer)



Failure (Slide Layer)



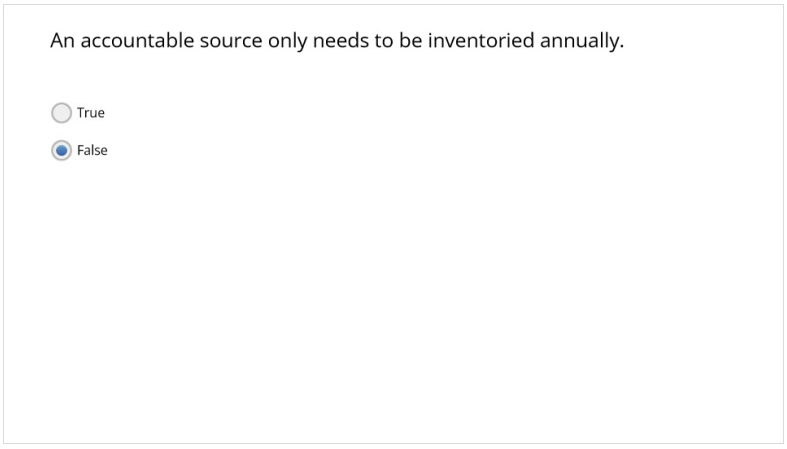
2.4 End of Course



1. RSS Quiz Bank

Q1.1 An accountable source only needs to be inventoried annually.

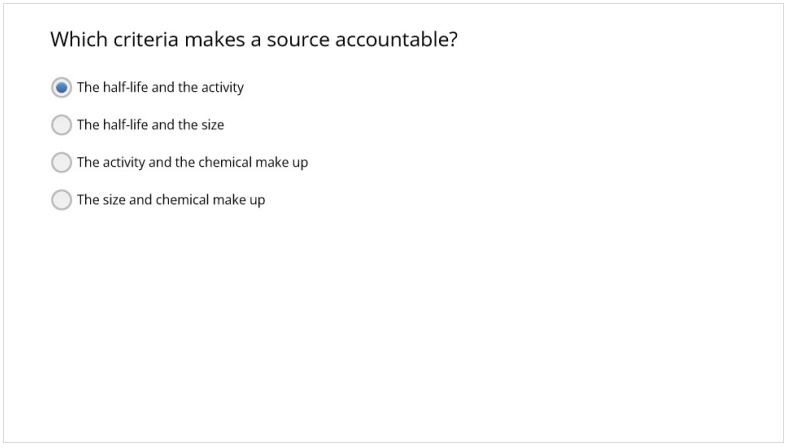
(True/False, 10 points, 1 attempt permitted)



Correct	Choice
	True
X	False

Q1.2 Which criteria makes a source accountable?

(Multiple Choice, 10 points, 1 attempt permitted)

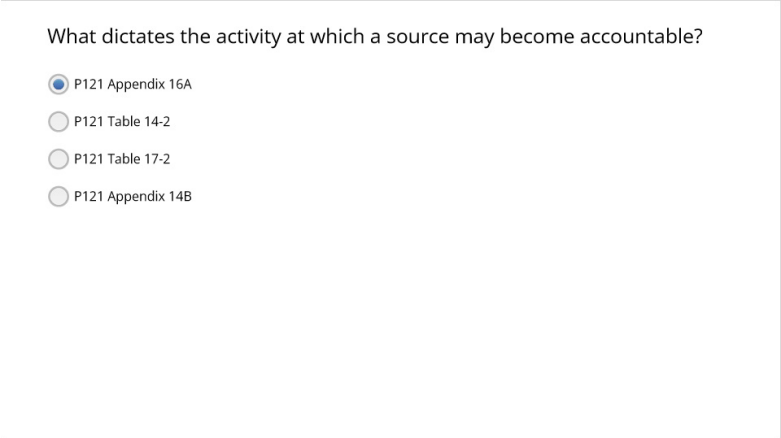


Correct	Choice
X	The half-life and the activity

	The half-life and the size
	The activity and the chemical make up
	The size and chemical make up

Q1.3 What dictates the activity at which a source may become accountable?

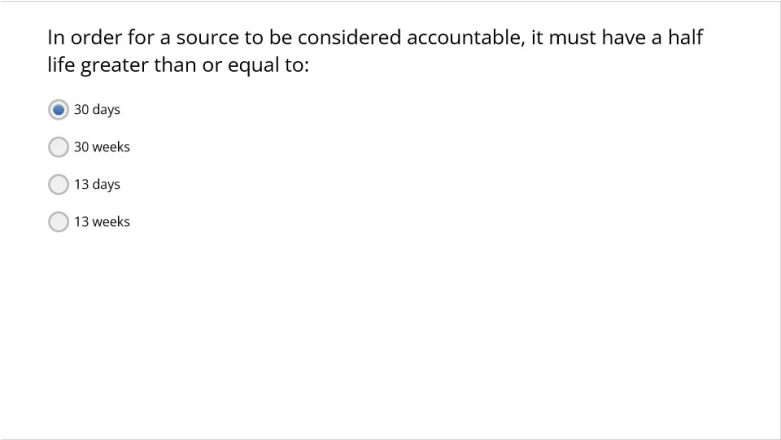
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	P121 Appendix 16A
	P121 Table 14-2
	P121 Table 17-2
	P121 Appendix 14B

Q1.4 In order for a source to be considered accountable, it must have a half life greater than or equal to:

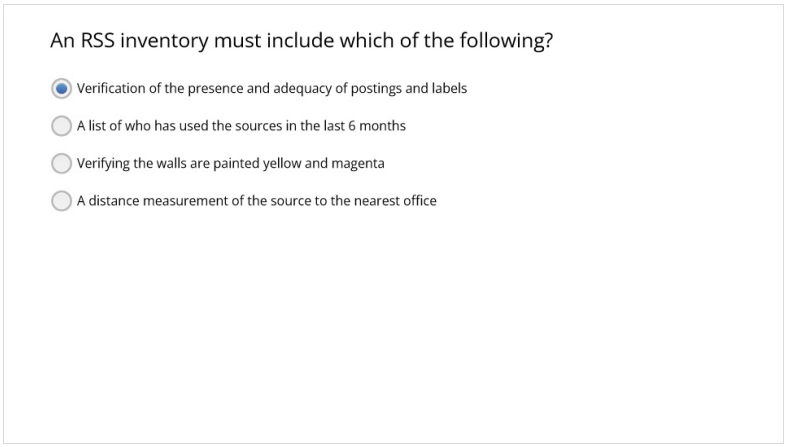
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	30 days
	30 weeks
	13 days
	13 weeks

Q1.5 An RSS inventory must include which of the following?

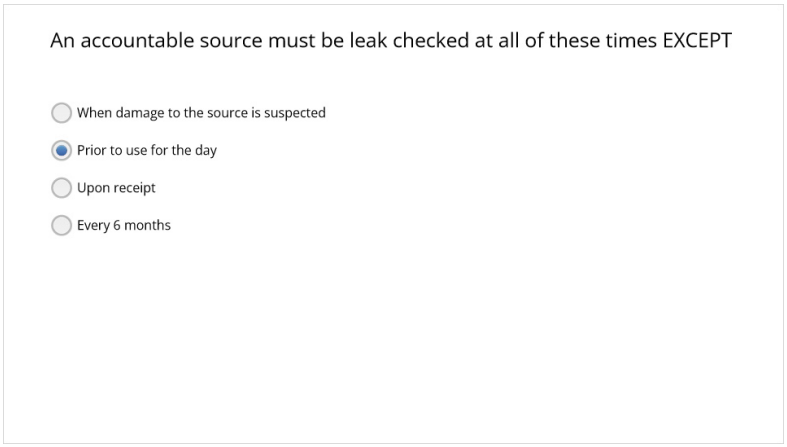
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	Verification of the presence and adequacy of postings and labels
	A list of who has used the sources in the last 6 months
	Verifying the walls are painted yellow and magenta
	A distance measurement of the source to the nearest office

Q1.6 An accountable source must be leak checked at all of these times EXCEPT

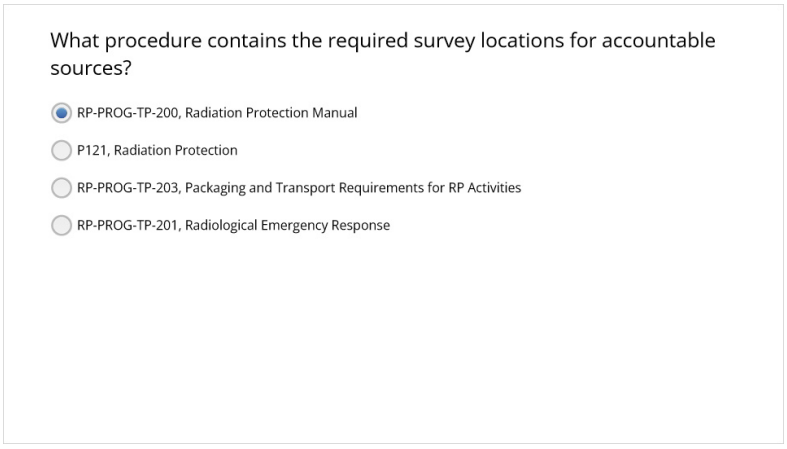
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
	When damage to the source is suspected
X	Prior to use for the day
	Upon receipt
	Every 6 months

Q1.7 What procedure contains the required survey locations for accountable sources?

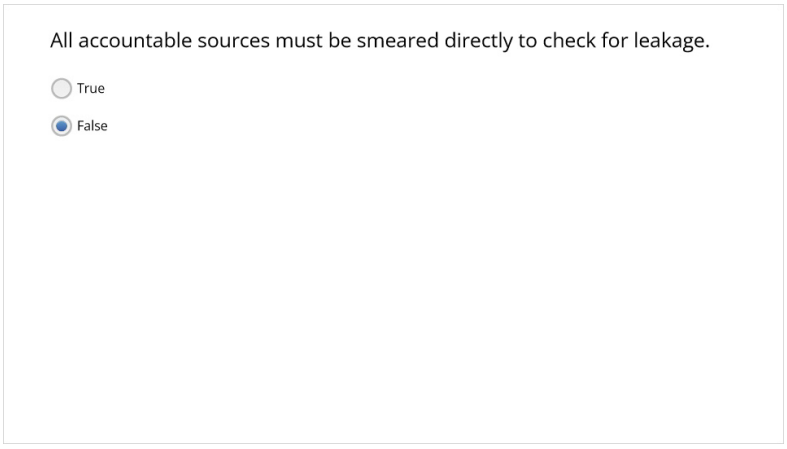
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	RP-PROG-TP-200, Radiation Protection Manual
	P121, Radiation Protection
	RP-PROG-TP-203, Packaging and Transport Requirements for RP Activities
	RP-PROG-TP-201, Radiological Emergency Response

Q1.8 All accountable sources must be smeared directly to check for leakage.

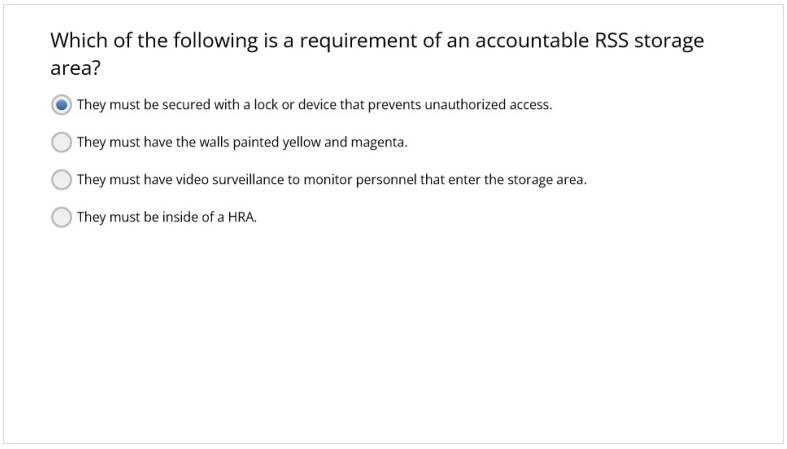
(True/False, 10 points, 1 attempt permitted)



Correct	Choice
	True
X	False

Q1.9 Which of the following is a requirement of an accountable RSS storage area?

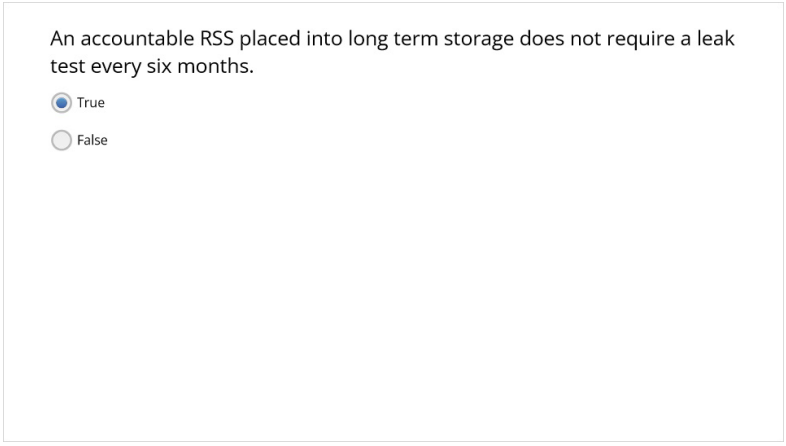
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	They must be secured with a lock or device that prevents unauthorized access.
	They must have the walls painted yellow and magenta.
	They must have video surveillance to monitor personnel that enter the storage area.
	They must be inside of a HRA.

Q1.10 An accountable RSS placed into long term storage does not require a leak test every six months.

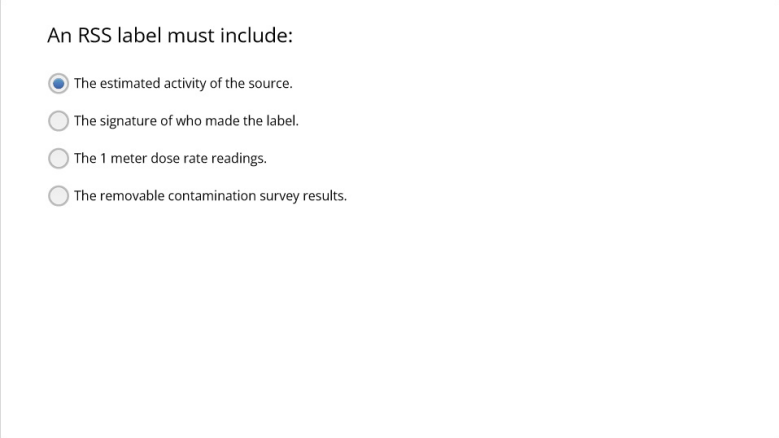
(True/False, 10 points, 1 attempt permitted)



Correct	Choice
X	True
	False

Q1.11 An RSS label must include:

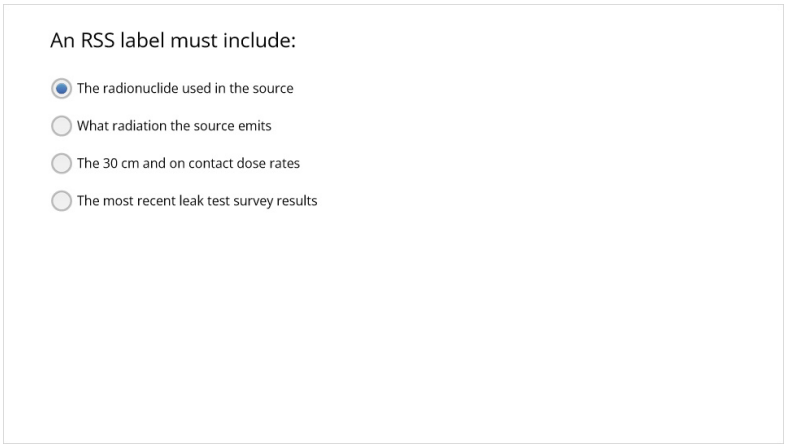
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	The estimated activity of the source.
	The signature of who made the label.
	The 1 meter dose rate readings.
	The removable contamination survey results.

Q1.12 An RSS label must include:

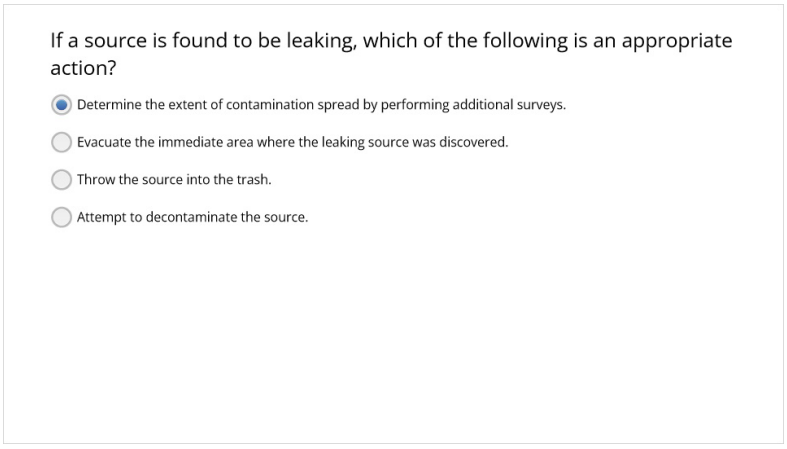
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	The radionuclide used in the source
	What radiation the source emits
	The 30 cm and on contact dose rates
	The most recent leak test survey results

Q1.13 If a source is found to be leaking, which of the following is an appropriate action?

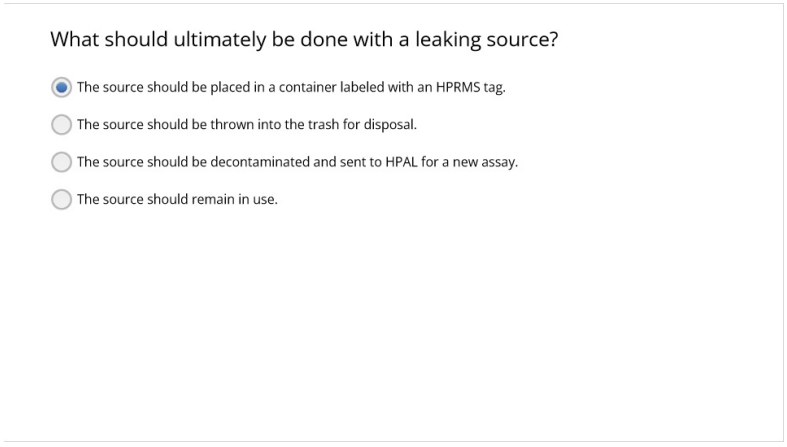
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	Determine the extent of contamination spread by performing additional surveys.
	Evacuate the immediate area where the leaking source was discovered.
	Throw the source into the trash.
	Attempt to decontaminate the source.

Q1.14 What should ultimately be done with a leaking source?

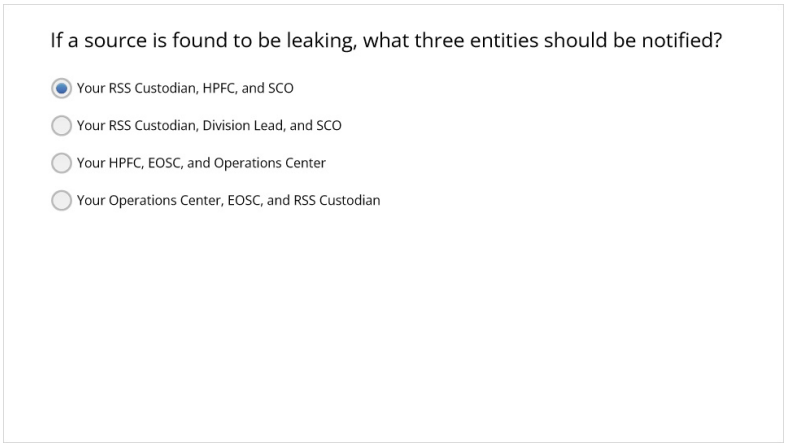
(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	The source should be placed in a container labeled with an HPRMS tag.
	The source should be thrown into the trash for disposal.
	The source should be decontaminated and sent to HPAL for a new assay.
	The source should remain in use.

Q1.15 If a source is found to be leaking, what three entities should be notified?

(Multiple Choice, 10 points, 1 attempt permitted)



Correct	Choice
X	Your RSS Custodian, HPFC, and SCO
	Your RSS Custodian, Division Lead, and SCO
	Your HPFC, EOSC, and Operations Center
	Your Operations Center, EOSC, and RSS Custodian

RCT Continuing Training – Radioactive Sealed Sources Transcript

Slide #1.1 RCT Continuing Training – Radioactive Sealed Sources

No narration

Slide #1.2 Introduction

“Welcome to RCT Continuing Training. This quarter’s topic will review the requirements associated with radioactive sealed source, or RSS, use. To complete this training, you will be required to view this entire presentation and complete the quiz at the end with a passing score. The in-person training for this quarter can be found on UTrain course number 59118. Please register for a day that works best with your schedule.”

Slide #1.3 Terminal Objective

“The terminal objective for this course is: Given the need to perform duties as an RCT, recognize the requirements of radioactive sealed source, RSS, use in accordance with RP-PROG-TP-200, Radiation Protection Manual and P121, Radiation Protection.”

Slide #1.4 Enabling Objectives

“To accomplish our terminal objective, we will be focusing on the following enabling objectives:

1. Determine whether a RSS is accountable or non-accountable.
2. State the required frequency for RSS inventory and leak check surveys at LANL.
3. Discuss the necessary inventory and survey requirements for an accountable RSS at LANL.
4. Determine suitable survey points for a routine leak check of a given RSS.”

Slide #1.5 Enabling Objectives Cont.

5. Identify the proper radiation detection and counting instrumentation to be used for the survey of a RSS.
6. State the storage requirements for an accountable RSS at LANL.
7. Identify the proper labeling requirements for RSSs at LANL.
8. State the required actions for a leaking source.”

Slide #1.6 Why RSS Control Matters

“Radioactive Sealed sources can be found all over LANL property for a variety of uses. RCTs use them for instrument checks and customers use them for a variety of work. As an RCT, you are responsible for proper handling of RSSs to include labeling, storage, inventory, and survey requirements which prevents unauthorized access and potential spreads of contamination.”

Slide #1.7 Event Summary

“To further illustrate the gravity of why RSS control matters, we can explore an event involving sources at the Lawrence Livermore National Laboratory. One of their facilities had requested a single cesium 137 source in 2006. The facility was instead given two sources, one of which was a tritium source that was leaking and was only discovered to be leaking from elevated survey results during monthly routine surveys. Due to the long delay in detection of the leak, tritium contamination was found to have been spread to two facilities, a government vehicle, personal clothing, a personal vehicle, and a private residence.”

Slide #1.8 Contributing Factors

“Now let’s look at the applicable contributing factors. Obviously the first thing that should have been a red flag for these workers is that they received two sources instead of one. But in addition to getting a second source, that second source was not controlled properly to include labeling, inventory, storage, packaging, and transport requirements. This bonus source also emitted a radiation that the RCTs did not expect to encounter and consequently the instruments they used were unable to detect the leak that was occurring during receipt. When signs arose that indicated an unknown source of contamination was spreading, workers assumed precautions were taken and raised no concerns.”

Slide #1.9 Lessons Learned

“The lessons we can learn from this event coincide very well with some of the lab’s SCoR principles. Everyone is personally responsible for ensuring safe operations and staff raise concerns because trust permeates the organization. When something abnormal occurs during your work, no one should hesitate to notify others. If indications for a spread of contamination are present, take the action necessary to find the cause of the contamination, or at least verify that it is being investigated with supervision. A questioning attitude also applies here. If a worker receives two sources when only expecting one or even simpler, there are additional items in a received shipment than what was requested or on an inventory sheet, a call to the shipping facility is necessary for clarification.”

Slide #1.10 Scor and CONOPS Principles

“Now let’s review what safe conduct of research and conduct of operations principles apply to RSS controls. In terms of ConOps, our operating routines are affected because we work with various types of RSSs daily. RSSs require robust controls to prevent their loss and ensure they don’t spread contamination to uncontrolled areas. We also need to be in compliance with DOE and LANL procedures. We covered the three SCoR principles of personal responsibility, raising concerns, and a questioning attitude in the previous slide, but two additional principles are relevant as well. Proper compliance with RSS requirements helps us identify hazards and understanding RSS use necessitates a knowledge of what can go wrong when these sources are in service.”

Slide #1.11 What makes an RSS accountable?

“While all RSSs should be handled with care, an accountable RSS is a higher hazard to personnel and requires specific controls. P121 defines an accountable RSS as any source that has both a half-life greater than or equal to 30 days and also has an activity greater than or equal to the corresponding value found on appendix 16A of P121. The most common accountable RSS used by RCTs is the Americium Beryllium, or AmBe sources used for NRD instrument checks.”

Slide #1.12 Inventory Requirements

“If a source is accountable, it must be inventoried at least every 6 months. This inventory must establish the location of the accountable source, that required postings and labels are present, and that the storage location, containers, and locking devices can adequately prevent unintentional personnel access.”

Slide #1.13 Knowledge Check #1

No narration

Slide #1.14 Survey Requirements

“Survey frequencies to leak test accountable RSSs are required upon receipt, prior to packaging for transport, when any damage is suspected, and at least once every six months. Performing RSS leak checks while performing the 6 month inventory can help maximize efficiency of meeting both inventory and survey requirements.”

Slide #1.15 Survey Instrument Selection

“When performing RSS leak checks, it is important to know what the isotope emits. This will dictate what instruments are used for surveys. For contamination, smears will be used to detect any removable contamination. Field screen the smears with a portable survey instrument. Be sure to use an instrument that will detect the anticipated contamination type or cover all types of contamination by utilizing a dual scintillation detector like a 380 AB probe or 43-93 probe. We want to know of a leak as early as possible, so we can respond as early as possible. Then either count the smears using a smear counter, such as a 3030E or prepare the smears to be sent to HPAL. For beta and gamma radiation surveys, use the RO-20 in open and closed window respectively, and for neutron radiation, use a neutron radiation detector or NRD.”

Slide #1.16 Survey Locations

“Not all sources are built the same, and therefor require different survey methods. You will need to determine what type of source you will be dealing with and refer to table 18 in RP-PROG-TP-200 section 1623.2 to find the survey locations. Please note that some sources, like the electroplated sources listed in table 18, require indirect smears as to avoid damage from repeated smear surveys on the source surface.”

Slide #1.17 RSS Leak Test Demonstration

“Alright so we are going to do a survey on the source and make sure we don’t have anything leaking. We are going to open up the container. Take a smear where the source was at. Make sure you do a direct survey of the smear. Get a second smear. Smear the edge of the source. Direct survey of the smear. Flip the source over. Make sure you don’t see anything missing on the source itself, no cracks, no material missing. Go ahead and take the third smear, direct survey the smear. Make sure you put the source ID on there when you send smears to HPAL. Place the source back in its container.”

Slide #1.18 Knowledge Check #2

No narration

Slide #1.19 Storage Requirements

“If a source is accountable, the storage location must be approved by your supervision and must be secured in a way that prevents unauthorized access. RCTs are responsible for surveying these storage areas with proper documentation and must maintain the radiological posting of these areas as with all controlled areas.”

Slide #1.20 Storage Requirements Cont.

“If an accountable source will not be used for a long period of time, then it may be placed in long term storage. This storage area must be a separate location to the one used for active accountable sources in use. Additionally, each accountable source in a long-term storage area must be tagged with information that includes:

- The out of service date
- The source control number
- Its location
- Who the RSS custodian is
- The phrase ‘six-month RSS inventory required’
- And the statement ‘leak test required prior to use’ as accountable sources in long term storage are exempt from six-month leak test requirements.”

Slide #1.21 Labeling Requirements

“Just like all radioactive material, an RSS must be labeled in accordance with P121 chapter 17. However exemptions do apply to certain sources which can be found in table 17-2. Basically, if a source contains less than 1/10 of the activity listed in Appendix 16A and is less than 0.1 Curies in total activity, they need not be labeled. However, it is always a good work practice to label any radioactive material and it’s always nice to have identification for our check sources.”

Slide #1.22 Labeling Criteria

“A properly labeled source must include the following information:

- The word caution or danger
- The words radioactive material
- A trefoil
- The radionuclide used in the source
- An estimated quantity of activity
- And the date that activity was estimated”

Slide #1.23 Knowledge Check #3

No narration

Slide #1.24 Good Work Practices

“As we alluded in the labeling requirements. Exempt sources may be treated differently from accountable sources or even ones that don’t meet the criteria for exemption in table 17-2, but we want to treat them with the same level of caution to develop good work habits. These sources can leak just like any other source and inadvertent exposure can cause the spread of contamination onto clothes or skin. So, consider taking these additional steps when working with all sources:

- Regularly inspect sources for signs of degradation. A common issue with even depleted uranium, or DU, slugs used as response check sources is small pieces of the DU chipping off. So just a quick visual inspection prior to use can go a long way in preventing a potential spread of contamination. Another potential sign of a leaking source is unusually low readings during a performance test of an instrument.
- An informal inventory and checkout sheet kept at the source storage location can assist in keeping track of sources day-to-day and can remove the guess work of where a source has gone, especially with sources that see use by multiple technicians.
- Lock up all source storage areas so non-RP personnel cannot inadvertently access them.
- Only remove the sources when in use and return them to their proper location when finished. One of the most annoying things that can occur during routine maintenance is when a source is needed for CAM or PCM tests and a technician has left it in another storage location.
- And finally, as a quality-of-life improvement for instrument checks, be sure to perform regular assays of your sources needed for accurate tests like initial setups and performance tests.”

Slide #1.25 Leaking Cesium Source

“To contrast the Lawrence Livermore event lets review an event that occurred here at LANL that was addressed the right way. In 2020, a puncture was observed in the center of a cesium 137 source and was suspected of leaking. Surveys verified that a leak had indeed occurred, and proper response actions were taken by controlling the source to ensure no additional spread of contamination was possible.”

Slide #1.26 Response to Leaking Sources

“So, what exactly are the proper actions to take if a source is found to be leaking? Section 1623.2 of TP-200 states that the RSS custodian, HPFC, and Source Control Office, or SCO, be informed. The RCT need to verify that contamination has not been spread by performing additional surveys. The source itself must be contained in a sealed container, like a bag, and labeled with an HPRMS tag to prevent further spread of contamination.”

Slide #2.1 Quiz Introduction

No narration

Slide #2.2 Draw from RSS Quiz Bank

No narration

Slide #2.3 Quiz Results

No narration

Slide #2.4 End of Course

“Congratulations! You have successfully completed the online portion of this quarters Continuing Training. Be sure to also sign up for the required in-person training under course number 59118 in UTrain. As always, if you have any questions or comments, please contact rp-training@lanl.gov. Press the exit course button to exit this presentation.”