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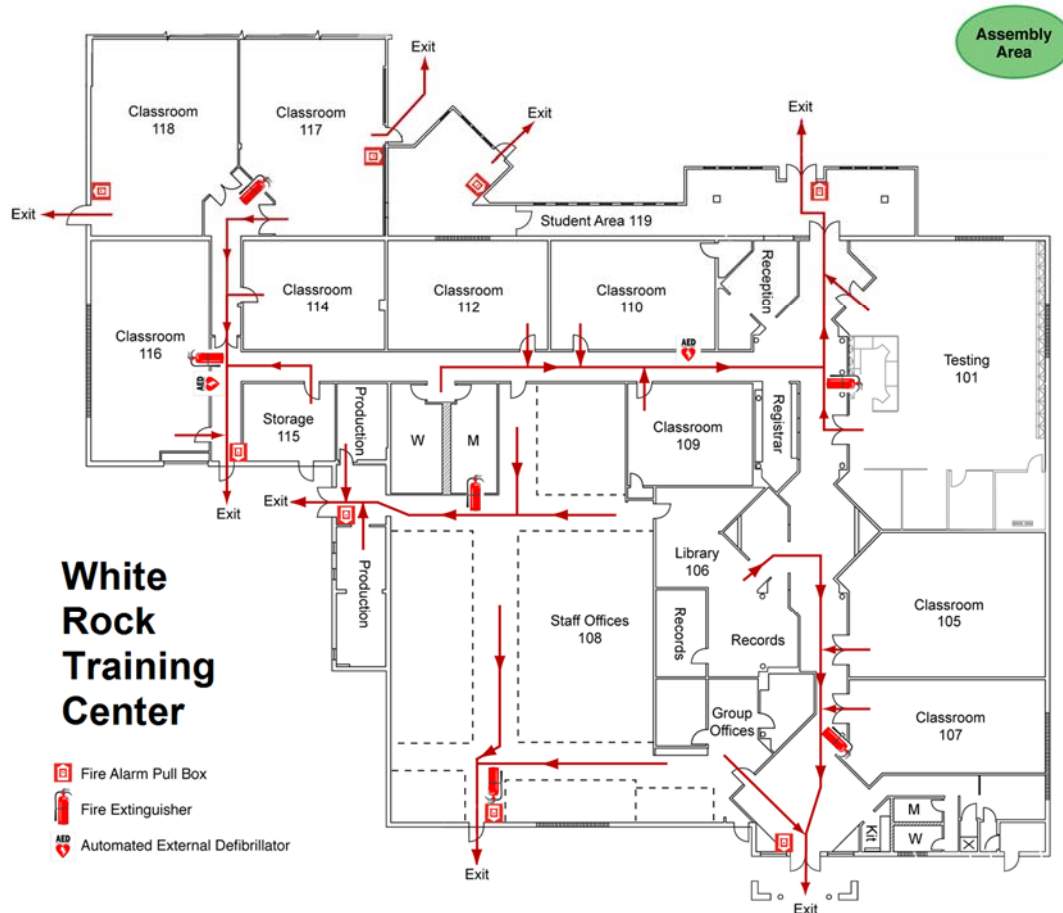
RCT: Module 2.10, Access Control and Work Area Setup

Course 8776



August 2017

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Introduction

Course Overview

This course presents information on radiological work permits (RWPs), various types of postings used in radiological areas, radiological area setups, access controls, and releases of material from radiological areas. All of these are fundamental duties of RCTs.

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

Course Objectives

2.10.01 State the purpose of and information found on a Radiological Work Permit (RWP) including the different classifications at LANL.

2.10.02 State responsibilities in using or initiating an RWP.

2.10.03 State the document that governs the ALARA program at LANL.

2.10.04 Describe how exposure/performance goals are established at LANL.

2.10.05 State the conditions under which a pre-job ALARA review is required at LANL.

2.10.06 State the conditions under which a post-job ALARA review is required at LANL.

2.10.07 State the purpose of radiological postings, signs, labels, and barricades; and the RCTs responsibilities for them.

2.10.08 Identify the following radiological postings at your site, requirements for posting/barriers, and requirements for entry:

- a. Radiological Buffer Area
- b. Radiation Area
- c. High Radiation Area
- d. Very High Radiation Area
- e. Hot Spot
- f. Contamination Area
- g. High Contamination Area
- h. Airborne Radioactivity Area

Introduction

- i. Fixed Surface Contamination
- j. Soil Contamination
- k. Radioactive Material Area
- l. Underground Radioactive Material Area

2.10.09 Describe good practices, support equipment to use, and common discrepancies in setting up radiological areas.

2.10.10 List the requirements individuals should follow while working in RBAs.

2.10.11 Describe good practices in setting up portable ventilation systems and count rate meters.

2.10.12 List the requirements individuals should follow while working in RBAs.

2.10.13 State the requirements for removing or releasing materials from any radiological area.

Target Audience

This course is designed for Los Alamos National Laboratory (LANL) new-hire RCT employees with no operational experience.

Acronyms

ALARA	as-low-as-reasonable achievable
ARA	airborne radiation area
CA	controlled area
CFR	Code of Federal Regulations
DAC	derived air concentration
DOE	Department of Energy
DOT	Department of Transportation
d/p	differential pressure
ENV	Environmental Protection Division
FRPR	facility radiation protection requirement
GERT	general employee radiological training
HCA	high contamination area
HEPA	high efficiency particulate air
HPFC	health physics facility coordinator
HRA	high radiation area
IRSC	Institutional Radiation Safety Committee

Introduction

IWD	integrated work document
IWM	integrated work management
LANL	Los Alamos National Laboratory
MDA	minimum detectable activity
NAAR	new-activity ALARA review
PCM	personnel contamination monitor
RA	radiation area
RBA	radiological buffer area
RCA	radiological control area
RCT	radiological control technician
RDR	radiological document review
RGD	radiation-generating device
RMA	radiological material area
RP	radiation protection
RWA	radiological work analysis
RWCP	radiological work control package
RWP	radiological work permit
SCA	soil contamination area
SME	subject matter expert
SNM	special nuclear material
SOP	step-off pad
VHRA	very high radiation area

Notes. . . .

Purpose of Radiological Work Permit (RWP)

2.10.01 State the purpose of and information found on a Radiological Work Permit (RWP) including the different classifications at your site.

Purpose

The RWP is an administrative mechanism used to establish radiological controls for intended work activities. The RWP informs workers of area radiological conditions and entry requirements and provides a mechanism to relate worker exposure to specific work activities.

RWPs are required for entry into the any radiological areas. Radiological areas are defined in P121, *Radiation Protection*, as

- radiation areas (RAs),
- high radiation areas (HRAs),
- very high radiation areas (VHRAs),
- contamination areas (CAs),
- high contamination areas (HCAs), and
- airborne radioactivity areas (ARAs).

Required Information

The RWP should include the following information:

- Description of work
- Work area/process radiological controls
- Dosimetry requirements
- Pre-job briefing requirements, as applicable
- Training requirements for entry
- Protective clothing and respiratory protection requirements
- Radiological control coverage requirements and stay time controls, as applicable
- Limiting radiological conditions that may void the RWP
- Special dose or contamination reduction considerations
- Special personnel frisking considerations

Purpose of Radiological Work Permit (RWP)

- Technical work document number, as applicable
- Unique identifying number
- Date of issue and expiration
- Authorizing signature

Responsibilities for RWP Use

2.10.02 State responsibilities in using or initiating an RWP.

Workers accessing an area permitted by an RWP are required to attend a pre-job briefing performed by an RCT and sign the RWP before initially entering the work area, after making any revisions to the RWP, and when performing the pre-job briefing to the frequency specified in the RWP.

This process signifies that the worker understands the RWP. The worker's signature signifies that he/she is aware of the radiological conditions and agrees to comply with the requirements.

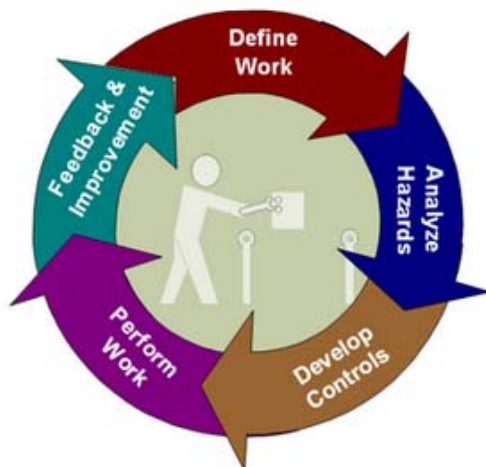
Pre-Job Briefings

Pre-job briefings are conducted by the cognizant RCT and should include the

- scope of work to be performed;
- radiological conditions of the workplace;
- RWP requirements;
- special radiological control requirements;
- RWP limits—conditions, such as contamination or radiation levels that may void the RWP;
- health physics/radiological control hold points;
- communications and coordination with other groups;
- provisions for housekeeping and final cleanup;
- consideration of potential accident situations or unusual occurrences and a review of abnormal and emergency procedures and plans; and
- emergency response provisions.

Radiological Hazard Analysis and Work Planning

P300, *Integrated Work Management* (IWM), defines requirements and a process for conducting work in a safe, secure, and environmentally responsible manner. The hazard identification, hazard analysis, and definition of controls are essential elements of the IWM process.



RP-1-TBD-1, Radiological Work Control Package (RWCP) Technical Basis

The RWCP consists of four phases, which implement the five steps of IWM. Table 1 explains the relationship between the RWCP process and IWM.

Table 1 RWCP's Implementation of IWM

RWCP Phase	IWM
Phase I: RWCP Request	1) Define the work
Phase II: Radiological Work Analysis	2) Analyze hazards 3) Develop and implement controls
Phase III: Issue a Radiological Work Permit and Perform Work	4) Perform the Work
Phase IV: Extending or Closing RWPs	5) Feedback and improvement

P121, Radiation Protection, Chapter 11, Radiological Work Control

P121 defines the process to ensure that radiological hazards are appropriately captured and integrated with the IWM process, addressing both safety and regulatory requirements to control radiological hazards.

Work is managed through the IWM process, which drives the requirement for developing an integrated work document (IWD). A radiological hazard analysis must be performed by a radiation protection (RP) subject matter expert (SME or RWP Authority) in accordance with the requirements of P121 Chapter 11; in some cases, a facility radiation protection requirements document (FRPR) or RWP is required.

Table 11-4, Hazard Grading IWDs and RWPs

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve any of the following? • Work that could contaminate uncontrolled areas or the environment; • Work in (or likely to create) an Airborne Radioactivity Area (ARA) with levels >40 derived air concentration (DAC); • Dose Rate >1 rem/hr in the work area (equivalent dose to whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate >10 rem/hr (considering all radiations, at contact with accessible material or device); or • Work expected to create uncharacterized radiological conditions, including: – working outside engineered controls, or – breaching engineered containment systems. YES – This is High-Hazard radiological work, and an Integrated Work Document (IWD) and Radiological Work Permit (RWP) are required. NO – Continue with questions below.	• Remediation of legacy contamination in proximity to uncontrolled areas • Decontamination of liquid waste containment systems • Opening a highly contaminated radioactive material shipment • Retrieving, packaging, shipping, and receiving high activity activation products • Breach of internally contaminated systems where the breach could create an airborne radioactivity hazard, including maintenance or troubleshooting activities on actinide hoods, gloveboxes, and associated ventilation systems • Decontamination and demolition of radiological facilities or contaminated systems

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve any of the following? • Dose Rate >5 mrem/hr and <1 rem/hr (equivalent dose to the whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate >50 mrem/hr and <10 rem/hr (considering all radiations, at contact with accessible material or device); • Work in (or likely to create) a High Contamination Area (HCA); • Work in (or likely to create) a Contamination Area (CA); or • Work in (or likely to create) an Airborne Radioactivity Area (with levels between 1 and 40 DAC <u>or</u> > 12 DAC-hr in a week). YES – This is Moderate-Hazard radiological work, and an IWD (or "qualified worker") and either an RWP or FRPR (for routine, stable, well-characterized conditions) are required. See Table 11-3 for RWP thresholds; work with a high activity radioactive sealed source (RSS) >100 mrem/hr at 30 cm requires an RWP. NO – Continue with questions below.	• Use of an accountable source with a dose rate greater than 5 mrem/hr at 30 cm to performance test health physics instruments • Routine handling of dispersible radioactive materials within intact engineered controls, where the activity and work area are stable, well-characterized, controlled in accordance with the Facility Radiation Protection Requirements document (FRPR), and where sustained performance demonstrates effective controls (such as routine glovebox work).

Responsibilities for RWP Use

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve routine activities in a facility within the following limits? • Dose Rate <5 mrem/hr (equivalent dose to the whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate <50 mrem/hr (considering all radiations, at contact with accessible material or device); • Contamination < Table 14-2 on readily accessible surfaces or penetration of internally contaminated systems; and • Measurable airborne radioactivity < 1 DAC. YES – This is Low-Hazard radiological work, occupational exposure will likely be less than 100 mrem/year, and neither an IWD nor RWP are required. Follow the Integrated Work Management (IWM) process to address nonradiological hazards. NO – Continue with questions below.	• Administrative work such as management walkarounds or inspections • Handling robust containers of radioactive material such as closed, surveyed, Department of Transportation (DOT), or standardized special nuclear material (SNM) containers • Leak-testing of accountable sealed sources (<5 mrem/hr @ 30 cm) • Conducting routine radiological surveys • Analyzing laboratory samples

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work only involve the following? • Work with commercially available analytical devices containing RSSs when used as designed, and with source remaining inside the device (does not include high dose rate sources such as irradiators, soil density gauges); • Work with consumer products containing radioactive material incidental to their operation (e.g., exit signs, welding rods, camera lenses, luminous dials, smoke detectors); • Work with radiation generating devices (RGDs) categorized as cabinet x-ray devices, unattended RGD installations, or electronic devices that produce ionizing radiation incidentally (<0.5 mrem/hr at 5 cm) as defined in Chapter 18, Radiation Generating Device (RGD) Control; • Work with naturally occurring radioactive material that has not been technologically enhanced; or • Storage, handling, or use of RSSs less than 10% of accountability thresholds in Appendix 16A. YES – These activities are considered nonradiological work, occupational exposure will be much less than 100 mrem/year, and an IWD and RWP are not required. Follow the IWM process to address nonradiological hazards. NO – Contact a Radiation Protection Subject Matter Expert (RPSME) for guidance.	• Servicing or replacing smoke detectors • Work with thoriated lenses, thorium or uranium-containing lantern mantles, tritium exit signs, radium dial watches, etc. • Work with uranium ore • Operating certified cabinet x-ray systems • Handling low activity check sources, including RCT source-checking instruments

When performing the hazard analysis, a walk-down of the area may be appropriate. Walk-downs are particularly important when specifying air-sampling locations, the use of containment tents, or the use of local exhaust ventilation.

RCTs will perform pre-job surveys and participate in walk-downs with the RWP Authority, identifying and analyzing radiological hazards and establishing controls.

Responsibilities for RWP Use

When concurrent nonradiological hazards are present in a work step, the RP SME, RCT, and supporting safety or industrial hygiene professional will consult to determine the best controls to mitigate all hazards.

Radiological Controls in Work Control Documents

The RWP is used to document the results of radiological hazard identification and hazard analysis and to specify controls and is deemed equivalent to the IWM-driven hazard analysis for moderate and high radiological hazards. In accordance with IWM requirements, controls relevant to workers must be resolved and incorporated specifically or referenced in the IWD.

When RWPs are required, they must serve as the focal point for keeping radiological records associated with that work.

RWCP Process–Radiological Work Analysis (RWA)

Once the processes, procedures, and objectives of the job are defined and documented by the RWP requester, the RP RWCP SME begins the radiological work analysis (RWA).

The RWA consists of a job-level analysis, stage-level analysis, and peer review. The RWA part of RWCP process documents that an as-low-as-reasonably achievable (ALARA) review of the work was performed and that controls and requirements were set to keep the radiological risk ALARA.

The RCT reviews the RWP request, RWA, and RWP with the RP RWCP SME or the health physics facility coordinator (HPFC) before beginning a job under the RWP.

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2012-0301)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Requester
ZNumber: 171508 View Requester
Name: Courville Kenneth C
Phone: [blank]
Group: RP-1

Primary SME
ZNumber: 171508 View Primary SME
Name: Courville Kenneth C

Backup SME
ZNumber: 109793 View Backup SME
Name: Lamonte Timothy G

Dates [Error 1]
RWP request made on: 10/17/2012 Submitted by Requester
Effective Date: 10/26/2012
Expiration Date: 1/25/2013 Same as next Review date.

RCT Support Information
Phone: 667-9358 Pager: 412-8659 Pages: [blank]

Pre-Job Survey done by RCT
ZNumber: [blank] Lookup RCT

Training Requirements
☒ APR ☐ GERT ☒ Rad Worker ☐ Respirator ☐ SCBA
Note: Training requirements will include specific training plans, in this group box, in a future release of RPAS.

RWP Completion
Field Work End Date: [blank] End Reason: [blank]
RWP Status: Active

Audit Check (showing both Job and Stage level errors)
Check Job Level
☒ Audited
Errors: 0
Date: 10/19/2012
Time: 10:15:27

Stg	It	Item	Tab Name	Notes
-----	----	------	----------	-------

Summary
An RWP is Required.
Contamination Controls are Required. Airborne Rad Controls are Required. External Radiation Controls are Required.

Save the RWA at the Job Level and Exit Cancel

Responsibilities for RWP Use

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Job Level Radiological Work Analysis:

1. Energy from the System [Errors 11-12]
Are you adding/taking away energy from the system? (e.g. heating, cooling, pressure change, grinding, explosive) ☐ No ☒ Yes or Possible
Please explain:

2. Radioactive Sealed Source (RSS) [Error 13]
Will this work involve a Radioactive Sealed Source? ☐ No ☒ Yes or Possible
Answer question 3 on Accountable RSS.

3. Accountable RSS [Errors 14-15]
Is this an accountable radioactive sealed source or licensed by an agreement state? ☐ No ☒ Yes
Is the leak test current? ☐ No ☒ Yes

4. Radiation-Generating Device (RGD) [Errors 16-17]
Will a radiation-generating device be used? ☐ No ☒ Yes or Possible
Is the annual survey current, and is the machine approved for use? ☐ No ☒ Yes

5. Radioactive Material Transport [Errors 18-19]
Will any non RP-1 radioactive material be transported between or within Technical Area work locations? ☐ N/A ☐ No ☒ Yes or Possible
Have the Point of Contact (POC) contact Packaging and Transportation for proper radioactive material transport requirements for the safe and secure transfer of Nuclear Materials and Special Nuclear Materials (NM/SNM).
P & T Hazmat Field Operations transportation personnel are responsible for these transfers. Provide any necessary packaging and transportation requirements in a Hold Point or Instruction.
Is the receiving location prepared and authorized to receive the shipment? ☐ No ☒ Yes

Save the RWA at the Job Level and Exit Cancel

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Determine Additional Information Requirements:

The following questions determine what, if any, additional information may be required.

1. Will the work be performed in, or likely to create, a Radiological Buffer Area for External Radiation purposes?	*1. ☐ No ☒ Yes or Possible	No FRPS	Requirement
2. Will the work be performed in, or likely to create, a Radiation Area?	*2. ☐ No ☒ Yes or Possible		
3. Will the work be performed in, or likely to create, a High Radiation Area?	3. ☐ No ☒ Yes or Possible		
4. Will the work be performed in, or likely to create, a Very High Radiation Area?	4. ☐ No ☒ Yes or Possible		
5. Will the work be performed in a Contamination Area, or likely to increase contamination levels?	*5. ☐ No ☒ Yes or Possible	No FRPS	
6. Will the work be performed in a High Contamination Area?	6. ☐ No ☒ Yes or Possible		
7. Will the work be performed in, or likely to create, an Airborne Radioactivity Area?	7. ☐ No ☒ Yes or Possible		
8. Will you breach a Contaminated or a potentially Contaminated System?	8. ☐ No ☒ Yes or Possible		
9. Will you disturb the soil in a Soil Contamination Area?	9. ☐ No ☒ Yes or Possible		
10. Could this work spread contamination into an uncontaminated area?	10. ☐ No ☒ Yes or Possible		
11. Is there the potential for cross-contamination from other sources?	11. ☐ No ☒ Yes or Possible		
12. Will contaminated or potentially contaminated surfaces be penetrated or disturbed?	12. ☐ No ☒ Yes or Possible		
13. Will the work involve contamination under paint?	13. ☐ No ☒ Yes or Possible		
14. Will the work be performed in an Underground Radioactive Material Area?	14. ☐ No ☒ Yes or Possible		
15. Will industrial radiography work be performed? If this will be a first time use, the work needs a review by RP-3.	15. ☐ No ☒ Yes or Possible		

Contamination Controls are Required Airborne Rad Controls are Required. External Radiation Controls are Required.

This is provided by personal protective equipment (PPE) and/or work area configuration controls. This is provided by using respiratory protection and/or work area configuration controls. This is provided by dosimetry and other methods.

RWA Determination

This Radiological Work Analysis (RWA) determines that the work WILL require a Radiological Work Permit (RWP).

Will an RWP be issued for tracking purposes? ☐ No ☒ Yes

Indicate what additional information you want to complete (even if they may not be required):

☐ Contamination Controls will be completed anyway ☐ Airborne Radioactivity Controls will be completed anyway ☐ External Radiation Controls will be completed anyway

Save the RWA at the Job Level and Exit Cancel

Responsibilities for RWP Use

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

These topics that must be covered during the Pre-Job briefing:

Check the appropriate checkboxes to instruct the RCT to cover specifically during the pre-job briefing.

☒ RWP stage descriptions	☐ Containment systems used
☒ Personal Protective Equipment (PPE)	☐ Remote handling tools
☒ Expected and maximum conditions	☐ Temporary shielding
☐ Dosimetry requirements	☐ Local ventilation
☐ HEPA systems to be used	☒ Bioassay requirements
☒ Hold points and instructions	☐ Personnel monitoring instructions
☒ RCT coverage	☐ Special monitoring equipment
☐ Additional or other PPE	☒ Emergency procedures

The Pre-Job Briefing is required to be given:

The pre-job briefing must be given whenever ANY of these events or intervals occurs:

Fixed interval:

☐ The PPE is upgraded or downgraded.

☐ The RWP is extended.

The Worker must read the RWP and sign the Acknowledgement Log:

The worker must be read and sign whenever ANY of these events or intervals occurs:

Fixed interval:

☐ Before each entry

☐ Weekly

☐ Biweekly

☐ Monthly

☐ Bi-monthly

☐ Quarterly

Save the RWP at the Job Level and Exit Cancel

Radiological Activity Reviews and IWDs

According to P121, *Radiation Protection*, and current Laboratory integrated work management requirements (P300), RP SME approval is not required for IWDs; however, P121 does require that RP SMEs review radiological IWDs. P121 requires that an RP SME review moderate hazard and high or complex hazard IWDs (Table 11-5, Article 1123), approve work control documents that prescribe radiological controls (Table 11-5, Article 1123), and perform new-activity ALARA reviews (NAARs) (Articles 912, 1126).

RP-1-DP-05.05, *Radiological Activity Reviews*, is used to perform and document the review of high-hazard radiological and moderate-hazard radiological IWDs (see Table 11-4, P121). RP-1-DP-05.05, *Radiological Activity Reviews*, also describes the qualification process for RP SMEs.

RP SMEs may delegate responsibility for review completion or comment phases of a radiological document review (RDR) or any portions thereof when appropriate, but they must approve the RDR when it is completed by those not authorized as RP SMEs.

In conducting the review, the RP SME or designee will do the following:

- Complete an RP-1-Form 10, *Radiological Document Review*, to document a review of a radiological work control document.
- Determine the hazard grading of the work described in the work document according to Table 11-4 of P121. An RDR is not required, but rather is optional for IWDs used for low-hazard radiological work or nonradiological work.

Responsibilities for RWP Use

- RDR review is required for IWDs used for high-hazard or moderate-hazard radiological work.

Radiological Document Review (RDR), RP-1-Form-10

Radiological Document Review (RDR)

Document Title:	
Document Number:	Revision or Issue Date:

Section 1: Type of Review

Ongoing or previously reviewed activity
☐ IWD ☐ Other work document
☐ New activity. If this box is checked, STOP. A new activity ALARA review (NAAR) (RP-1-Form-11) is required

Section 2: RDR Screening

1. Does document or should the document specify radiological controls?	☐ Yes ☐ No
If yes , continue. If no , you may STOP. Attachment A is not required.	
2. Are the activities considered facility maintenance, the work is adequately addressed in the FRPR or an RWP will be used for the activities, and there is no change in a process or use of radioactive material?	☐ Yes ☐ No
If yes , you may STOP. Use a FRPR or an RWP. Continuing this form is optional. If no , continue.	
3. Was the document previously reviewed and the review documented on an RDR by RP-1?	☐ Yes ☐ No
4. If question 3 is yes, have there been changes in radiological controls or hazards since last review?	☐ Yes ☐ No
If yes , continue. If question 4 is no , complete section 5 (and 6 if required), completion of remaining questions is optional.	
Determine hazard grading of work (see Table 11-4, P121). Check one: ☐ High-hazard ☐ Moderate-hazard ☐ Low-hazard ☐ Non-radiological	
5. Are the activities considered low hazard radiological work or non-radiological work and the only radiological controls needed are adequately addressed in the FRPR?	☐ Yes ☐ No
If yes , complete section 5 (and 6 if required), further review is optional. If no , continue with next section.	

Section 3: Document Review

Answer the following questions about the activities described in the radiological work control document under review. Credit may be taken for radiological controls described in the FRPR for the areas where the activities will be performed.	Yes	No
1. Are new or modified engineered controls required?		
2. Are new or different access controls required?		
3. Are new or additional administrative controls required?		
4. Are new or different types of radiological instruments needed?		
5. Are changes in PPE required?		
6. Are radiological posting changes required?		
7. Is different dosimetry required (consider both internal and external dosimetry)?		
8. Are changes in workplace monitoring required?		
9. Is increase radiation protection coverage required?		
10. Is there anything described that is not consistent with or in conflict with the FRPR?		
11. Is an RWP required? (Required for high-hazard radiological work, moderate-hazard work that the FRPR does not address, and entry into radiological areas in accordance with table 11-3 in P121)		
If the answer to <u>all</u> of the above questions is no , then complete sections 5 (and 6 if required). If the answer to <u>any</u> questions above is yes , then complete the next section.		

Responsibilities for RWP Use

Section 4: Issue and Comment Description

Complete the section below for any questions that were answered **yes** in the previous section. Add rows or attach a continuation sheet if more room is needed.

Question	Comment/Issue
Is a continuation sheet for additional comments or issues attached? ☐ Yes ☐ No	

Section 5: Document Review Completion Signature

Complete this section to document that review was completed.

Name Signature Z-Number Date

Review completed by authorized RP SME? ☐ Yes ☐ No

If **no**, then RP-1 SME signature is required in section 6 irrespective of document type.

Section 6: Approval Signature (RP-1 Use Only)

An RP-1 authorized SME completes this section if:

- Document is not an IWD, or
- Reviewer completing and signing section 5 is not an authorized RP SME

By signature below, signee indicates that comments/issues are satisfactorily resolved and document is approved.

Name Signature Z-Number Date

Notes. . . .

ALARA Program at LANL

2.10.03 State the document that governs the ALARA program at your site.

Exposure to ionizing radiation is typically quantified, tracked, and controlled in terms of the dose equivalent that workers receive, or could potentially receive, in given situations. Management policy is to maintain the radiation exposure of employees, subcontractors, visitors, and members of the general public not only within applicable Department of Energy (DOE) and administrative limits, but ALARA.

P121, *Radiation Protection*, Chapter 3, *ALARA Program*, governs the ALARA program at LANL.

The ALARA program at LANL comprises

- management commitment,
- training,
- design review,
- radiological work review,
- performance assessment, and
- documentation.

Notes. . . .

ALARA (Exposure/Performance) Goals at LANL

2.10.04 Describe how exposure/performance goals are established at your site.

P121, *Radiation Protection*, Chapter 3, *ALARA Program*. Article 325.1.d, indicates that the ALARA goals process is established and administered by the Institutional Radiation Safety Committee (IRSC). Goals are established by participating organizations before each calendar year begins and are tracked throughout the year by the organizations and the IRSC. The IRSC provides oversight and review of the ALARA goals process; respective organizations are responsible for goals, performance, and associated ALARA efforts.

ALARA (Exposure/Performance) Goals at LANL

Notes. . . .

Pre-Job ALARA Review at LANL

2.10.05 State the conditions under which a pre-job ALARA review is required at your site.

New-Activity ALARA Review (NAAR)

A NAAR must be conducted by an RP SME to prescribe access controls commensurate with radiological hazards.

A NAAR must be conducted for the following conditions before initiating the activity:

- new, uncharacterized radiological operations;
- an increase in the source term (e.g., the quantity of radioactive material or increased beam strength) above what is currently authorized and approved;
- a change in the type of hazard, including a new radionuclide or physical/chemical form of material;
- a change in the process or tools that would increase the hazard or result in an uncharacterized condition;
- a change or new location from what is currently authorized and approved;
- a reduction of or significant change in engineered controls; or
- activities that have not been performed for a period of 24 months or more, regardless of whether they have been previously reviewed and approved.

Notes. . . .

Post-Job ALARA Review at LANL

2.10.06 State the conditions under which a post-job ALARA review is required at your site.

Radiological post-job reviews allow the opportunity to critique the work performance. Although they will not affect the dose already received for a particular job, they can be effective in reducing the doses received the next time that job is performed.

As a minimum, the post-job review should include the following, as applicable:

- any changes/modifications made to original work instructions,
- the time required to perform the job,
- the resources required for the job,
- the estimated collective dose vs the actual collective dose summary,
- the effectiveness of exposure controls implemented,
- problems encountered and solutions,
- abnormal events/situations causing the use of stop work,
- lessons learned, and
- actions taken to prevent recurrence of problems or situation.

P121, *Radiation Protection*, Chapter 3, *ALARA Program*. Article 324.d, Radiological Work Review:

A Radiological Work Permit (RWP) must be utilized according to thresholds in Chapter 11, Radiological Work Control, to document an ALARA work review, radiological hazard analysis, specification of controls, and post job evaluation specific to radiation protection.

RP-1-DP-004.06, *Radiological Work Control Package (RWCP) Procedure*, provides a standardized means for RP personnel to establish radiological controls for radiological work coverage based on information provided by a requester in the RWP system.

RCT responsibilities for RWP use include

Post-Job ALARA Review at LANL

- conducting a post-job survey and review,
- attaching appropriate documentation; and
- closing out the RWP when directed to do so by supervisory personnel.

HPFC or Team Leader responsibilities for RWP use include

- reviewing pre-job, hot job, and post-job surveys;
- ensuring that all surveys and supporting documents are attached to the RWP;
- ensuring the closeout of the RWP at the conclusion of the job; and
- ensuring that all documentation is filed in accordance with RP procedures.

Radiological Postings, Signs, Labels, Barricades, and RCT Responsibilities

2.10.07 State the purpose of radiological postings, signs, labels, and barricades; and the RCTs responsibilities for them.

The purpose of radiological postings, signs, and labels is to identify items or areas that have the potential for, or actually contain, radiological hazards; identify the radiological hazard(s) present in an area; and prevent workers from inadvertently entering radiological area(s) and/or mishandling radioactive materials.

Each individual is responsible to read and comply with all information identified on radiological postings, signs, and labels. Because more than one radiological hazard may be identified on a posting, sign, or label, it is important to read all of the information and not just the first line.

All access points into an area must be posted to ensure that workers are adequately warned of the hazards in the area. Postings and status boards (if applicable) should be promptly updated after a survey is completed to reflect the corrected conditions in the area.

If necessary, the RWP should be amended to reflect any changes in the area. The information on status boards, RWPs, postings, and survey maps should be consistent. Any discrepancy should be immediately corrected. Workers could review erroneous data that have not been updated and subsequently become contaminated or receive unnecessary radiation exposure.

RCTs should immediately update postings after performing a survey. The RWP and any status boards must also be updated.

Areas should be posted if there is a strong potential for the situation to exist, even if it is not now present. Areas can be posted as ARAs or surface contamination areas if equipment in the area has been known to leak and create airborne or contamination hazards. Posting areas in such a situation will ensure that the proper protective equipment is used and could prevent personnel contamination or unplanned internal exposure.

If areas are posted only when the appropriate limits have been reached, personnel can be subjected to hazards when the hazard could otherwise have been minimized.

Radiological Postings, Signs, Labels, Barricades, and RCT Responsibilities

Disregarding any radiological posting, sign, or label can lead to unnecessary or excessive radiation exposure and/or personnel contamination.

Unauthorized removal or relocation of radiological postings, signs, and labels may lead to disciplinary actions up to and including job termination.

If any type of material used to identify radiological hazards is found outside a radiological buffer area (RBA), it should be reported to radiological control personnel immediately. The RCT would then perform a survey of the sign, posting, or label and conduct a survey of the area in which it was found.

Any contamination or higher-than-expected radiation levels must be promptly reported to the RCT supervisor.

RP personnel (RCTs, HPFCs, and health physicists) are responsible for determining and applying postings.

Posting Requirements, P121, Radiation Protection, Chapter 7; and 10-CFR-835

Areas shall be posted to warn individuals of the presence, or potential presence, of radiation and/or radioactive materials.

Postings and labels shall include the standard radiation warning trefoil in black or magenta imposed on a yellow background.

Signs shall be clearly and conspicuously posted and may include radiological protection instructions.

Controlled Areas: Each access point to a controlled area shall be posted whenever radiological areas exist in the area. Individuals who enter only the controlled area without entering radiological areas are not expected to receive a total effective dose equivalent of more than 100 mrem (0.001 Sievert) in a year.

Radiological Areas: Each access point to a radiological area shall be posted with conspicuous signs.

Radiological areas include the

- RA,
- HRA,
- VHRA,
- CA,
- HCA, and
- ARA.

Radiological Postings, Signs, Labels, Barricades, and RCT Responsibilities

Exceptions to posting requirements are allowed for periods of less than 8 continuous hours when the area is placed under the continuous observation and control of an individual knowledgeable of, and empowered to implement, required access and exposure control measures.

Notes. . . .

Radiological Postings at LANL, Posting/Barriers, Entry Requirements

2.10.08 Identify the following radiological postings at your site, requirements for posting/barriers, and requirements for entry:

- a. Radiological Buffer Area
- b. Radiation Area
- c. High Radiation Area
- d. Very High Radiation Area
- e. Hot Spot
- f. Contamination Area
- g. High Contamination Area
- h. Airborne Radioactivity Area
- i. Fixed Surface Contamination
- j. Soil Contamination
- k. Radioactive Material Area
- l. Underground Radioactive Material Area

Radiological Controlled Areas (RCAs)

The following table lists criteria for posting RCAs.

Table 4 Criteria for posting RCAs

Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Reasonable Potential but Unlikely that individual receives ≥ 100 mrem/year, and/or removable surface contamination levels >Table 14.2	Notice Controlled Area Access Controlled For Radiological Purposes	Training: • GERT • Facility-specific training If RCA is controlled for contamination: • Long pants • Shoes that enclose the foot	RCAs controlled for external radiation: • None RCAs controlled for contamination: • Hand and foot frisk • Monitor other areas of the body suspected of contamination

a. Radiological Buffer Areas (RBAs)

RBAs provide secondary boundaries within the RCA to minimize the spread of contamination and to limit doses to general employees who have not been trained as radiological workers. RBAs are considered part of the RCA. However, RBAs are considered to be an area of relatively higher radiological risk.

Radiological Postings at LANL, Posting/Barriers, Entry Requirements

An RBA should be established as a secondary boundary around radiological areas (CAs, HCAs, ARAs, RAs, HRAs, and VHRAs). The size of the RBA should be commensurate with the potential for the spread of contamination or where the expected dose to individuals routinely accessing the areas adjacent to these areas would be greater than 0.1 rem per year.

An RBA should be established for contamination control as a secondary boundary around CAs, HCAs, and ARAs. The size of the RBA should be commensurate with the potential for the spread of contamination.

An RBA should be established as a secondary boundary around RAs, HRAs, and VHRAs, where the expected dose to individuals routinely accessing the areas immediately adjacent to these radiological areas would be greater than 0.1 rem per year.

RBA postings must contain the wording CAUTION, RADIOLOGICAL BUFFER AREA and any other information required for hazard communication, as shown in the following tables.

Table 6 Criteria for posting RBAs

Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Reasonable Potential and likely that Individual receives ≥ 100 mrem/year and/or removable surface contamination levels >Table 14-2	Caution Radiological Buffer Area	Training: • Radiological Worker • Facility-specific training RBA's controlled for external radiation: • TLD RBA's controlled for contamination: • Anti-C labcoat • Booties • Long pants • Shoes that enclose the foot	RBA's controlled for external radiation: • None RBA's controlled for contamination: • Hand and foot frisk • Monitor other areas of the body suspected of contamination

External Radiation Posting Areas: b. Radiation Area; c. High Radiation Area; d. Very High Radiation Area

Table 7 Criteria for posting external radiation hazards

Area	Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Radiation area (RA)	> 0.005 rem in 1 hour at 30 cm	Caution Radiation Area	• Radiological worker, facility specific training • TLD • FRPR or RWP^c	None
High radiation area (HRA)	> 0.1 rem in 1 hour at 30 cm and ≤ 1 rem	Caution High Radiation Area	• Radiological worker, facility specific training • TLD , supplemental dosimeter^c • FRPR or RWP^c	None
	> 1 rem in 1 hour at 30 cm	Danger High Radiation Area	• Radiological worker, facility specific training • TLD , supplemental dosimeter • RWP^c	None
Very high radiation area (VHRA)	> 500 rad in 1 hour at 100 cm	Grave Danger Very High Radiation Area	• Training to be determined and approved by the RP division leader • For other requirements, see chapter 4, part 3 in P121, <i>Radiation Protection</i>	To be determined

External Radiation Posting Areas: d. Very High Radiation Area

Individuals must be prevented from unauthorized or inadvertent entry to VHRAs. Normally, access to VHRAs must not be allowed. Only under the most stringent control or emergency conditions will access be allowed to an area where these radiation levels may be present.

External Radiation Posting Areas: c. High Radiation Area; d. Very High Radiation Area

Entry to an area where an HRA or VHRA existed, with the assumption that the HRA or VHRA no longer exists, requires positive verification that the HRA or VHRA no longer exists. This verification requires real-time radiation monitoring to verify that the source of the HRA or VHRA is appropriately deenergized or shielded.

Other controls may be used in lieu of real-time radiation monitoring for entering an area that was an HRA, provided that they are

- designed and tested to be robust;
- approved by an RP SME; and
- formally documented in association with the activity or work area (e.g., RWP, FRPR, or operating procedure).

e. Hot Spots (Labeling)

Hot spots are localized sources of radiation having contact radiation levels greater than a 100-millirem-per-hour penetrating radiation dose and more than five times greater than the general area dose rate.

Hot spots may be labeled; however, larger areas may be posted as radiological areas when practical.

A label reading "Caution, Hot Spot" and marking the location of the hot spot should be placed on or as near the spot as practicable.

Labeling hot spots is not required in areas with general area dose rates greater than 1 rem/h.

Posting Areas for Contamination: f. Contamination Area; g. High Contamination Area; h. High Contamination Area

Table 8 Criteria for posting contamination hazards

Area	Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Contamination area (CA)	Removable contamination levels greater than, or likely to exceed, table 14-2 values but do not exceed 100 × the values of table 14-2 of P121	Caution Contamination Area	• Radiological worker, facility specific training • FRPR or RWP • Level I Clothing	Whole body frisk
High contamination area (HCA)	Removable contamination levels greater than, or likely to exceed, 100 × the values of table 14-2 in P121	Danger High Contamination Area	• Radiological worker, facility specific training • RWP • Level II Clothing	Whole body frisk
Airborne radioactivity area (ARA)	Airborne concentrations above background that are greater than, or likely to exceed, the DAC values or that would result in an individual (without respirator) being exposed to greater than 12 DAC-h in a week	Caution Airborne Radioactivity Area	• Radiological worker, facility specific training • RWP • Level I or II Clothing, hood, any required respiratory protection equipment	Whole body frisk

P121, Radiation Protection, Table 14-2 for Posting Criteria: i. Fixed Surface Contamination

Table 14-2. Surface Contamination Values ¹		
Radionuclide	Removable ^{2,4} (dpm/100 cm ²)	Total (Fixed + Removable) ^{2,3} (dpm/100 cm ²)
U-natural, U-235, U-238, and associated decay products ⁹	1,000 ⁷	5,000 ⁷
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	100 ¹⁰
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90. ^{5,8}	1,000 beta-gamma	5,000 beta-gamma
Tritium and special tritium compounds (STCs) ⁶	10,000	See Footnote 6

Labeling:

- Areas outside radiological areas that have total contamination exceeding the total surface contamination values but removable contamination levels below those values specified in Table 14-2 are subject to the following:
 - RP SMEs ensure the appropriate control of fixed contamination, including decontamination; application of fixative coatings, painting, surveying; and management of these areas;
 - Areas must be labeled or posted to warn individuals of their fixed contamination status. This action may be accomplished by individually labeling spots of fixed contamination or posting larger areas if labeling individual spots is not practical.

j. Soil Contamination

Areas with soil contamination that have a reasonable potential to cause more than 15 mrem/year offsite or more than 30 mrem/year onsite must be posted as soil contamination areas (SCAs).

SCAs are not normally controlled for occupational hazard and are managed and posted by the Environmental Protection Division (ENV). Nevertheless, when work is conducted in these areas, the potential for personnel exposure exists, and occupational hazards are managed in accordance with P121.

k. Radioactive Material Area (RMA)

RMAs shall be posted “Caution, Radioactive Material” and require general employee radiological training (GERT) or facility-specific training for entry.

Accessible areas where radioactive materials are used, handled, or stored must be identified with RMA posting, except when

- the amount of radioactive material does not exceed the values of Appendix 16A in P121,
- the area is posted as a radiological area,
- each item or container of radioactive material in the area is labeled in accordance with P121, or
- the material of concern consists solely of components/structures that have been activated.

I. Underground Radioactive Material Area (RMA)

LANL does not have any underground RMAs.

Access Control

10 Code of Federal Regulations (CFR) 835 requires the following:

- §835.501 Radiological Areas:
 - Personnel entry control shall be maintained for each radiological area.
 - The degree of control shall be commensurate with existing and potential radiological hazards within the area.
 - One or more of the following methods shall be used to ensure control:
 - signs and barricades;
 - control devices on entrances;
 - conspicuous visual and/or audible alarms;
 - locked entrance ways; or
 - administrative controls.
 - Written authorizations shall be required to control entry into and perform work within radiological areas. These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards.
 - No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions.
- § 835.502 High and very high radiation areas:
 - The following measures shall be implemented for each entry into a high radiation area:
 - The area shall be monitored as necessary during access to determine the exposure rates to which the individuals are exposed;
 - Each individual shall be monitored by a supplemental dosimetry device or other means capable of providing an immediate estimate of the individual's integrated deep dose equivalent during the entry.

Radiological Postings at LANL, Posting/Barriers, Entry Requirements

- Physical controls. One or more of the following controls shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed a deep dose equivalent to the whole body of 1 rem (0.01 Sievert) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:
 - A control device that prevents entry to the area when high radiation levels exist or that, upon entry, causes the radiation level to be reduced below the level that defines a high radiation area;
 - A device that functions automatically to prevent the use or operation of the radiation source or field while individuals are in the area;
 - A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry;
 - Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;
 - Continuous direct or electronic surveillance that is capable of preventing unauthorized entry;
 - A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.
- VHRAs. In addition to the above requirements, additional measures shall be implemented to ensure that individuals are not able to gain unauthorized or inadvertent access to very high radiation areas.
- No control(s) shall be established in an HRA or VHRA that would prevent the rapid evacuation of personnel.

P121, Radiation Protection, Access Control Requirements for Posted Areas

Table 9-3. Area Designation and Minimum Required Control Levels	
Area Designation	Control Level
Any Radiological Controlled Area (RCA)	1
Any Radiological Buffer Area (RBA)	1
Radioactive Material Area (RMA), Soil Contamination Area (SCA)	1
Radiation Area (RA) and High Radiation Area (HRA) that is less than or equal to 1 rem in 1 hr at 30 cm	1
HRA that is greater than 1 rem in 1 hr at 30 cm	2
Very High Radiation Area (VHRA)	3
Contamination Area (CA)	1
High Contamination Area (HCA)	1
Airborne Radioactivity Area (ARA)	1

Table 9-4. Required Controls for Areas Posted for Radiological Hazards	
Level	Criteria
Level 1	Administrative controls (see Chapter 11 , <i>Radiological Work Control</i>) and/or signs and barricades, or any Level 2 control.
Level 2	One or more of the following must be used at access points to control entry or occupancy: • A control device that prevents entry to the area when radiological hazards that define the area are present or that, upon entry, causes the radiation hazard to be reduced below that defining level (e.g., reduces radiation below 100 mrem/hr for a High Radiation Area [HRA]). • A device that functions automatically to prevent the creation of a radiological hazard while personnel are in the area. • A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the area and the supervisor of the activity are made aware of the entry. • Entryways that are locked. During periods when access to the area is required, positive control over each entry must be maintained. • Continuous direct or electronic surveillance that is capable of preventing unauthorized entry. • A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in enough time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.
Level 3	In addition to a Level 2 control, at least one other measure must be implemented to ensure that individuals are not able to gain inadvertent or unauthorized access. This requires a control that meets the following criteria: • an additional Level 2 control that is separate (may be redundant) and • sufficiently robust to prevent inadvertent or unauthorized access

Setting Up Radiological Areas

2.10.09 Describe good practices, support equipment to use, and common discrepancies in setting up radiological area.

Good Practices

Good practices include the following:

- Establish walkways in low dose areas.
- Do not store radioactive materials near walkways or where personnel frequently work.
- Place rope boundaries as close to the source of contamination as possible to minimize the size of the contaminated area.
- Ensure that the area is not so limited that contamination is easily spread across the boundaries.
- Use drip trays or containment devices to prevent the spread of contamination.
- Establish laydown areas for equipment to limit personnel safety hazards and/or radiation exposure.
- Set up step-off pads (SOPs) upwind of contamination hazards.
- Post all accessible sides and entrance(s) to areas containing radiological hazards.
- Use personnel contamination monitors (PCMs), along with portable contamination survey instrumentation. PCMs are more likely to detect contamination on individuals because personnel tend to survey too quickly.

Discrepancies to Avoid

Avoid the following discrepancies:

- Posting information not updated or information otherwise incorrect.
- Boundaries not verified for contamination, radiation, and airborne radioactivity hazards.
- Survey instruments out of calibration or defective.
- SOPs not set up for the efficient removal of protective clothing (not enough room to prevent contaminating the SOPs) and not near survey instrumentation.

Setting Up Radiological Areas

- Laundry and waste receptacles not placed for efficient use or not placed at all.
- Receptacles not properly labeled as to their contents.
- Boundaries of areas set up too far from the hazards, interfering with access to areas otherwise unaffected.
- Count rate meters not located close to the SOPs.
- Status boards or survey maps do not reflect where SOPs and boundaries lie.
- Status board not kept up to date. The information on the status boards, postings, and RWPs should agree.
- Tripping hazards exist from wires, hoses, or cables.
- Background radiation in the monitoring area is too high for the efficient detection of low-level contamination.
- Portable contamination survey instrumentation is not set up for proper operation.
- Protective clothing (gloves and booties) is not readily available in a personnel contamination event.
- Phones or other communication devices are not available near the SOP or portable contamination survey instrumentation.
- Not posting all access points into the area.
- Failure to post dress and undress procedures.

Support Equipment

Support equipment includes the following:

- SOPs.
- Portable contamination survey instrumentation.
- Yellow and magenta rope, ribbon, or tape.
- Laundry receptacles.
- Waste receptacles (clean and radioactive waste receptacles).
- Postings, signs, labels, and posting inserts.
- Communication equipment that is readily available.
- Additional protective clothing.
- Dose rate meters and smears.

Containment Devices

2.010.10 List discrepancies frequently observed in containment devices.

Containment devices include gloveboxes, glove ports, hot cells, huts, and windbreaks. Discrepancies include the following:

- Holes/leaks in the containments, or the containment is maintained at a positive pressure, facilitating the spread of contamination.
- Liquids accumulate in hoses or main portions of the containment.
- Airlocks are too small to remove protective clothing without spreading contamination.
- Ventilation exhaust is not directed to the plant's ventilation system.
- Material is allowed to accumulate inside containments, limiting safe and/or efficient use.
- Sharp objects are used inside containments.
- Devices are not tethered to prevent introduction into systems.
- Transfer sleeves/ports are not used or are unavailable.
- Containment is not provided with a high-efficiency particulate air (HEPA) filter or ventilation exhaust.
- Containments are not periodically surveyed inside and out.
- No means of quickly verifying loss of ventilation exist.
- Containment is not decontaminated before being dismantled.
- Adequate access is not provided for lines or hoses.
- Containment is not maintained at a negative pressure.
- Containment is not supported properly to minimize stress from minor ventilation.

Containment Devices

- Changes are not structurally supported to maintain its configuration during use.
- Containments are not inspected before use and periodically during use.
- Appropriate containment devices are not used for leaks.
- A funnel is not used to collect leakage.
- Plastic components show fatigue or wear.
- A funnel is not positioned to collect all leaking fluid.
- Drain lines are kinked, allowing the buildup of liquids.
- Drain lines are not secured properly to the collection device.
- The containment device is not labeled to indicate hazards that are present.

Portable Ventilation Systems and Count Rate Meters

2.10.11 Describe good practices in setting up portable ventilation systems and count rate meters.

Good Practices–Portable Ventilation Systems

The following are good practices for portable ventilation systems:

- Use only HEPA filters with pre-filters (roughing filters).
- Perform radiation survey on filters periodically while in use.
- Have radiological limits established for filter replacement.
- Exhaust filter discharge to the plant ventilation system whenever possible.
- Ensure that there are no openings in the trunk or between the blower and the filter.
- Monitor the filter differential pressure (d/p) periodically.
- Establish the filter d/p at which the filter must be replaced.
- Remove filters, and place them into plastic bags to prevent the release of activity.
- Position streamers to signify the flow of ventilation through doorways or through containment devices.

Good Practices–Portable Survey Instrumentation and PCMs

The following are good practices for portable survey instrumentation and PCMs:

- Place them in low background area.
- Equip them with a reliable power supply.
- Position them to facilitate easy access by workers.
- Set alarms to site administrative control levels or DOE limits.
- Ensure that the instrument is source checked and calibrated.
- Check extension cords for electrical safety.
- Place portable contamination survey instrumentation and PCMs upwind of contaminated areas.
- Do not place the instrumentation near radioactive material storage areas or other areas where the background radiation can change.

Portable Ventilation Systems and Count Rate Meters

- Provide portable contamination survey instrumentation with sources to source check the instrument.

Requirements for Working in RBAs

2.10.12 List the requirements individuals should follow while working in RBAs.

General Requirements

Workers who receive radiation exposures from other nuclear facilities must report the exposure to site radiological control personnel and their supervisor upon returning to the site and should follow these requirements:

- Avoid contact with potentially contaminated surfaces.
- Any management/supervision or site radiological control personnel should give stop work or evacuation orders if unanticipated radiation or contamination is encountered or if the appropriate RWP is not being followed.
- Wear dosimetry in accordance with the postings and the RWP.
- Maintain exposure ALARA.
- Report all injuries.
- Monitor clothing and exposed skin as required, and report the presence of radioactive contamination.
- Place contaminated items and waste in approved radioactive waste containers.
- Wash your hands when leaving the RBA and before eating food or using tobacco products.
- Do not enter areas posted as "Respiratory Protection Required" if you are not respiratory qualified.

Hot Particles

Hot particles are small, discrete, highly radioactive particles capable of causing extremely high doses to a localized area in a short period of time. Hot-particle contamination may be present or generated when contaminated systems are opened or when operations such as machining, cutting or grinding are performed on highly radioactive material.

A hot particle is further defined in P121 as having an activity of nominally 15,000 dpm or greater (α or β/γ) and/or being capable of producing an equivalent dose to the skin greater than 100 mrem in 1 h.

Requirements for Working in RBAs

Special surveys must be performed in areas with the potential for hot-particle contamination. Areas must be posted to specifically identify the presence of hot particles.

Access to hot-particle areas should be controlled through a job-specific RWP. The following controls should be considered for inclusion in the RWP:

- Periodically monitor personnel during the work activity at a frequency based on the potential magnitude of skin exposure.
- Provide additional personal protective equipment and clothing.
- Provide direct radiological control coverage during work or assistance during protective clothing removal.
- Use sticky pads or multiple SOPs.
- Segregate personal protective equipment and clothing used in hot-particle areas from other radiological protective equipment and clothing during laundering, and survey them before reuse.

The response to hot-particle skin contamination should include the following:

- Immediate removal and retention of the hot particle for subsequent analysis.
- Analysis of the particle.
- Assessment of worker dose.
- Evaluation of work control adequacy.

Removing or Releasing Material from Radiological Areas

2.10.13 State the requirements for removing or releasing materials from any radiological area.

Removing Material

Facility operations require that radioactive and nonradioactive material be removed from radiological areas, RBAs, and the site. Before this material is allowed to leave, important steps outlined in the procedures must be followed. 10 CFR 835, §835.1101 requires the following:

- Except as provided below, material and equipment in CAs, HCAs, and ARAs shall not be released to a controlled area if
 - removable contamination levels on accessible surfaces exceed the removable surface contamination values specified in Appendix D of 10 CFR 835 or
 - prior use suggests that the removable contamination levels on inaccessible surfaces are likely to exceed the removable surface contamination values specified in Appendix D of 10 CFR 835.
- Material and equipment exceeding the removable surface contamination levels specified in Appendix D of 10 CFR 835 may be conditionally released for movement onsite from one radiological area for immediate placement to another radiological area only if appropriate monitoring is performed and appropriate controls for the movement are established and exercised.
- Material and equipment with fixed contamination levels that exceed the limits specified in Appendix D of 10 CFR 835 may be released for use in CAs outside radiological areas only under the following conditions:
 - Removable surface contamination levels are below the removable surface contamination values specified in Appendix D of 10 CFR 835 and
 - The material or equipment is routinely monitored and clearly marked or labeled to alert personnel to the contaminated status.

Releasing Material

RP-1-DP-23.04, *Release of Items from Radiological Control and Tagging Items with Radioactive Materials*, describes the process of determining survey requirements and documenting the release of items from radiological control.

Removing or Releasing Material from Radiological Areas

The release of items may be authorized after release criteria are met, based on a combination of process knowledge and careful monitoring of the items.

RP-1-DP-12.04 Exclusions do not apply to the

- unrestricted release for reuse or recycling of volumetrically contaminated or activated metals as addressed in DOE's January 12, 2000 Moratorium;
- unrestricted release for recycling of metals from radiological areas as addressed in DOE's July 13, 2000 Suspension; or
- unrestricted release of other volume-contaminated or activated items, such as bulk materials, construction debris, or soil.

Items leaving RCAs for contamination, depleted uranium shrapnel, or volume contamination must be surveyed by an RCT for release.

RCTs must release items only after a survey indicates less than minimum detectable activity (MDA). Items with greater than MDA require additional approval.

Hand-carried personal items (e.g., notebooks, pagers, and flashlights) do not require a survey if the items have not come into contact with any potentially contaminated surfaces; have not entered a CA, HCA, or ARA; have not left the direct possession of the individual; and have no contamination detected on the individual when surveyed upon exiting.

RCA for Legacy Contamination

This posting is used to designate areas that have not been released from radiological controls due to past radiological activities and the potential for legacy contamination. Workers need to be conscientious and exercise judgment when working in these areas.

Health physics/radiation protection approval is required before working on or breaching facility systems, facility surfaces, and programmatic equipment. RCT surveys may be required. The type of work that will require RP evaluation in legacy areas include

- penetrating walls/floors,
- opening ventilation systems,
- removing installed equipment,
- opening machines for routine maintenance,
- opening utility and access panels, and
- moving equipment with potential historical contamination.

Removing or Releasing Material from Radiological Areas

Routine operations on programmatic equipment do not require health physics/radiation protection approval beyond that specified in standard work documents.

Most items coming out of areas controlled for legacy contamination do not require an RCT survey. The individual requesting the item release must determine whether the item is affected by legacy contamination (e.g., installed equipment, facility system components, historical equipment or materials subject to past radiological use, and known radiological use). If the item is affected by legacy contamination, the item must be evaluated and surveyed by an RCT for release.



RCT: Module 2.10, ACCESS CONTROL AND WORK AREA SETUP

Course 8776

August 2017

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0



Operated by Los Alamos National Security, LLC for the U.S. Department of Energy's NNSA

Overview

This course presents information on radiological work permits (RWPs), various types of postings used in radiological areas, radiological area setups, access controls, and releases of material from radiological areas. All of these are fundamental duties of RCTs.

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Objectives

2.10.01 State the purpose of and information found on a Radiological Work Permit (RWP) including the different classifications at LANL.

2.10.02 State responsibilities in using or initiating an RWP.

2.10.03 State the document that governs the ALARA program at LANL.

2.10.04 Describe how exposure/performance goals are established at LANL.

Objectives

2.10.05 State the conditions under which a pre-job ALARA review is required at LANL.

2.10.06 State the conditions under which a post-job ALARA review is required at LANL.

2.10.07 State the purpose of radiological postings, signs, labels, and barricades; and the RCTs responsibilities for them.

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Objectives

2.10.08 Identify the following radiological postings at your site, requirements for posting/barriers, and requirements for entry:

- a. Radiological Buffer Area
- b. Radiation Area
- c. High Radiation Area
- d. Very High Radiation Area
- e. Hot Spot
- f. Contamination Area
- g. High Contamination Area
- h. Airborne Radioactivity Area
- i. Fixed Surface Contamination
- j. Soil Contamination
- k. Radioactive Material Area
- l. Underground Radioactive Material Area

Objectives

2.10.09 Describe good practices, support equipment to use, and common discrepancies in setting up radiological areas.

2.10.10 List discrepancies frequently observed in containment devices.

2.10.11 Describe good practices in setting up portable ventilation systems and count rate meters.

2.10.12 List the requirements individuals should follow while working in RBAs.

2.10.13 State the requirements for removing or releasing materials from any radiological area.

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2.10.01 – Purpose of a Radiological Work Permit (RWP)

The RWP is an administrative mechanism used to establish radiological controls for intended work activities. The RWP informs workers of area radiological conditions and entry requirements and provides a mechanism to relate worker exposure to specific work activities.

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2.10.01 – Purpose of a Radiological Work Permit (RWP)

RWPs are required for entry into the any Radiological Areas. Radiological Areas are defined in P121, *Radiation Protection*, as:

- Radiation Areas (RAs)
- High Radiation Areas (HRAs)
- Very High Radiation Areas (VHRAs)
- Contamination Areas (CAs)
- High Contamination Areas (HCAs)
- Airborne Radioactivity Areas (ARAs)

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2.10.01 – Purpose of a Radiological Work Permit (RWP)

Required information:

- The RWP should include the following information:
 - Description of work
 - Work area/process radiological controls
 - Dosimetry requirements
 - Pre-job briefing requirements, as applicable
 - Training requirements for entry
 - Protective clothing and respiratory protection requirements
 - Radiological control coverage requirements and stay time controls, as applicable
 - Limiting radiological conditions that may void the RWP

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2.10.01 – Purpose of a Radiological Work Permit (RWP)

Required information: *(continued)*

- Special dose or contamination reduction considerations
- Special personnel frisking considerations
- Technical work document number, as applicable
- Unique identifying number
- Date of issue and expiration
- Authorizing signature

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.02 – Responsibilities for RWP Use

Workers accessing an area permitted by an RWP are required to attend a pre-job briefing performed by an RCT and sign the RWP before initially entering the work area, after making any revisions to the RWP, and when performing the pre-job briefing to the frequency specified in the RWP.

This process signifies that the worker understands the RWP. The worker's signature signifies that he/she is aware of the radiological conditions and agrees to comply with the requirements.

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2.10.02 – Responsibilities for RWP Use

Pre-Job Briefings

- Pre-job briefings are conducted by the cognizant RCT and should include the
 - Scope of work to be performed
 - Radiological conditions of the workplace
 - RWP requirements
 - Special radiological control requirements
 - RWP limits – conditions, such as contamination or radiation levels that may void the RWP
 - Health physics/radiological control hold points

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2.10.02 – Responsibilities for RWP Use

Pre-Job Briefings (*continued*)

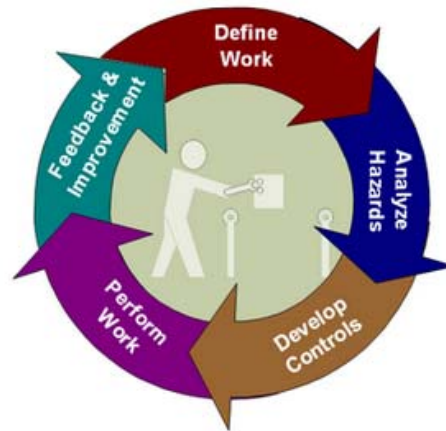
- Communications and coordination with other groups
- Provisions for housekeeping and final cleanup
- Consideration of potential accident situations or unusual occurrences and a review of abnormal and emergency procedures and plans
- Emergency response provisions

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2.10.02 – Responsibilities for RWP Use

Radiological Hazard Analysis and Work Planning

- P300, *Integrated Work Management (IWM)*, defines requirements and a process for conducting work in a safe, secure, and environmentally responsible manner. The hazard identification, hazard analysis, and definition of controls are essential elements of the IWM process.



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2.10.02 – Responsibilities for RWP Use

RP-1-TBD-1, *Radiological Work Control Package (RWCP) Technical Basis*

- The RWCP consists of four phases, which implement the five steps of IWM. Table 1 explains the relationship between the RWCP process and IWM.

Table 1 RWCP's Implementation of IWM

RWCP Phase	IWM
Phase I: RWCP Request	1) Define the work
Phase II: Radiological Work Analysis	2) Analyze hazards 3) Develop and implement controls
Phase III: Issue a Radiological Work Permit and Perform Work	4) Perform the Work
Phase IV: Extending or Closing RWPs	5) Feedback and improvement

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2.10.02 – Responsibilities for RWP Use

P121, Radiation Protection, Chapter 11, Radiological Work Control

- P121 defines the process to ensure that radiological hazards are appropriately captured and integrated with the IWM process, addressing both safety and regulatory requirements to control radiological hazards.
- Work is managed through the IWM process, which drives the requirement for developing an Integrated Work Document (IWD). A radiological hazard analysis must be performed by a radiation protection (RP) subject matter expert (SME) in accordance with the requirements of P121 Chapter 11, and in some cases, a facility radiation protection requirements document (FRPR) or RWP is required.

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2.10.02 – Responsibilities for RWP Use

P121, *Radiation Protection*, Table 11-4, Hazard Grading IWDs and RWPs

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve any of the following? • Work that could contaminate uncontrolled areas or the environment; • Work in (or likely to create) an Airborne Radioactivity Area (ARA) with levels >40 derived air concentration (DAC); • Dose Rate >1 rem/hr in the work area (equivalent dose to whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate >10 rem/hr (considering all radiations, at contact with accessible material or device); or • Work expected to create uncharacterized radiological conditions, including: – working outside engineered controls, or – breaching engineered containment systems.	• Remediation of legacy contamination in proximity to uncontrolled areas • Decontamination of liquid waste containment systems • Opening a highly contaminated radioactive material shipment • Retrieving, packaging, shipping, and receiving high activity activation products • Breach of internally contaminated systems where the breach could create an airborne radioactivity hazard, including maintenance or troubleshooting activities on actinide hoods, gloveboxes, and associated ventilation systems • Decontamination and demolition of radiological facilities or contaminated systems
YES – This is High-Hazard radiological work, and an Integrated Work Document (IWD) and Radiological Work Permit (RWP) are required.	
NO – Continue with questions below.	

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2.10.02 – Responsibilities for RWP Use

P121, *Radiation Protection*, Table 11-4, Hazard Grading IWDs and RWPs (*continued*)

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve any of the following? • Dose Rate >5 mrem/hr and <1 rem/hr (equivalent dose to the whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate >50 mrem/hr and <10 rem/hr (considering all radiations, at contact with accessible material or device); • Work in (or likely to create) a High Contamination Area (HCA); • Work in (or likely to create) a Contamination Area (CA); or • Work in (or likely to create) an Airborne Radioactivity Area (with levels between 1 and 40 DAC or >12 DAC-hr in a week).	• Use of an accountable source with a dose rate greater than 5 mrem/hr at 30 cm to performance test health physics instruments • Routine handling of dispersible radioactive materials within intact engineered controls, where the activity and work area are stable, well-characterized, controlled in accordance with the Facility Radiation Protection Requirements document (FRPR), and where sustained performance demonstrates effective controls (such as routine glovebox work).
YES – This is Moderate-Hazard radiological work, and an IWD (or "qualified worker") and either an RWP or FRPR (for routine, stable, well-characterized conditions) are required. See Table 11-3 for RWP thresholds; work with a high activity radioactive sealed source (RSS) >100 mrem/hr at 30 cm requires an RWP. NO – Continue with questions below.	

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2.10.02 – Responsibilities for RWP Use

P121, *Radiation Protection*, Table 11-4, Hazard Grading IWDs and RWPs (*continued*)

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work involve routine activities in a facility within the following limits? • Dose Rate <5 mrem/hr (equivalent dose to the whole body, at 30 cm from accessible surfaces); • Extremity / shallow dose rate <50 mrem/hr (considering all radiations, at contact with accessible material or device); • Contamination < Table 14-2 on readily accessible surfaces or penetration of internally contaminated systems; and • Measurable airborne radioactivity < 1 DAC.	• Administrative work such as management walkarounds or inspections • Handling robust containers of radioactive material such as closed, surveyed, Department of Transportation (DOT), or standardized special nuclear material (SNM) containers • Leak-testing of accountable sealed sources (<5 mrem/hr @ 30 cm) • Conducting routine radiological surveys • Analyzing laboratory samples
YES –This is Low-Hazard radiological work, occupational exposure will likely be less than 100 mrem/year, and neither an IWD nor RWP are required. Follow the Integrated Work Management (IWM) process to address nonradiological hazards.	
NO – Continue with questions below.	

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2.10.02 – Responsibilities for RWP Use

P121, *Radiation Protection*, Table 11-4, Hazard Grading IWDs and RWPs (*continued*)

Table 11-4. Radiological Work Permit (RWP) and Integrated Work Document (IWD) Decision Requirements for Radiological Work	
Hazard Grading Questions	Examples
Does the work only involve the following? • Work with commercially available analytical devices containing RSSs when used as designed, and with source remaining inside the device (does not include high dose rate sources such as irradiators, soil density gauges); • Work with consumer products containing radioactive material incidental to their operation (e.g., exit signs, welding rods, camera lenses, luminous dials, smoke detectors); • Work with radiation generating devices (RGDs) categorized as cabinet x-ray devices, unattended RGD installations, or electronic devices that produce ionizing radiation incidentally (<0.5 mrem/hr at 5 cm) as defined in Chapter 18, Radiation Generating Device (RGD) Control; • Work with naturally occurring radioactive material that has not been technologically enhanced; or • Storage, handling, or use of RSSs less than 10% of accountability thresholds in Appendix 16A.	• Servicing or replacing smoke detectors • Work with thoriated lenses, thorium or uranium-containing lantern mantles, tritium exit signs, radium dial watches, etc. • Work with uranium ore • Operating certified cabinet x-ray systems • Handling low activity check sources, including RCT source-checking instruments
YES – These activities are considered nonradiological work, occupational exposure will be much less than 100 mrem/year, and an IWD and RWP are not required. Follow the IWM process to address nonradiological hazards. NO – Contact a Radiation Protection Subject Matter Expert (RPSME) for guidance.	

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2.10.02 – Responsibilities for RWP Use

Radiological Hazard Analysis and Work Planning (continued)

- When performing the hazard analysis, a walk-down of the area may be appropriate. Walk-downs are particularly important when specifying air-sampling locations, the use of containment tents, or the use of local exhaust ventilation.
- RCTs will perform pre-job surveys and participate in walk-downs with the RP SME, identifying and analyzing radiological hazards and establishing controls.
- When concurrent nonradiological hazards are present in a work step, the RP SME, RCT, and supporting safety or industrial hygiene professional will consult to determine the best controls to mitigate all hazards.

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2.10.02 – Responsibilities for RWP Use

Radiological Controls in Work Control Documents

- The RWP is used to document the results of radiological hazard identification and hazard analysis and to specify controls and is deemed equivalent to the IWM-driven hazard analysis for moderate and high radiological hazards. In accordance with IWM requirements, controls relevant to workers must be resolved and incorporated specifically or referenced in the IWD.
- When RWPs are required, they must serve as the focal point for keeping radiological records associated with that work.

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2.10.02 – Responsibilities for RWP Use

RWCP Process – Radiological Work Analysis (RWA)

- Once the processes, procedures, and objectives of the job are defined and documented by the RWP Requester, the RP RWCP SME begins the Radiological Work Analysis (RWA).
- The RWA consists of a job-level analysis, stage-level analysis, and peer review. The RWA part of RWCP process documents that an ALARA review of the work was performed, and that controls and requirements were set to keep the radiological risk ALARA.
- The RCT reviews the RWP request, RWA, and the RWP with the RP RWCP SME or the HPFC before beginning a job under the RWP.

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2.10.02 – Responsibilities for RWP Use

RWCP Process – Radiological Work Analysis (RWA) (continued)

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2012-0301)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Requester:
ZNumber: 171508
Name: Courville Kenneth C
Phone:
Group: RP-1
[View Requester](#)

Primary SME:
ZNumber: 171508
Name: Courville Kenneth C
[View Primary SME](#)

Backup SME:
ZNumber: 109793
Name: Lamonte Timothy G
[View Backup SME](#)

Dates [Error 1]:
RWP request made on: 10/17/2012 Submitted by Requester.
Effective Date: 10/26/2012
Expiration Date: 1/25/2013 Same as next Review date.

Identification:
RWP ID: 2012-0301 Site: OJT RWP Request: Closed [View RWP Request](#)
Summary: Package Leaking Accountable Sealed Source & Performing Decontamination

RCT Support Information:
Phone: 667-9358 Pager: 412-8659 Pages:

Pre-Job Survey done by RCT:
ZNumber: [Lookup RCT](#)

Training Requirements:
☒ APR ☐ GERT ☒ Rad Worker ☐ Respirator ☐ SCBA
Note: Training requirements will include specific training plans, in this group box, in a future release of RPAS.

RWP Completion:
Field Work End Date: End Reason:
RWP Status: Active

Audit Check (showing both Job and Stage level errors):
[Check Job Level](#)
☒ Audited
Errors: 0
Date: 10/19/2012
Time: 10:15:27

Stg	#	Item	Tab Name	Notes
-----	---	------	----------	-------

Audit Record:
Stage Number:
Item Number: 0
Type: ☐ Information ☐ Requirement
Item:
Located on Tab:
Notes:

Summary:
An RWP is Required. An RWP is Required.
Contamination Controls are Required. Airborne Rad Controls are Required. External Radiation Controls are Required.

[Save the RWA at the Job Level and Exit](#) [Cancel](#)

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.02 – Responsibilities for RWP Use

RWCP Process – Radiological Work Analysis (RWA) (continued)

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Job Level Radiological Work Analysis:

- 1. Energy from the System [Errors 11-12]**
Are you adding/taking away energy from the system? (e.g. heating, cooling, pressure change, grinding, explosive) ☐ No ☒ Yes or Possible
Please explain:
- 2. Radioactive Sealed Source (RSS) [Error 13]**
Will this work involve a Radioactive Sealed Source? ☐ No ☒ Yes or Possible
Answer question 3 on Accountable RSS.
- 3. Accountable RSS [Errors 14-15]**
Is this an accountable radioactive sealed source or licensed by an agreement state? ☐ No ☒ Yes
Is the leak test current? ☐ No ☒ Yes
- 4. Radiation-Generating Device (RGD) [Errors 16-17]**
Will a radiation-generating device be used? ☐ No ☒ Yes or Possible
Is the annual survey current, and is the machine approved for use? ☐ No ☒ Yes
- 5. Radioactive Material Transport [Errors 18-19]**
Will any non RP-1 radioactive material be transported between or within Technical Area work locations? ☐ N/A ☐ No ☒ Yes or Possible
Have the Point of Contact (POC) contact Packaging and Transportation for proper radioactive material transport requirements for the safe and secure transfer of Nuclear Materials and Special Nuclear Materials (NM/SNM).
P & T Hazmat Field Operations transportation personnel are responsible for these transfers. Provide any necessary packaging and transportation requirements in a Hold Point or Instruction.
Is the receiving location prepared and authorized to receive the shipment? ☐ No ☒ Yes

Save the RWA at the Job Level and Exit Cancel

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2.10.02 – Responsibilities for RWP Use

RWCP Process – Radiological Work Analysis (RWA) (continued)

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

Determine Additional Information Requirements:

The following questions determine what, if any, additional information may be required.

1. Will the work be performed in, or likely to create, a Radiological Buffer Area for External Radiation purposes?	* 1. ☐ No ☒ Yes or Possible	No FRPS	
2. Will the work be performed in, or likely to create, a Radiation Area?	* 2. ☐ No ☒ Yes or Possible		
3. Will the work be performed in, or likely to create, a High Radiation Area?	3. ☐ No ☒ Yes or Possible		
4. Will the work be performed in, or likely to create, a Very High Radiation Area?	4. ☐ No ☒ Yes or Possible		
5. Will the work be performed in a Contamination Area, or likely to increase contamination levels?	* 5. ☐ No ☒ Yes or Possible	No FRPS	
6. Will the work be performed in a High Contamination Area?	6. ☐ No ☒ Yes or Possible		
7. Will the work be performed in, or likely to create, an Airborne Radioactivity Area?	7. ☐ No ☒ Yes or Possible		
8. Will you breach a Contaminated or a potentially Contaminated System?	8. ☐ No ☒ Yes or Possible		
9. Will you disturb the soil in a Soil Contamination Area?	9. ☐ No ☒ Yes or Possible		
10. Could this work spread contamination into an uncontaminated area?	10. ☐ No ☒ Yes or Possible		
11. Is there the potential for cross-contamination from other sources?	11. ☐ No ☒ Yes or Possible		
12. Will contaminated or potentially contaminated surfaces be penetrated or disturbed?	12. ☐ No ☒ Yes or Possible		
13. Will the work involve contamination under paint?	13. ☐ No ☒ Yes or Possible		
14. Will the work be performed in an Underground Radioactive Material Area?	14. ☐ No ☒ Yes or Possible		
15. Will industrial radiography work be performed? If this will be a first time use, the work needs a review by RP-3.	15. ☐ No ☒ Yes or Possible		

Requirement

Contamination Controls are Required. This is provided by personal protective equipment (PPE) and/or work area configuration controls.

Airborne Rad Controls are Required. This is provided by using respiratory protection and/or work area configuration controls.

External Radiation Controls are Required. This is provided by dosimetry and other methods.

RWA Determination

This Radiological Work Analysis (RWA) determines that the work WILL require a Radiological Work Permit (RWP).

Will an RWP be issued for tracking purposes? ☐ No ☒ Yes

Indicate what additional information you want to complete (even if they may not be required):

☐ Contamination Controls will be completed anyway ☐ Airborne Radioactivity Controls will be completed anyway ☐ External Radiation Controls will be completed anyway

Save the RWA at the Job Level and Exit Cancel

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.02 – Responsibilities for RWP Use

RWCP Process – Radiological Work Analysis (RWA) (continued)

View or Update the Radiological Work Analysis at the Job Level (RWP ID: 2013-0224)

Job Summary | Work Analysis | Review and Design | Hazards Screening | Pre-Job Briefing | EPD

These topics that must be covered during the Pre-Job briefing:

Check the appropriate checkboxes to instruct the RCT to cover specifically during the pre-job briefing.

☒ RWP stage descriptions	☐ Containment systems used
☒ Personal Protective Equipment (PPE)	☐ Remote handling tools
☒ Expected and maximum conditions	☐ Temporary shielding
☐ Dosimetry requirements	☐ Local ventilation
☐ HEPA systems to be used	☒ Bioassay requirements
☒ Hold points and instructions	☐ Personnel monitoring instructions
☒ RCT coverage	☐ Special monitoring equipment
☐ Additional or other PPE	☒ Emergency procedures

The Pre-Job Briefing is required to be given:

The pre-job briefing must be given whenever ANY of these events or intervals occurs:

Fixed interval:

☐ The PPE is upgraded or downgraded.

☐ The RWP is extended.

The Worker must read the RWP and sign the Acknowledgement Log:

The worker must be read and sign whenever ANY of these events or intervals occurs:

Fixed interval:

☐ The PPE is upgraded or downgraded.

☐ The RWP is extended.

Save the RWA at the Job Level and Exit Cancel

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2.10.02 – Responsibilities for RWP Use

Radiological Activity Reviews and IWDs

- According to P121, *Radiation Protection*, and current Laboratory integrated work management requirements (P300), RP SME approval is not required for IWDs; however, P121 does require that RP SMEs review radiological IWDs.
- P121 requires that an RP SME review moderate hazard and high or complex hazard IWDs (Table 11-5, Article 1123), approve work control documents that prescribe radiological controls (Table 11-5, Article 1123), and perform new-activity ALARA reviews (NAARs) (Articles 912, 1126).

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2.10.02 – Responsibilities for RWP Use

Radiological Activity Reviews and IWDs (*continued*)

- RP-1-DP-05.05, *Radiological Activity Reviews*, is used to perform and document the review of high-hazard radiological and moderate-hazard radiological IWDs (see Table 11-4, P121).
- RP-1-DP-05.05, *Radiological Activity Reviews* also describes the qualification process for RP SMEs.
- RP SMEs may delegate responsibility for review completion or comment phases of a radiological document review (RDR) or any portions thereof when appropriate, but they must approve the RDR when it is completed by those not authorized as RP SMEs.

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2.10.02 – Responsibilities for RWP Use

Radiological Activity Reviews and IWDs (*continued*)

- In conducting the review, the RP SME or designee will do the following:
 - Complete an RP-1-Form 10, Radiological Document Review, to document a review of a radiological work control document.
 - Determine the hazard grading of the work described in the work document according to Table 11-4 of P121. An RDR is not required, but rather is optional, for IWDs used for low-hazard radiological work or nonradiological work.
 - RDR review is required for IWDs used for high-hazard or moderate-hazard radiological work.

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2.10.02 – Responsibilities for RWP Use

Radiological Document Review (RDR), RP-1-Form-10

Radiological Document Review (RDR)

Document Title:	
Document Number:	Revision or Issue Date:

Section 1: Type of Review

Ongoing or previously reviewed activity
☐ IWD ☐ Other work document
☐ New activity. If this box is checked, STOP. A new activity ALARA review (NAAR) (RP-1-Form-11) is required

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2.10.02 – Responsibilities for RWP Use

Radiological Document Review (RDR), RP-1-Form-10 (continued)

Section 2: RDR Screening

1. Does document or should the document specify radiological controls?	☐ Yes ☐ No
If yes , continue. If no , you may STOP. Attachment A is not required.	
2. Are the activities considered facility maintenance, the work is adequately addressed in the FRPR or an RWP will be used for the activities, and there is no change in a process or use of radioactive material?	☐ Yes ☐ No
If yes , you may STOP. Use a FRPR or an RWP. Continuing this form is optional. If no , continue.	
3. Was the document previously reviewed and the review documented on an RDR by RP-1?	☐ Yes ☐ No
4. If question 3 is yes, have there been changes in radiological controls or hazards since last review?	☐ Yes ☐ No
If yes , continue. If question 4 is no , complete section 5 (and 6 if required), completion of remaining questions is optional.	
Determine hazard grading of work (see Table 11-4, P121). Check one: ☐ High-hazard ☐ Moderate-hazard ☐ Low-hazard ☐ Non-radiological	
5. Are the activities considered low hazard radiological work or non-radiological work and the only radiological controls needed are adequately addressed in the FRPR?	☐ Yes ☐ No
If yes , complete section 5 (and 6 if required), further review is optional. If no , continue with next section.	

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2.10.02 – Responsibilities for RWP Use

Radiological Document Review (RDR), RP-1-Form-10 (continued)

Section 3: Document Review

<i>Answer the following questions about the activities described in the radiological work control document under review. Credit may be taken for radiological controls described in the FRPR for the areas where the activities will be performed.</i>	Yes	No
1. Are new or modified engineered controls required?		
2. Are new or different access controls required?		
3. Are new or additional administrative controls required?		
4. Are new or different types of radiological instruments needed?		
5. Are changes in PPE required?		
6. Are radiological posting changes required?		
7. Is different dosimetry required (consider both internal and external dosimetry)?		
8. Are changes in workplace monitoring required?		
9. Is increase radiation protection coverage required?		
10. Is there anything described that is not consistent with or in conflict with the FRPR?		
11. Is an RWP required? (Required for high-hazard radiological work, moderate-hazard work that the FRPR does not address, and entry into radiological areas in accordance with table 11-3 in P121)		
If the answer to <u>all</u> of the above questions is no , then complete sections 5 (and 6 if required). If the answer to <u>any</u> questions above is yes , then complete the next section.		

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2.10.02 – Responsibilities for RWP Use

Radiological Document Review (RDR), RP-1-Form-10 (continued)

Section 4: Issue and Comment Description

Complete the section below for any questions that were answered **yes** in the previous section. Add rows or attach a continuation sheet if more room is needed.

Question	Comment/Issue
Is a continuation sheet for additional comments or issues attached? ☐ Yes ☐ No	

Section 5: Document Review Completion Signature

Complete this section to document that review was completed.

Name Signature Z-Number Date

Review completed by authorized RP SME? ☐ Yes ☐ No

If **no**, then RP-1 SME signature is required in section 6 irrespective of document type.

Section 6: Approval Signature (RP-1 Use Only)

An RP-1 authorized SME completes this section if:

- Document is not an IWD, or
- Reviewer completing and signing section 5 is not an authorized RP SME

By signature below, signee indicates that comments/issues are satisfactorily resolved and document is approved.

Name Signature Z-Number Date

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2.10.03 – ALARA Program at LANL

Exposure to ionizing radiation is typically quantified, tracked, and controlled in terms of the dose equivalent that workers receive, or could potentially receive, in given situations. Management policy is to maintain the radiation exposure of employees, subcontractors, visitors and members of the general public not only within applicable DOE and administrative limits, but ALARA.

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2.10.03 – ALARA Program at LANL

P121, *Radiation Protection*, Chapter 3, *ALARA Program*, governs the ALARA program at LANL.

The ALARA program at LANL comprises

- Management Commitment;
- Training,
- Design Review,
- Radiological Work Review,
- Performance Assessment, and
- Documentation.

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2.10.04 – ALARA (exposure/performance) Goals at LANL

P121, *Radiation Protection*, Chapter 3, *ALARA Program*. Article 325.1.d indicates that the ALARA Goals Process is established and administered by the Institutional Radiation Safety Committee (IRSC). Goals are established by participating organizations before each calendar year begins and are tracked throughout the year by the organizations and the IRSC. The IRSC provides oversight and review of the ALARA Goals Process; respective organizations are responsible for goals, performance, and associated ALARA efforts.

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2.10.05 – Pre-job ALARA Review at LANL

New-Activity ALARA Review (NAAR)

- A NAAR must be conducted by an RP SME to prescribe access controls commensurate with radiological hazards.
- A NAAR must be conducted for the following conditions before initiating the activity:
 - New, uncharacterized radiological operations;
 - An increase in the source term (e.g., the quantity of radioactive material or increased beam strength) above what is currently authorized and approved;
 - A change in the type of hazard, including a new radionuclide or physical/chemical form of material;

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2.10.05 – Pre-job ALARA Review at LANL

New Activity ALARA Review (NAAR) (*continued*)

- A change in the process or tools that would increase the hazard or result in an uncharacterized condition;
- A change or new location from what is currently authorized and approved;
- A reduction of or significant change in engineered controls; or
- Activities that have not been performed for a period of 24 months or more, regardless of whether they have been previously reviewed and approved.

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2.10.06 – Post-Job ALARA Review at LANL

Radiological post-job reviews allow the opportunity to critique the work performance. Although they will not affect the dose already received for a particular job, they can be effective in reducing the doses received the next time that job is performed.

As a minimum, the post-job review should include the following, as applicable:

- Any changes/modifications made to original work instructions.
- The time required to perform the job.
- The resources required for the job.

2.10.06 – Post-Job ALARA Review at LANL

- The estimated collective dose vs the actual collective dose summary.
- The effectiveness of exposure controls implemented.
- Problems encountered and solutions.
- Abnormal events/situations causing the use of stop work.
- Lessons learned.
- Actions taken to prevent recurrence of problems or situation.

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2.10.06 – Post-Job ALARA Review at LANL

P121, *Radiation Protection*, Chapter 3, *ALARA Program*.
Article 324.d, Radiological Work Review:

- A Radiological Work Permit (RWP) must be utilized according to thresholds in Chapter 11, Radiological Work Control, to document an ALARA work review, radiological hazard analysis, specification of controls, and post job evaluation specific to radiation protection.

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2.10.06 – Post-Job ALARA Review at LANL

RP-1-DP-004.06, *Radiological Work Control Package (RWCP) Procedure*, provides a standardized means for RP personnel to establish radiological controls for radiological work coverage based on information provided by a requester in the RWP system.

RCT responsibilities for RWP use include

- Conducting a post-job survey and review,
- Attaching appropriate documentation, and
- Closing out the RWP when directed to do so by supervisory personnel.

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2.10.06 – Post-Job ALARA Review at LANL

HPFC or Team Leader responsibilities for RWP use include:

- Reviewing pre-job, hot job, and post-job surveys.
- Ensuring that all surveys and supporting documents are attached to the RWP.
- Ensuring the closeout of the RWP at the conclusion of the job.
- Ensuring that all documentation is filed in accordance with RP procedures.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

The purpose of radiological postings, signs, and labels is to identify items or areas that have the potential for, or actually contain, radiological hazards; identify the radiological hazard(s) present in an area and prevent workers from inadvertently entering radiological area(s) and/or mishandling radioactive materials.

Each individual is responsible to read and comply with all information identified on radiological postings, signs, and labels. Because more than one radiological hazard may be identified on a posting, sign, or label, it is important to read all of the information and not just the first line.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

All access points into an area must be posted to ensure that workers are adequately warned of the hazards in the area. Postings and status boards (if applicable) should be promptly updated after a survey is completed to reflect the corrected conditions in the area.

If necessary, the RWP should be amended to reflect any changes in the area. The information on status boards, RWPs, postings, and survey maps should be consistent. Any discrepancy should be immediately corrected. Workers could review erroneous data that have not been updated and subsequently become contaminated or receive unnecessary radiation exposure.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

RCTs should immediately update postings after performing a survey. The RWP and any status boards must also be updated.

Areas should be posted if there is a strong potential for the situation to exist, even if it is not now present. Areas can be posted as ARAs or surface contamination areas, if equipment in the area has been known to leak and create airborne or contamination hazards. Posting areas in such a situation will ensure that the proper protective equipment is used and could prevent personnel contamination or unplanned internal exposure.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

If areas are posted only when the appropriate limits have been reached, personnel can be subjected to hazards when the hazard could otherwise have been minimized.

Disregarding any radiological posting, sign or label can lead to unnecessary or excessive radiation exposure and/or personnel contamination.

Unauthorized removal or relocation of radiological postings, signs and labels may lead to disciplinary actions up to and including job termination.

2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

If any type of material used to identify radiological hazards is found outside an RBA, it should be reported to radiological control personnel immediately. The RCT would then perform a survey of the sign, posting or label and conduct a survey of the area in which it was found.

Any contamination or higher-than-expected radiation levels must be promptly reported to the RCT supervisor.

RP personnel (RCTs, HPFCs, and health physicists) are responsible for determining and applying postings.

2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

Posting Requirements, P121, Radiation Protection, Chapter 7; and 10-CFR-835

- Areas shall be posted to warn individuals of the presence, or potential presence, of radiation and/or radioactive materials.
- Postings and labels shall include the standard radiation warning trefoil in black or magenta imposed on a yellow background.
- Signs shall be clearly and conspicuously posted and may include radiological protection instructions.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

Posting Requirements, P121, Radiation Protection, Chapter 7; and 10-CFR-835 (*continued*)

- Controlled Areas: Each access point to a controlled area shall be posted whenever radiological areas exist in the area. Individuals who enter only the controlled area without entering radiological areas are not expected to receive a total effective dose equivalent of more than 100 mrem (0.001 Sievert) in a year.

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

Posting Requirements, P121, Radiation Protection, Chapter 7; and 10-CFR-835 (*continued*)

- Radiological Areas: Each access point to a radiological area shall be posted with conspicuous signs.
- Radiological Areas include the following:
 - Radiation Area
 - High Radiation Area
 - Very High Radiation Area
 - Contamination Area
 - High Contamination Area
 - Airborne Radioactivity Area

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2.10.07 – Radiological Postings, Signs, Labels, and Barricades and RCT Responsibilities

Posting Requirements, P121, Radiation Protection, Chapter 7; and 10-CFR-835 (*continued*)

- Exceptions to posting requirements are allowed for periods of less than 8 continuous hours when the area is placed under the continuous observation and control of an individual knowledgeable of, and empowered to implement, required access and exposure control measures.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Radiological Controlled Areas (RCAs)

Table 4 Criteria for posting RCAs

Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Reasonable Potential but Unlikely that individual receives ≥ 100 mrem/year, and/or removable surface contamination levels >Table 14.2	Notice Controlled Area Access Controlled For Radiological Purposes	Training: • GERT • Facility-specific training If RCA is controlled for contamination: • Long pants • Shoes that enclose the foot	RCAs controlled for external radiation: • None RCAs controlled for contamination: • Hand and foot frisk • Monitor other areas of the body suspected of contamination

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

a. Radiological Buffer Areas (RBAs)

- RBAs provide secondary boundaries within the RCA to minimize the spread of contamination and to limit doses to general employees who have not been trained as radiological workers. RBAs are considered part of the RCA. However, RBAs are considered to be an area of relatively higher radiological risk.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

a. Radiological Buffer Areas (RBAs) (*continued*)

- An RBA should be established as a secondary boundary around Radiological Areas (CAs, HCAs, ARAs, RAs, HRAs, and VHRAs). The size of the RBA should be commensurate with the potential for the spread of contamination or where the expected dose to individuals routinely accessing the areas adjacent to these areas would be greater than 0.1 rem per year.
- An RBA should be established for contamination control as a secondary boundary around CAs, HCAs, and ARAs. The size of the RBA should be commensurate with the potential for the spread of contamination.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

a. Radiological Buffer Areas (RBAs) (*continued*)

- An RBA should be established as a secondary boundary around RAs, HRAs, and VHRAs, where the expected dose to individuals routinely accessing the areas immediately adjacent to these radiological areas would be greater than 0.1 rem per year.
- RBA postings must contain the wording CAUTION, RADIOLOGICAL BUFFER AREA and any other information required for hazard communication.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

a. Radiological Buffer Areas (RBAs) (*continued*)

Table 6 Criteria for posting RBAs

Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Reasonable Potential and likely that Individual receives ≥ 100 mrem/year and/or removable surface contamination levels >Table 14-2	Caution Radiological Buffer Area	Training: • Radiological Worker • Facility-specific training RBAs controlled for external radiation: • TLD RBAs controlled for contamination: • Anti-C labcoat • Booties • Long pants • Shoes that enclose the foot	RBAs controlled for external radiation: • None RBAs controlled for contamination: • Hand and foot frisk • Monitor other areas of the body suspected of contamination

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

External Radiation Posting Areas: b. Radiation Area; c. High Radiation Area; d. Very High Radiation Area

Table 7 Criteria for posting external radiation hazards

Area	Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Radiation area (RA)	> 0.005 rem in 1 hour at 30 cm	Caution Radiation Area	• Radiological worker, facility specific training • TLD • FRPR or RWP	None
High radiation area (HRA)	> 0.1 rem in 1 hour at 30 cm and ≤ 1 rem	Caution High Radiation Area	• Radiological worker, facility specific training • TLD , supplemental dosimeter • FRPR or RWP	None
	> 1 rem in 1 hour at 30 cm	Danger High Radiation Area	• Radiological worker, facility specific training • TLD , supplemental dosimeter • RWP	None
Very high radiation area (VHRA)	> 500 rad in 1 hour at 100 cm	Grave Danger Very High Radiation Area	• Training to be determined and approved by the RP division leader • For other requirements, see chapter 4, part 3 in P121, <i>Radiation Protection</i>	To be determined

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

External Radiation Posting Areas: d. Very High Radiation Area

- Individuals must be prevented from unauthorized or inadvertent entry to VHRAs. Normally, access to VHRAs must not be allowed. Only under the most stringent control or emergency conditions will access be allowed to an area where these radiation levels may be present.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

External Radiation Posting Areas: c. High Radiation Area;
d. Very High Radiation Area

- Entry to an area where an HRA or VHRA existed, with the assumption that the HRA or VHRA no longer exists, requires positive verification that the HRA or VHRA no longer exists. This verification requires real-time radiation monitoring to verify that the source of the HRA or VHRA is appropriately deenergized or shielded.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

External Radiation Posting Areas: c. High Radiation Area;
d. Very High Radiation Area (*continued*)

- Other controls may be used in lieu of real-time radiation monitoring for entering an area that was an HRA, provided that they are
 - Designed and tested to be robust;
 - Approved by an RP SME; and
 - Formally documented in association with the activity or work area (e.g., RWP, FRPR, or operating procedure).

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

e. Hot Spots (Labeling)

- Hot spots are localized sources of radiation having contact radiation levels greater than a 100-millirem-per-hour penetrating radiation dose and more than five times greater than the general area dose rate.
- Hot spots may be labeled; however, larger areas may be posted as radiological areas when practical.
- A label reading "Caution, Hot Spot" and marking the location of the hot spot should be placed on or as near the spot as practicable.
- Labeling hot spots is not required in areas with general area dose rates greater than 1 rem/h.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Posting Areas for Contamination: f. Contamination Area; g. High Contamination Area; h. High Contamination Area

Table 8 Criteria for posting contamination hazards

Area	Criteria	Required Posting	Minimum Entry Requirements	Minimum Exit Requirements
Contamination area (CA)	Removable contamination levels greater than, or likely to exceed, table 14-2 values but do not exceed 100 × the values of table 14-2 of P121	Caution Contamination Area	• Radiological worker, facility specific training • FRPR or RWP • Level I Clothing	Whole body frisk
High contamination area (HCA)	Removable contamination levels greater than, or likely to exceed, 100 × the values of table 14-2 in P121	Danger High Contamination Area	• Radiological worker, facility specific training • RWP • Level II Clothing	Whole body frisk
Airborne radioactivity area (ARA)	Airborne concentrations above background that are greater than, or likely to exceed, the DAC values or that would result in an individual (without respirator) being exposed to greater than 12 DAC-h in a week	Caution Airborne Radioactivity Area	• Radiological worker, facility specific training • RWP • Level I or II Clothing, hood, any required respiratory protection equipment	Whole body frisk

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

P121, Radiation Protection, Table 14-2 for Posting Criteria:

i. Fixed Surface Contamination

Table 14-2. Surface Contamination Values ¹		
Radionuclide	Removable ^{2,4} (dpm/100 cm ²)	Total (Fixed + Removable) ^{2,3} (dpm/100 cm ²)
U-natural, U-235, U-238, and associated decay products ⁹	1,000 ⁷	5,000 ⁷
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	100 ¹⁰
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90. ^{5,8}	1,000 beta-gamma	5,000 beta-gamma
Tritium and special tritium compounds (STCs) ⁶	10,000	See Footnote 6

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

i. Fixed Surface Contamination (Labeling)

- Areas outside radiological areas that have total contamination exceeding the total surface contamination values but removable contamination levels below those values specified in Table 14-2 are subject to the following:
 - RP SMEs ensure the appropriate control of fixed contamination, including decontamination; application of fixative coatings, painting, surveying; and management of these areas;
 - Areas must be labeled or posted to warn individuals of their fixed contamination status. This action may be accomplished by individually labeling spots of fixed contamination or posting larger areas if labeling individual spots is not practical.

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

j. Soil Contamination

- Areas with soil contamination that have a reasonable potential to cause more than 15 mrem/year off-site or more than 30 mrem/year on-site must be posted as SCAs.
- SCAs are not normally controlled for occupational hazard and are managed and posted by the Environmental Protection Division (ENV). Nevertheless, when work is conducted in these areas, the potential for personnel exposure exists, and occupational hazards are managed in accordance with P121.

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

k. Radioactive Material Area (RMA)

- RMAs shall be posted “Caution, Radioactive Material” and require GERT or facility-specific training for entry.
- Accessible areas where radioactive materials are used, handled, or stored must be identified with RMA posting except when:
 - The amount of radioactive material does not exceed the values of appendix 16A in P121.
 - The area is posted as a radiological area.
 - Each item or container of radioactive material in the area is labeled in accordance with P121.
 - The material of concern consists solely of components/structures that have been activated.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

I. Underground Radioactive Material Area (RMA)

LANL does not have any underground RMAs.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control

- 10 CFR 835 requires the following:
- §835.501 Radiological Areas
 - Personnel entry control shall be maintained for each radiological area.
 - The degree of control shall be commensurate with existing and potential radiological hazards within the area.
 - One or more of the following methods shall be used to ensure control:
 - Signs and barricades;
 - Control devices on entrances;

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- Conspicuous visual and/or audible alarms;
 - Locked entrance ways; or
 - Administrative controls.
- Written authorizations shall be required to control entry into and perform work within radiological areas. These authorizations shall specify radiation protection measures commensurate with the existing and potential hazards.
 - No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- § 835.502 High and very high radiation areas.
 - The following measures shall be implemented for each entry into a high radiation area:
 - The area shall be monitored as necessary during access to determine the exposure rates to which the individuals are exposed;
 - Each individual shall be monitored by a supplemental dosimetry device or other means capable of providing an immediate estimate of the individual's integrated deep dose equivalent during the entry.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- Physical controls. One or more of the following controls shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed a deep dose equivalent to the whole body of 1 rem (0.01 Sievert) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- A control device that prevents entry to the area when high radiation levels exist or that, upon entry, causes the radiation level to be reduced below the level that defines an HRA;
- A device that functions automatically to prevent the use or operation of the radiation source or field while individuals are in the area;
- A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the HRA and the supervisor of the activity are made aware of the entry;

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;
- Continuous direct or electronic surveillance that is capable of preventing unauthorized entry;
- A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.

RCT_2.10_Axs-Ctrl&Wk-Area_8776_VG, R1.0

2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*)

- VHRAs. In addition to the above requirements, additional measures shall be implemented to ensure that individuals are not able to gain unauthorized or inadvertent access to VHRAs.
- No control(s) shall be established in an HRA or VHRA that would prevent the rapid evacuation of personnel.

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*) – P121, *Radiation Protection*,
Access Control Requirements for Posted Areas

Table 9-3. Area Designation and Minimum Required Control Levels	
Area Designation	Control Level
Any Radiological Controlled Area (RCA)	1
Any Radiological Buffer Area (RBA)	1
Radioactive Material Area (RMA), Soil Contamination Area (SCA)	1
Radiation Area (RA) and High Radiation Area (HRA) that is less than or equal to 1 rem in 1 hr at 30 cm	1
HRA that is greater than 1 rem in 1 hr at 30 cm	2
Very High Radiation Area (VHRA)	3
Contamination Area (CA)	1
High Contamination Area (HCA)	1
Airborne Radioactivity Area (ARA)	1

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2.10.08 – Radiological Postings at LANL; Posting/Barriers; Entry Requirements

Access Control (*continued*) – P121, *Radiation Protection*,
Access Control Requirements for Posted Areas

Table 9-4. Required Controls for Areas Posted for Radiological Hazards	
Level	Criteria
Level 1	Administrative controls (see Chapter 11 , <i>Radiological Work Control</i>) and/or signs and barricades, or any Level 2 control.
Level 2	One or more of the following must be used at access points to control entry or occupancy: • A control device that prevents entry to the area when radiological hazards that define the area are present or that, upon entry, causes the radiation hazard to be reduced below that defining level (e.g., reduces radiation below 100 mrem/hr for a High Radiation Area [HRA]). • A device that functions automatically to prevent the creation of a radiological hazard while personnel are in the area. • A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the area and the supervisor of the activity are made aware of the entry. • Entryways that are locked. During periods when access to the area is required, positive control over each entry must be maintained. • Continuous direct or electronic surveillance that is capable of preventing unauthorized entry. • A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in enough time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.
Level 3	In addition to a Level 2 control, at least one other measure must be implemented to ensure that individuals are not able to gain inadvertent or unauthorized access. This requires a control that meets the following criteria: • an additional Level 2 control that is separate (may be redundant) and • sufficiently robust to prevent inadvertent or unauthorized access

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2.10.09 –Setting Up Radiological Areas

Good Practices

- Establish walkways in low dose areas.
- Do not store radioactive materials near walkways or where personnel frequently work.
- Place rope boundaries as close to the source of contamination as possible to minimize the size of the contaminated area.
- Ensure that the area is not so limited that contamination is easily spread across the boundaries.
- Use drip trays or containment devices to prevent the spread of contamination.

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2.10.09 –Setting Up Radiological Areas

Good Practices (*continued*)

- Establish laydown areas for equipment to limit personnel safety hazards and/or radiation exposure.
- Set up SOPs upwind of contamination hazards.
- Post all accessible sides and entrance(s) to areas containing radiological hazards.
- Use personnel contamination monitors (PCMs), along with portable contamination survey instrumentation. PCMs are more likely to detect contamination on individuals because personnel tend to survey too quickly.

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2.10.09 –Setting Up Radiological Areas

Discrepancies to Avoid

- Posting information not updated or information otherwise incorrect.
- Boundaries not verified for contamination, radiation, and airborne radioactivity hazards.
- Survey instruments out of calibration or defective.
- SOPs not set up for the efficient removal of protective clothing (not enough room to prevent contaminating the SOPs) and not near survey instrumentation.
- Laundry and waste receptacles not placed for efficient use or not placed at all.

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2.10.09 –Setting Up Radiological Areas

Discrepancies to Avoid (*continued*)

- Receptacles not properly labeled as to their contents.
- Boundaries of areas setup too far from the hazards interfering with access to areas otherwise unaffected.
- Count rate meters not located close to the SOPs.
- Status boards or survey maps do not reflect where SOPs and boundaries lie.
- Status board not kept up to date. The information on status boards, postings, and RWPs should agree.
- Tripping hazards exist from wires, hoses, or cables.

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2.10.09 –Setting Up Radiological Areas

Discrepancies to Avoid (continued)

- Background radiation in the monitoring area is too high for the efficient detection of low-level contamination.
- Portable contamination survey instrumentation is not set up for proper operation.
- Protective clothing (gloves and booties) is not readily available in a personnel contamination event.
- Phones or other communication devices are not available near the SOP or portable contamination survey instrumentation.
- Not posting all access points into the area.
- Failure to post dress and undress procedures.

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2.10.09 –Setting Up Radiological Areas

Support Equipment

- SOPs.
- Portable contamination survey instrumentation.
- Yellow and magenta rope, ribbon, or tape.
- Laundry receptacles.
- Waste receptacles (clean and radioactive waste receptacles).
- Postings, signs, labels, and posting inserts.
- Communication equipment that is readily available.
- Additional protective clothing.
- Dose rate meters and smears.

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2.10.10 – Containment Devices

Containment devices include glove boxes, glove ports, hot cells, huts, and windbreaks. Discrepancies include

- Holes/leaks in the containments, or the containment is maintained at a positive pressure, facilitating the spread of contamination.
- Liquids accumulate in hoses or main portions of the containment.
- Airlocks are too small to remove protective clothing without spreading contamination.
- Ventilation exhaust is not directed to the plant's ventilation system.

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2.10.10 – Containment Devices

Discrepancies (*continued*)

- Material is allowed to accumulate inside containments, limiting safe and/or efficient use.
- Sharp objects are used inside containments.
- Devices are not tethered to prevent introduction into systems.
- Transfer sleeves/ports are not used or are unavailable.
- Containment is not provided with a HEPA filter or ventilation exhaust.
- Containments are not periodically surveyed inside and out.
- No means of quickly verifying loss of ventilation exists.

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2.10.10 – Containment Devices

Discrepancies (*continued*)

- Containment is not decontaminated before being dismantled.
- Adequate access is not provided for lines or hoses.
- Containment is not maintained at a negative pressure.
- Containment is not supported properly to minimize stress from minor ventilation
- Changes are not structurally supported to maintain its configuration during use.
- Containments are not inspected before use and periodically during use.

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2.10.10 – Containment Devices

Discrepancies (*continued*)

- Appropriate containment devices are not used for leaks.
- A funnel is not used to collect leakage.
- Plastic components show fatigue or wear.
- A funnel is not positioned to collect all leaking fluid.
- Drain lines are kinked, allowing the buildup of liquids.
- Drain lines are not secured properly to the collection device.
- The containment device is not labeled to indicate hazards that are present.

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2.10.11 – Portable Ventilation Systems and Count Rate Meters

Good Practices – Portable Ventilation Systems

- Use only HEPA filters with pre-filters (roughing filters)
- Perform radiation survey on filters periodically while in use.
- Have radiological limits established for filter replacement.
- Exhaust filter discharge to the plant ventilation system whenever possible.
- Ensure that there are no openings in the trunk or between the blower and the filter.

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2.10.11 – Portable Ventilation Systems and Count Rate Meters

Good Practices – Portable Ventilation Systems (*continued*)

- Monitor the filter differential pressure (d/p) periodically.
- Establish the filter d/p at which the filter must be replaced.
- Remove filters, and place them into plastic bags to prevent the release of activity.
- Position streamers to signify the flow of ventilation through doorways or through containment devices.

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2.10.11 – Portable Ventilation Systems and Count Rate Meters

Good Practices – Portable Survey Instrumentation and PCMs

- Place them in low background area.
- Equip them with a reliable power supply.
- Position them to facilitate easy access by workers.
- Set alarms to site administrative control levels or DOE limits.
- Ensure that the instrument is source checked and calibrated.
- Check extension cords for electrical safety.

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2.10.11 – Portable Ventilation Systems and Count Rate Meters

Good Practices – Portable Survey Instrumentation and PCMs
(continued)

- Place portable contamination survey instrumentation and PCMs upwind of contaminated areas.
- Do not place the instrumentation near radioactive material storage areas or other areas where the background radiation can change.
- Provide portable contamination survey instrumentation with sources to source check the instrument.

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2.10.12 – Requirements for Working in RBAs

Workers who receive radiation exposures from other nuclear facilities must report the exposure to site radiological control personnel and their supervisor upon returning to the site.

Avoid contact with potentially contaminated surfaces.

Any management/supervision or site radiological control personnel should give stop work or evacuation orders if unanticipated radiation or contamination is encountered or if the appropriate RWP is not being followed.

Wear dosimetry in accordance with the postings and the RWP.

Maintain exposure ALARA.

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2.10.12 – Requirements for Working in RBAs

Report all injuries.

Monitor clothing and exposed skin as required and report the presence of radioactive contamination.

Place contaminated items and waste in approved radioactive waste containers.

Wash your hands when leaving the RBA and before eating food or using tobacco products.

Do not enter areas posted as “Respiratory Protection Required” if you are not respiratory qualified.

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2.10.12 – Requirements for Working in RBAs

Hot Particles

- Hot particles are small, discrete, highly radioactive particles capable of causing extremely high doses to a localized area in a short period of time. Hot-particle contamination may be present or generated when contaminated systems are opened or when operations such as machining, cutting or grinding are performed on highly radioactive materials.
- Hot particles are further defined in P121 as having an activity of nominally 15,000 dpm or greater (α or β/γ) and/or being capable of producing an equivalent dose to the skin greater than 100 mrem in 1 h.

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2.10.12 – Requirements for Working in RBAs

Hot Particles (*continued*)

- Special surveys must be performed in areas with the potential for hot-particle contamination.
- Areas must be posted to specifically identify the presence of hot particles.
- Access to hot-particle areas should be controlled through a job-specific RWP. The following controls should be considered for inclusion in the RWP:
 - Periodically monitor personnel during the work activity at a frequency based on the potential magnitude of skin exposure
 - Provide additional personal protective equipment and clothing

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2.10.12 – Requirements for Working in RBAs

Hot Particles (*continued*)

- Provide direct radiological control coverage during work or assistance during protective clothing removal
- Use sticky pads or multiple SOPs.
- Segregate personal protective equipment and clothing used in hot-particle areas from other radiological protective equipment and clothing during laundering, and survey them before reuse.

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2.10.12 – Requirements for Working in RBAs

Hot Particles (*continued*)

- The response to hot-particle skin contamination should include the following:
 - Immediate removal and retention of the hot particle for subsequent analysis
 - Analysis of the particle
 - Assessment of worker dose
 - Evaluation of work control adequacy

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2.10.13 – Removing or Releasing Material from Radiological Areas

Removing Material

- Facility operations require that radioactive and nonradioactive material be removed from radiological areas, RBAs, and the site. Before this material is allowed to leave, important steps outlined in the procedures must be followed. 10 CFR 835, §835.1101 requires the following:
 - Except as provided below, material and equipment in CAs, HCAs, and ARA shall not be released to a controlled area if
 - Removable contamination levels on accessible surfaces exceed the removable surface contamination values specified in Appendix D of 10 CFR 835; or

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Removing Material (*continued*)

- Prior use suggests that the removable contamination levels on inaccessible surfaces are likely to exceed the removable surface contamination values specified in Appendix D of 10 CFR 835.
- Material and equipment exceeding the removable surface contamination levels specified in Appendix D of 10 CFR 835 may be conditionally released for movement onsite from one radiological area for immediate placement to another radiological area only if appropriate monitoring is performed and appropriate controls for the movement are established and exercised.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Removing Material (*continued*)

- Material and equipment with fixed contamination levels that exceed the limits specified in Appendix D of 10 CFR 835 may be released for use in CAs outside radiological areas only under the following conditions:
 - Removable surface contamination levels are below the removable surface contamination values specified in Appendix D of 10 CFR 835; and
 - The material or equipment is routinely monitored and clearly marked or labeled to alert personnel to the contaminated status.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Releasing Material

- RP-1-DP-23.04, *Release of Items from Radiological Control and Tagging Items with Radioactive Materials*, describes the process of determining survey requirements and documenting the release of items from radiological control.
- The release of items may be authorized after release criteria are met based on a combination of process knowledge and careful monitoring of the items.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Releasing Material (*continued*) – RP-1-DP-12.04

Exclusions do not apply to the

- unrestricted release for reuse or recycling of volumetrically contaminated or activated metals as addressed in DOE's January 12, 2000 Moratorium.
- unrestricted release for recycling of metals from radiological areas as addressed in DOE's July 13, 2000 Suspension.
- unrestricted release of other volume-contaminated or activated items, such as bulk materials, construction debris, or soil.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Releasing Material (*continued*)

- Items leaving RCAs for contamination, DU shrapnel, or volume contamination must be surveyed by an RCT for release.
- RCTs must release items only after a survey indicates < minimum detectable activity (MDA). Items with > MDA require additional approval.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

Releasing Material (*continued*)

- Hand-carried personal items (e.g., notebooks, pagers, and flashlights) do not require a survey if the items have not come into contact with any potentially contaminated surfaces; have not entered a CA, HCA or ARA; have not left direct possession of individual; and have no contamination detected on the individual when surveyed upon exiting.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

RCA for Legacy Contamination

- This posting is used to designate areas that have not been released from radiological controls due to past radiological activities and the potential for legacy contamination. Workers need to be conscientious and exercise judgment when working in these areas.
- Health physics/radiation protection approval is required before working on or breaching facility systems, facility surfaces, and programmatic equipment. RCT surveys may be required.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

RCA for Legacy Contamination (*continued*)

- The type of work that will require RP evaluation in legacy areas include
 - Penetrating walls/floors
 - Opening ventilation systems
 - Removing installed equipment
 - Opening machines for routine maintenance
 - Opening utility and access panels
 - Moving equipment with potential historical contamination
- Routine operations on programmatic equipment do not require health physics/radiation protection approval beyond that specified in standard work documents.

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2.10.13 – Removing or Releasing Materials from Radiological Areas

RCA for Legacy Contamination (*continued*)

- Most items coming out of areas controlled for legacy contamination do not require an RCT survey.
- The individual requesting the item release must determine whether the item is affected by legacy contamination (e.g., installed equipment, facility system components, historical equipment or materials subject to past radiological use, and known radiological use).
- If the item is affected by legacy contamination, the item must be evaluated and surveyed by an RCT for release.

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