LR1

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Posting Radiological Hazards

RP 02.04

RP 03.04

Approved Rev: **Rev 2, 10/02/2019**

STE SCOPE:

This task is to perform the posting of radiological control areas within the RCA, Restricted Area, Controlled Area, and Unrestricted Area (not including High Radiation Areas (HRA), Locked High Radiation Areas (LHRA), Very High Radiation Areas (VHRA)). Posted area construction requirements are covered as well.

REFERENCES:

- NISP-RP-004

SUPPORTING MATERIALS:

None

ESTIMATED TIME:

4 hours

EVALUATION STANDARDS

The STE Knowledge Examination required a scoring grade of 80% to pass the examination. Remedial training must be provided IAW NISP-012 after two unsuccessful attempts and a third attempt is allowed. Once complete, the Performance Evaluation must be passed to gain credit for the completion of the STE in the EPRI completion registry.

Revised 1/11/19 updated for NISP-RP-004 Rev 1.

Revised 2, 10/02/2019

Slide 1

LR1 Reworded.
Labrecque, Ronald, 10/2/2019

Standardized Task Evaluation Program

The Standardized Task Evaluation (STE) program promotes a work-ready workforce through the standardization of common tasks by defining the knowledge and skills required to perform a given task. Subject Matter Experts (SMEs) analyze the task and generate lesson plans, knowledge examination, and performance evaluation elements. These elements are combined to create an STE package.

The Electric Power Research Institute (EPRI) facilitates the development, oversees the quality, and programmatically implements each STE. EPRI STE members have access to these materials and permission to implement these STEs in accordance with their site training and qualification procedures.

EPRI STE program disclaimer. For more information contact Chuck Lease: clease@epri.com.

Posting Radiological Hazards Overview

- This training covers the knowledge elements needed for the posting of radiological areas within the RCA, Restricted Area, Controlled Area, and Unrestricted Area (Junior Technician Qualification RP 02.04) as well as the knowledge elements associated with posting High Radiation Areas (HRA), Locked High Radiation Areas (LHRA), and Very High Radiation Areas (VHRA) (Senior Technician Qualification RP 03.04). Posted area construction requirements are covered as well.

LR2

[This slide is intended to provide an overview of why this training is important to the organization and the individual. 'What's In It For Me.' It can contain industry trends and events, industry operating experience (OE), consequences for incorrect operations/performance, etc.]

[Slide should contain condensed bullets of overview points]

[Notes section should provide additional information to reference related to the bulletized items in the slide]

Slide 3

LR2 Changed
Labrecque, Ronald, 10/2/2019

Terminal Objective

- When working as an RP technician at a US nuclear utility, individual will be able to establish boundaries, barriers, and postings necessary to inform workers of the radiological hazards in the work area in accordance with the standards of NISP-RP-004, Nuclear Industry Standard Process for Radiological Posting and Labeling.

Terminal Objective - When working as an RP technician at a US nuclear utility, individual will be able to establish boundaries, barriers, and postings necessary to inform workers of the radiological hazards in the work area in accordance with the standards of NISP-RP-004, Nuclear Industry Standard Process for Radiological Posting and Labeling.

Enabling Objective

1. Define the following terms
   - RCA
   - Radiation Area
   - High Radiation Area
   - Locked High Radiation Area
   - Very High Radiation Area
   - Neutron Area
   - Radiography Area
   - Contaminated Area
   - High Contamination Area
   - DRP Area
   - Alpha 2 Area
   - Alpha 3 Area
   - Airborne Radioactivity Area
   - Hot spot

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Enabling Objective

2. State the proper hierarchy for pocket inserts on postings.
3. State posting requirements for catch containments.
4. State posting and boundary requirements for a Neutron area.
5. State postings and boundary requirements for a Radiography area.
6. Identify the posting and boundary requirements for the following:
   - High Radiation Area
   - Locked High Radiation Area
   - Very High Radiation Area
   - Contaminated Area
   - High Contamination Area
   - DRP Area
   - Airborne Radioactivity Area
   - Radiation Area

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Enabling Objective

7. State posting required for a ladder storage area (to include staged ladders, portable power lifts, and teletowers).
8. State the boundary controls and posting requirements for an Alpha 2 Area.
9. State the boundary controls and posting requirements for an Alpha 3 Area.
10. State the labeling requirements for containers with radioactive material.
11. State the containers which are exceptions to labeling requirements for containers with radioactive materials.

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Definitions and Criteria

LR2
LR9

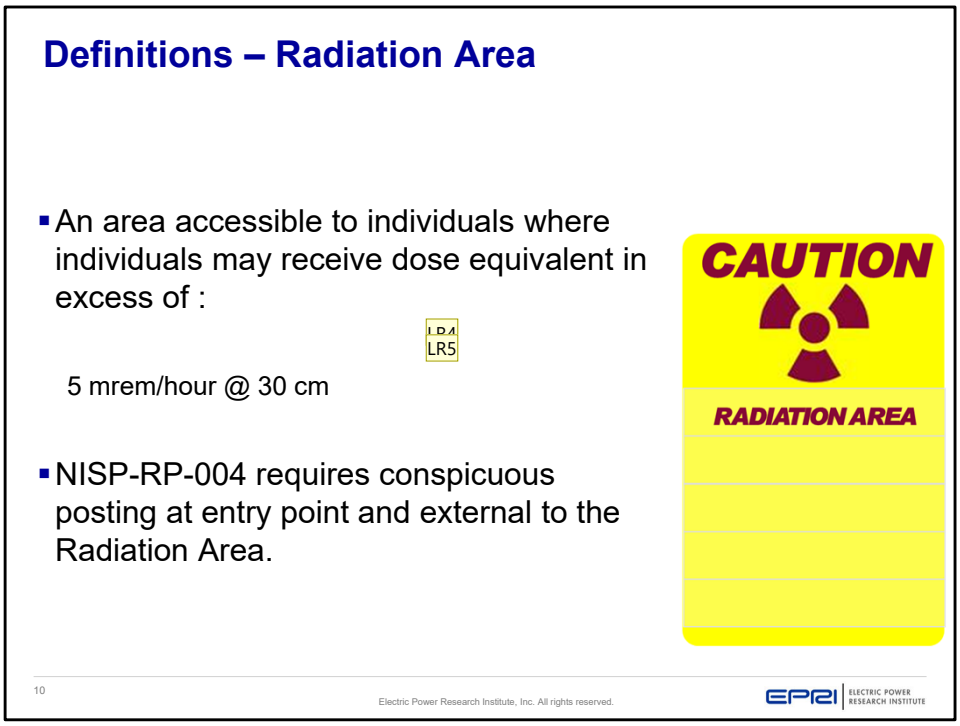
Slide 8

LR3 added "and Criteria"
Labrecque, Ronald, 10/2/2019

LR9 and deleted statement
Labrecque, Ronald, 10/2/2019

Definitions – RCA

- **Radiologically Controlled Area** (RCA) - An area within the restricted area posted in accordance with procedures for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.



Radiation Area- An area, accessible to individuals, in which radiation levels could result in an individual receiving a dose equivalent in excess of 5 mrem in 1 hour at 30 cm from the radiation source or from any surface that the radiation penetrates.

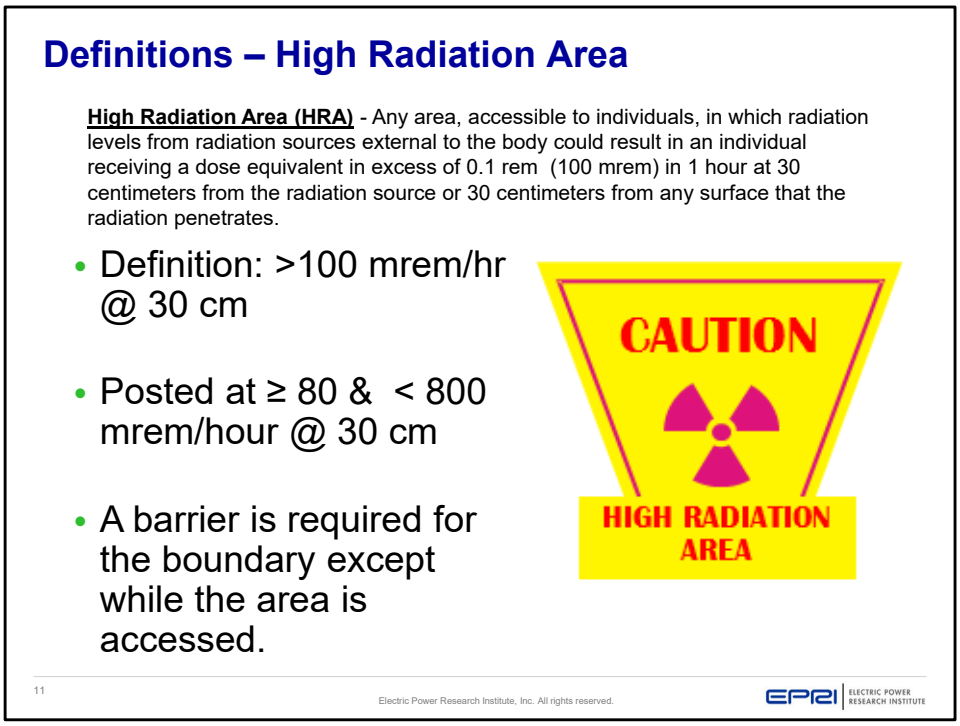
What exactly is accessible?
An area that can reasonably be occupied by a major portion of an individual's whole body. An area is not accessible if tools or other exceptional measures are needed to access the area. For example, a tank or vessel that has its cover bolted in place is inaccessible, or an opening in a shield wall that is physically difficult to access without a ladder or mobile platform is considered inaccessible. In addition, a pool of water such as the spent fuel pool is considered inaccessible unless a diver enters the pool.

Whenever there is a questionable or borderline decision regarding posting, always consult supervision!

Slide 10

LR4 removed -
Labrecque, Ronald, 10/2/2019

LR5 added NISP
Labrecque, Ronald, 10/2/2019



High Radiation Area (HRA) - Any area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving a dose equivalent in excess of 0.1 rem in 1 hour at 30 centimeters from the radiation source or 30 centimeters from any surface that the radiation penetrates.

Remind students that posting thresholds are based on the sum body dose (gamma and neutron).
An ANSI qualified Senior RP Technician qualified to RP STE 03.04 is required to post a High Radiation Area

Definitions – Locked High Radiation Area

Locked High Radiation Area (LHRA) - Any area accessible to individuals in which deep dose equivalent rates are greater than or equal to 1 rem per hour (but less than 500 rads in one hour at 1 meter) 30 centimeters from the source of radiation or from any surface that the radiation penetrates.

- Defined as ≥ 1 rem/hr @ 30 cm
- Posted at > 800 mrem/hour @ 30 cm
- A LOCKED barrier is required for the boundary except while the area is accessed.

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Locked High Radiation Area (LHRA) - Any area accessible to individuals in which deep dose equivalent rates are greater than or equal to 1 rem per hour (but less than 500 rads in one hour at 1 meter) 30 centimeters from the source of radiation or from any surface that the radiation penetrates.

An ANSI qualified Senior RP Technician qualified to RP STE 03.04 is required to post a Locked High Radiation Area

Definitions – Very High Radiation Area

Very High Radiation Area (VHRA) - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates.

- ≥ 500 rads/hour at 1 meter from any source or surface
- A locked barricade or Access Control Guard is required

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Very High Radiation Area (VHRA) - An area, accessible to individuals, in which radiation levels from radiation sources external to the body could result in an individual receiving an absorbed dose in excess of 500 rads (5 grays) in 1 hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates.

Note: “Grave Danger” as opposed to “Caution”

An ANSI qualified Senior RP Technician qualified to RP STE 03.04 is required to post a Very High Radiation Area

Definitions – Neutron Area

- **Neutron Area** – An area where the neutron dose rate is > 4 mrem/hour General Area at 30 cm from a source.
- Ƞ > 4 mrem/hour General Area or @ 30 cm from a source

Neutron Area – An area where the neutron dose rate is > 4 mrem/hour General Area at 30 cm from a source.

Definitions – Radiography Area

- **Radiography Area** - A radiographic work area posted and controlled in accordance with the licensee (radiography group) Operating and Emergency Procedures. LR6
- Boundary locations established in accordance with a Radiography Shot Plan of NISP-RP-009
- Access point are posted with access controls established per Shot Plan.
  - High Radiation Areas established IAW the radiographer's policy
  - Radiation Area boundaries shall be established where the expected dose rate is expected to be < 2 mrem/hour while the source is exposed.
  - **Access control will be established at the projected Radiation Area boundary at <2 mrem/hr.**

Radiography Area - A radiographic work area posted and controlled in accordance with the licensee (radiography group) Operating and Emergency Procedures.

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LR6 009
Labrecque, Ronald, 10/2/2019

Definitions – Contaminated Area

- **Contaminated Area** - An area having smearable contamination equal to or greater than 1000 dpm/100 cm² (100 net counts per minute using a pancake frisker probe) beta- gamma or 20 dpm/100 cm² alpha.

- ≥ 1,000 & < 100,000 βγ

  OR

- ≥ 20 α dpm/100 cm^2

Contaminated Area - An area having smearable contamination equal to or greater than 1000 dpm/100 cm² (100 net counts per minute using a pancake frisker probe) beta-gamma or 20 dpm/100 cm² alpha.

Definitions – High Contamination Area

- **High Contamination Area (HCA)** - An area where the majority of the area has removable surface contamination equal to or greater than 100,000 dpm/100cm² beta-gamma.

- ≥ 100,000 βγ dpm/100 cm^2

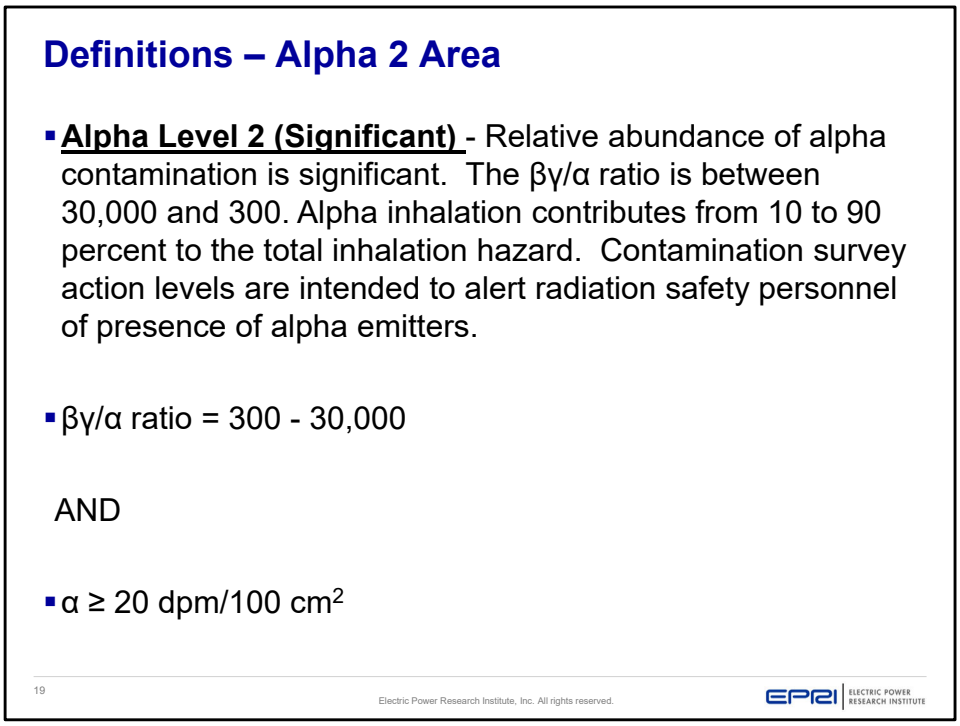
Definitions – DRP Area

- **Discrete Radioactive Particles (DRP)** - Small, loose, highly radioactive particles with > 500,000 dpm or 50,000 ccpm.
- DRPs > 500,000 dpm

OR

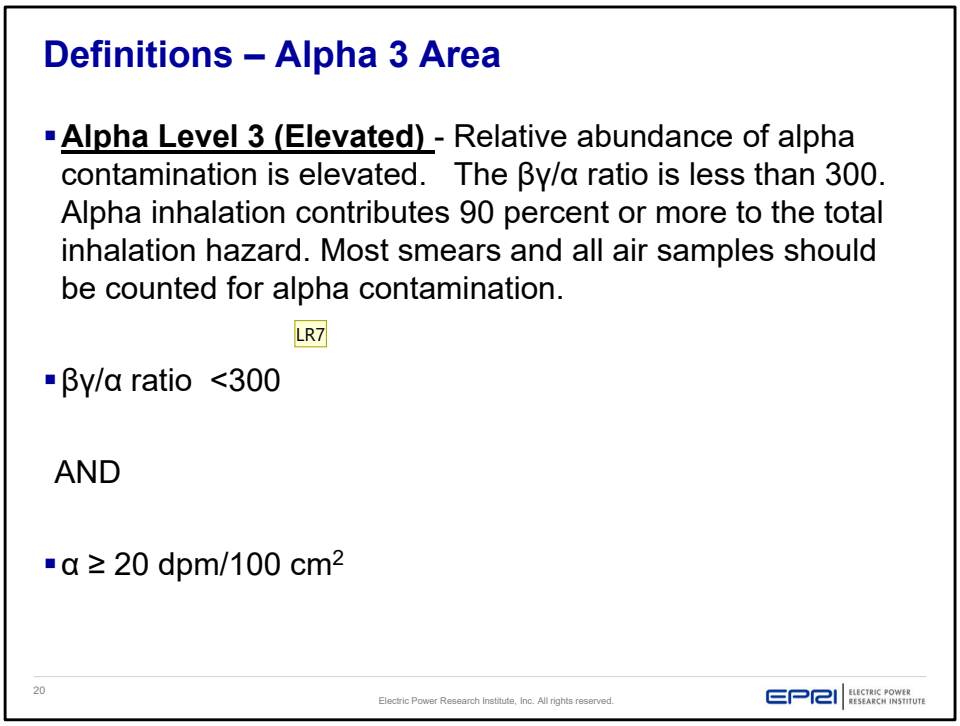
- > 50,000 ncpm

Discrete Radioactive Particles (DRP) - Small, loose, highly radioactive particles with > 500,000 dpm or 50,000 ccpm.



Alpha Level 1: (Minimal) - Relative abundance of alpha contamination is minimal. Internal exposure from alpha emitters is not likely to exceed 10% of total internal dose. The βγ/α ratio is greater than 30,000. Areas with low alpha activity levels, such as less than 20 dpm/100 cm², should be assigned Level 1 Areas. Action levels are recommended to verify low abundance of alpha emitters when high contamination or high airborne radioactivity is present.

Alpha Level 2 (Significant) - Relative abundance of alpha contamination is significant. The βγ/α ratio is between 30,000 and 300. Alpha inhalation contributes from 10 to 90 percent to the total inhalation hazard. Contamination survey action levels are intended to alert radiation safety personnel of presence of alpha emitters.



Alpha Level 3 (Elevated) - Relative abundance of alpha contamination is elevated. The βγ/α ratio is less than 300. Alpha inhalation contributes 90 percent or more to the total inhalation hazard. Most smears and all air samples should be counted for alpha contamination.

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LR7 corrected to < not or equal to
Labrecque, Ronald, 10/2/2019

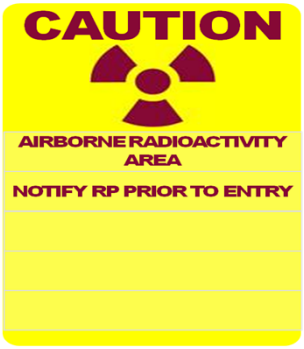
Definitions – Airborne Radioactivity Area

Airborne Radioactivity Area (ARA) - A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations in excess of the values of 10CFR20, Appendix B, Table 1, Column 3 (i.e., DAC values) OR to such a degree that an individual without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 12 DAC-hours.

- Particulates & Iodine ≥ 0.3 DAC

OR

- Noble Gas ≥ 1.0 DAC



Airborne Radioactivity Area (ARA) - A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations in excess of the values of 10CFR20, Appendix B, Table 1, Column 3 (i.e., DAC values) OR to such a degree that an individual without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 12 DAC-hours.

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Definitions – Hot Spot

- **Hot Spot** - Accessible hot spots when components have contact readings of more than 100 mrem/hour and more than five times the general area dose rates at 30 cm from the LR10 source.

- Localized source of radiation where contact dose rates are:

LR8

> 100 mrem/hour

AND

> 5 X the dose rate at 30 cm

Exception to posting when Foreign material exclusion and configuration controls prohibit the placement of signs.

Infrequent access to the area limits the value of the posting as determined by RP supervision.

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LR8 removed the - 's and moved exeption down
Labrecque, Ronald, 10/2/2019

LR10 changed
Labrecque, Ronald, 10/2/2019

LR12 deleted instructor note
Labrecque, Ronald, 10/2/2019

LR13

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NISP RP Requirements

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LR13 added rp
Labrecque, Ronald, 10/2/2019

Hierarchy for Pocket Inserts

- Use pocket inserts below signs as needed to post hazards and entry requirements
- Use the following hierarchy from top to bottom:
  - External hazards.
  - Airborne hazards.
  - Contamination hazards.
  - Other information.

Catch Containments

- Use yellow material for catch containments to identify the contained leakage as contaminated.
- Ensure the catch containment and drain tubing is conspicuously labeled for containing contamination if the containment is located in a non-contaminated area.

Catch Containment - Any of several styles of leakage gathering devices (drip funnel, drip pans, catch basin, etc.) designed to catch and funnel liquid or particulates into a suitable collection medium (i.e., floor drain, drain bottle, drum or absorbent material).

Labeling Requirements

- Label containers with radioactive material using a radiation symbol trefoil and the words "Caution Radioactive Material" as shown

- Add precautionary information for any of the following conditions:
  - Dose rates are ≥ 2 mrem/hour on contact with the contents in the container.
  - Smearable contamination ≥ 1,000 dpm/100 cm^2 is accessible if the container is opened.
  - Contents originated in a Level 3 Alpha Area.
  - Contents contain discrete radioactive particles.

Exceptions to Labeling Requirements

- Containers are not required to be labeled under step 6.4.2 LR14 for any of the following conditions:
  - Containers holding licensed material in quantities less than the quantities listed in 10 CFR 20, Appendix C
  - Containers holding licensed material in concentrations less than those specified in 10 CFR 20, Appendix B, Table 3.
  - Containers attended by an individual who takes the precautions necessary to prevent the exposure of individuals in excess of the limits established by 10 CFR 20.
  - Containers when they are in transport and packaged and labeled in accordance with the regulations of the Department of Transportation.
  - Containers that are accessible only to individuals authorized to handle or use them, or to work in the vicinity of the containers, if the contents are identified to these individuals by a readily available written record

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LR14 corrected ref.
Labrecque, Ronald, 10/2/2019

Exceptions to Labeling Requirements (Continued)

- Containers are not required to be labeled under step 6.4.2 LR15 for any of the following conditions (Continued) :
  - Installed manufacturing or process equipment, such as reactor components, piping, and tanks.
  - Containers holding licensed material (other than sealed sources that are either specifically or generally licensed) that are within an RCA if the containers are:
    - Conspicuously marked (such as by providing a system of color coding of containers) commensurate with the radiological hazard;
    - Accessible only to individuals who have sufficient instruction to minimize radiation exposure while handling or working in the vicinity of the containers; and
    - Subject to plant procedures to ensure they are appropriately labeled before being removed from the posted area.

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LR15 corrected ref.
Labrecque, Ronald, 10/2/2019

Postings Required for Ladder Storage

- Post ladder storage areas, staged ladders, portable power lifts, and teletowers with a sign stating “Contact RP Prior to Working or Climbing Above 7 Feet.”
- Place a posting on each side of power lifts and teletowers when in service to ensure the caution is conspicuous.

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Posting and Boundary Requirements

Neutron Area

Hazard →	Boundary Requirements →	Posting
NEUTRON AREA η > 4 mrem/hour General Area or @ 30 cm from a source	• Post area commensurate with the criteria for Radiation Area, HRA, or LHRA • Refer to NISP-RP-05 for access controls.	Standard Radiation Sign with the following: • RADIATION AREA • RP BRIEF REQUIRED FOR ENTRY • NEUTRON MONITORING REQUIRED

Table from NISP-004, Radiological Posting and Labeling.

Radiography

Hazard →	Boundary Requirements →	Posting
RADIOGRAPHY	• Setup of boundaries and barricades is a collaborative responsibility with the radiographer. • Radiographers must establish a restricted area boundary where the dose rate from source exposure is ≤ 2 mrem/hour. • Refer to NISP-RP-09, *Radiography* for boundary criteria and access controls.	Radiography Sign in addition to a Standard Radiation Sign with the following inserts: • RADIOGRAPHY IN PROGRESS • **AUTHORIZED PERSONNEL ONLY**

Table from NISP-004, Radiological Posting and Labeling.

Table from NISP-004, Radiological Posting and Labeling.

High Radiation Area

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Hazard →	Boundary Requirements →	Posting
HIGH RADIATION AREA ≥ 80 & < 800 mrem/hour @ 30 cm	• A barrier is required for the boundary except while the area is accessed. A SOP is not considered as a barrier. • Barriers at access locations must be secured.[4] • Refer to Attachments 1 and 2 for sample checklists typically used to post and down-post areas. • Attachment 1 may also be used for routine surveillance to verify the integrity of boundaries. • Post or label access points that require the removal of bolts and/or the use of lifting equipment. • Refer to NISP-RP-05 for access controls.	HRA Sign with the following: • RP BRIEF REQUIRED FOR ENTRY For bolted or plug access, an HRA sign is not required but the access must be labeled with a warning and: • CONTACT RP PRIOR TO OPENING

Table from NISP-RP LR17, Radiological Posting and Labeling.

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LR16 needs to be updated from new rev
Labrecque, Ronald, 10/2/2019

LR17 added RP
Labrecque, Ronald, 10/2/2019

Locked High Radiation Area

Hazard →	Boundary Requirements →	Posting
LOCKED HIGH RADIATION AREA ≥ 800 mrem/hour @ 30 cm	• A locked barricade is required for the boundary except while the area is accessed. • Refer to Attachments 1 and 2 for sample checklists typically used to post and down-post areas. • A flashing light and barrier may be used in lieu of a locked barricade as permitted by the plant Technical Specifications and as approved by the RPM. • Refer to Attachment 3 for a sample checklist typically used to set up flashing lights. • Attachment 1 may also be used for routine surveillance to verify the integrity of boundaries. • An Access Control Guard may be used while an area is being routinely accessed or additional time is required to establish controlled boundaries. Refer to Attachment 4 for a sample checklist typically used to brief Access Control Guards. • Ensure posting and locked access of areas that require the removal of bolts and/or the use of lifting equipment. • Refer to NISP-RP-05 for access controls.	LHRA Sign with the following: • RP BRIEF REQUIRED FOR ENTRY For bolted or plug access, an LHRA sign is not required but the access must be labeled with a warning and: • CONTACT RP PRIOR TO OPENING

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Table from NISP-004, Radiological Posting and Labeling.

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LR18 needs to be updated from new rev
Labrecque, Ronald, 10/2/2019

LR19 must fix on all slides to add RP NISP-RP-xxx
Labrecque, Ronald, 10/2/2019

Very High Radiation Area

Hazard →	Boundary Requirements →	Posting
VERY HIGH RADIATION AREA ≥ 500 rads/hour at 1 meter from any source or surface	• A locked barricade is required for the boundary except while the area is accessed.[5] • An Access Control Guard may be used while an area is being routinely accessed or additional time is required to establish controlled boundaries. Refer to Attachment 4 for a sample checklist typically used to brief Access Control Guards. • Refer to Attachments 1 and 2 for sample checklists typically used to post and down-post areas. • Attachment 1 may also be used for routine surveillance to verify the integrity of boundaries. • Refer to NISP-RP-05 for access controls.	VHRA Sign

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Table from NISP-004, Radiological Posting and Labeling.

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LR20 needs to be updated from new rev
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Contaminated Area

Hazard →	Boundary Requirements →	Posting

Contaminated Area
≥ 1,000 & < 100,000 βγ OR ≥ 20 α dpm/100 cm²
	• Use radiation rope to establish boundaries with conspicuous postings.
	• Radiation tape may be used in lieu of radiation rope to establish a boundary for a small area such as a sample sink, tabletop, drain, pump basin, catch basin, tubing, etc. Radiation tape must be accompanied with the text "Contaminated Area."
	• Conspicuously posted physical barriers such as handrails and knee walls do not require the use of radiation rope or tape on the barrier.
	• Place a step-off-pad (SOP) if required for workers to exit and remove protective clothing. (Note: An SOP is not a substitute for an HRA barrier.)
	• Secure hoses, cables, cords, etc. crossing the boundary to prevent pulling the potentially contaminated item out of the Contaminated Area.
	• Setup friskers and/or contamination monitors in close proximity after exiting the area to:
	  ○ Perform whole body monitoring OR
	  ○ Perform hand and foot frisking prior to proceeding to the nearest whole body contamination monitor.
		Standard Radiation Sign with the following:
		• CONTAMINATED AREA

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Table from NISP-004, Radiological Posting and Labeling.

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LR21 needs to be updated from new rev
Labrecque, Ronald, 10/2/2019

High Contamination Area

Hazard →	Boundary Requirements →	Posting
HIGH CONTAMINATION AREA ≥ 100,000 βγ dpm/100 cm²	• Use radiation rope to establish boundaries with conspicuous postings. • If worker access is required, establish a double SOP arrangement with knee or curtain walls as needed to contain the high levels of contamination.	Standard Radiation Sign with the following: • HIGH CONTAMINATION AREA • RP BRIEF REQUIRED FOR ENTRY

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Table from NISP-004, Radiological Posting and Labeling.

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LR22 needs to be updated from new rev
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DRP Area

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Hazard	Boundary Requirements	Posting
DRP AREA DRPs > 500,000 dpm OR > 50,000 ncpm	• Use radiation rope to establish boundaries with conspicuous postings. • Establish barriers as needed to prevent migration of particles across the boundary, e.g. a knee or curtain wall. • Establish a double SOP arrangement to maintain a buffer area to prevent particles from migrating to clean areas.	Standard Radiation Sign with the following: • HIGH CONTAMINATION AREA • DISCRETE RADIOACTIVE PARTICLES PRESENT • RP BRIEF REQUIRED FOR ENTRY Post the buffer area with Radiation Sign and the following inserts: • CONTAMINATED AREA • DRP BUFFER AREA

Table from NISP-004, Radiological Posting and Labeling.

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LR23 needs to be updated from new rev
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Airborne Radioactivity Area

Hazard	Boundary Requirements	Posting
AIRBORNE RADIOACTIVITY AREA Particulates & Iodine ≥ 0.3 DAC	• Setup a rope barrier and posting if airborne levels are due to, or expected from, system leakage or work in high levels of contamination. • Install ventilation and/or containment devices as needed to encapsulate the airborne radioactivity within the boundary.	Standard Radiation Sign with the following: • AIRBORNE RADIOACTIVITY AREA • RP BRIEF REQUIRED FOR ENTRY
AIRBORNE RADIOACTIVITY AREA Noble Gas ≥ 1.0 DAC	• Setup a rope barrier and posting when identified.	Standard Radiation Sign with the following: • AIRBORNE RADIOACTIVITY AREA • RP BRIEF REQUIRED FOR ENTRY

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Table from NISP-004, Radiological Posting and Labeling.

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LR24 needs to be updated from new rev
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Alpha 2 Area

Hazard →	Boundary Requirements →	Posting
ALPHA 2 AREA $\beta\gamma/\alpha$ ratio = 300 - 30,000 AND $\alpha \geq 20$ dpm/100 cm^2	• Boundary controls are the same as for a Contaminated Area.	Standard Radiation Sign with the following: • CONTAMINATED AREA • LEVEL 2 ALPHA AREA

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Table from NISP-004, Radiological Posting and Labeling.

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LR25 needs to be updated from new rev
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Alpha 3 Area

Hazard	Boundary Requirements	Posting
ALPHA 3 AREA βγ/α ratio ≤300 AND α ≥ 20 dpm/100 cm²	• Boundary controls are the same as for a Contaminated Area. • If βγ/α ratio ≤ 50, setup a frisker capable of detecting alpha radiation in close proximity to the boundary	Standard Radiation Sign with the following: • CONTAMINATED AREA • LEVEL 3 ALPHA AREA • RP BRIEF REQUIRED FOR ENTRY If βγ/α ratio < 50, add: • ALPHA FRISKING/MONITORING REQUIRED UPON EXIT

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Table from NISP-004, Radiological Posting and Labeling.

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LR26 needs to be updated from new rev
Labrecque, Ronald, 10/2/2019

Radiation Area

Hazard →	Boundary Requirements →	Posting
RADIATION AREA ≥ 4 & < 80 mrem/hour @ 30 cm	• Posting must be conspicuous at entry point and external to the Radiation Area. • Boundary demarcation or barricades are not required. • Avoid a single posting for a very large area or room if most of the area or room is < 4 mrem/hour. In such conditions, post the discrete areas or rooms ≥ 4 mrem/hour.	Standard Radiation Sign with the following: • RADIATION AREA

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Table from NISP-004, Radiological Posting and Labeling.

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LR27 needs to be updated from new rev
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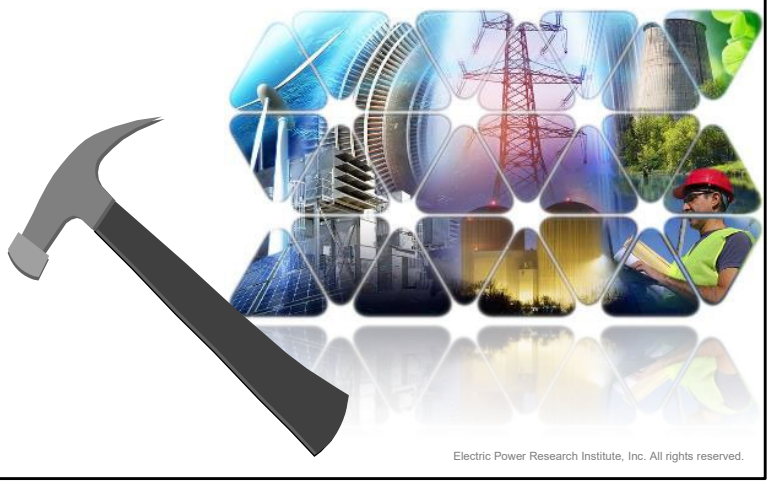
CONSTRUCTING POSTED AREAS



GENERAL POSTED AREA CONSTRUCTION

- Posted Area Boundaries:
  - Yellow and magenta rope, ribbons, chains, or physical barriers such as existing walls, fences or railings, or a radiation trained worker.
    - HRA's require the use of a physical barrier.
  - Appropriate radiological warning signs.

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Designate posted area boundaries using either (or a combination of) yellow and magenta rope, ribbon, or chains with the appropriate radiological warning signs.
Physical barriers can serve as a posted area boundary.
Physical barriers (such as walls, fences, etc.) can be used in place of rope boundaries.

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GENERAL POSTED AREA CONSTRUCTION

- Place rope/ribbon ≈ 3-5 feet above the floor.
- Postings and boundaries should be established such that workers may enter the area without having to “duck under”, move or adjust a posting or barrier to enter the area. Exceptions include use of a swing gate, door, turnstile, etc.

- Do not place ropes on:
  - Valve handwheels.
  - Snubbers.
  - Hot pipes or equipment.
  - Instrument tubing.
  - Rotating equipment.

Engineering may approve attachments to some plant equipment

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Revised per NISP-RP-004 Rev 1.

Slide 45

LR28 removed duplicate info
Labrecque, Ronald, 10/2/2019

GENERAL POSTED AREA CONSTRUCTION

- Yellow and magenta tape or paint can be used as a boundary for areas below the threshold for posting High Radiation Areas where rope, ribbon, chain, stanchions, etc. are not practical.
- Ensure radiological areas and boundaries are conspicuously posted to prevent inadvertent access.
- For areas posted as a contaminated area, the step off pad is considered the boundary. Avoid the use of rope, swing gates, or turnstiles as the barrier for those areas unless needed for other radiological conditions, such as high radiation area

LR29

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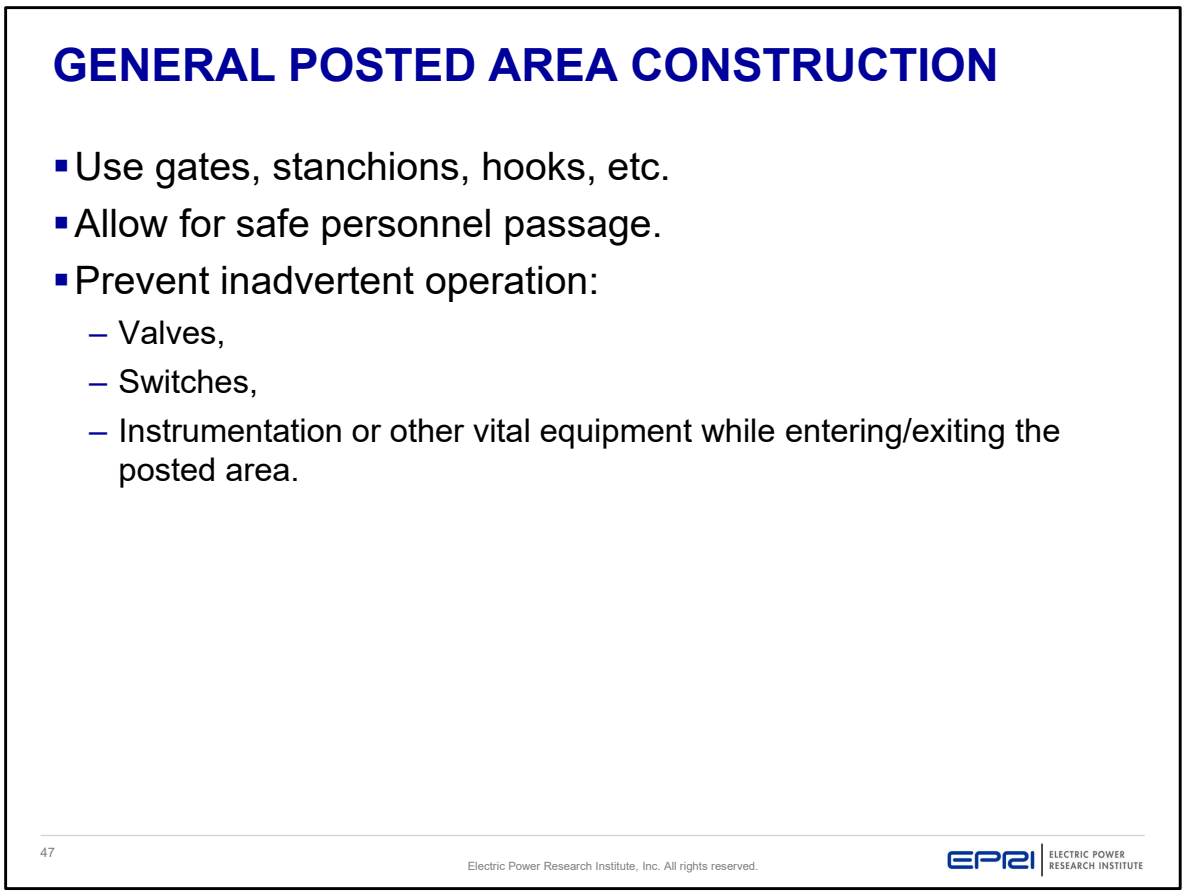
Areas that might not be practical would be floor drains or janitor sinks.

Revised per NISP-RP-004 Rev 1.

Slide 46

LR29 changed per 5.1 of 004
Labrecque, Ronald, 10/2/2019



Use gates, stanchions, hooks, etc setting up entrances/exits such that they allow for safe personnel passage and that personnel will not inadvertently operate valves, switches, instrumentation or other vital equipment while entering/exiting the posted area.

GENERAL POSTED AREA CONSTRUCTION

- For HRAs:
  - Free egress requirements maintained while area is occupied.
  - Area must be barricaded and conspicuously posted.

  OR
  - Guarded

- For LHRAs, & VHRAs:
  - Free egress requirements maintained while area is occupied.
  - Area must be barricaded and conspicuously posted.
  - Locked or Guarded

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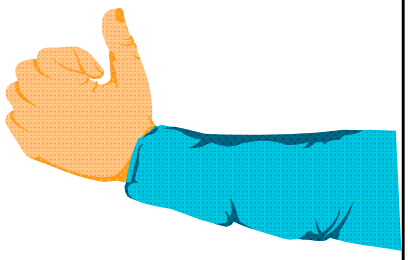
Meet free exit requirements at all times when personnel are in HRAs, LHRAs, and VHRAs.

GENERAL POSTED AREA CONSTRUCTION

- Sign visibility:
  - The sign must be seen from ANY direction.
- General Rule of Thumb:
  - If one can stand anywhere at the posted area boundary and NOT see a sign, additional signs are needed.
  - If at least one sign is visible from all posted area locations, then there is sufficient posting.



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How many signs are REQUIRED on a posted area?
As many as it takes to ensure anyone approaching the posted area from any direction can see a sign.

Posted Areas enclosed by physical barriers (such as walls, fences, etc.) do not have to be posted except at the entrance.

GENERAL POSTED AREA CONSTRUCTION

- Ensure signs at the different access points contain identical information.

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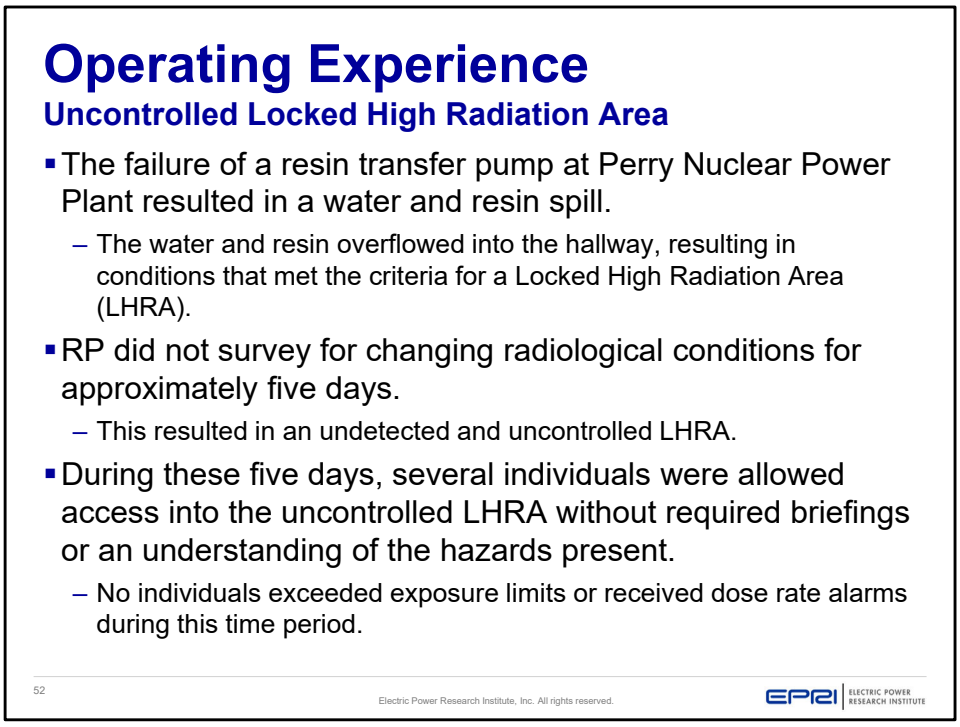
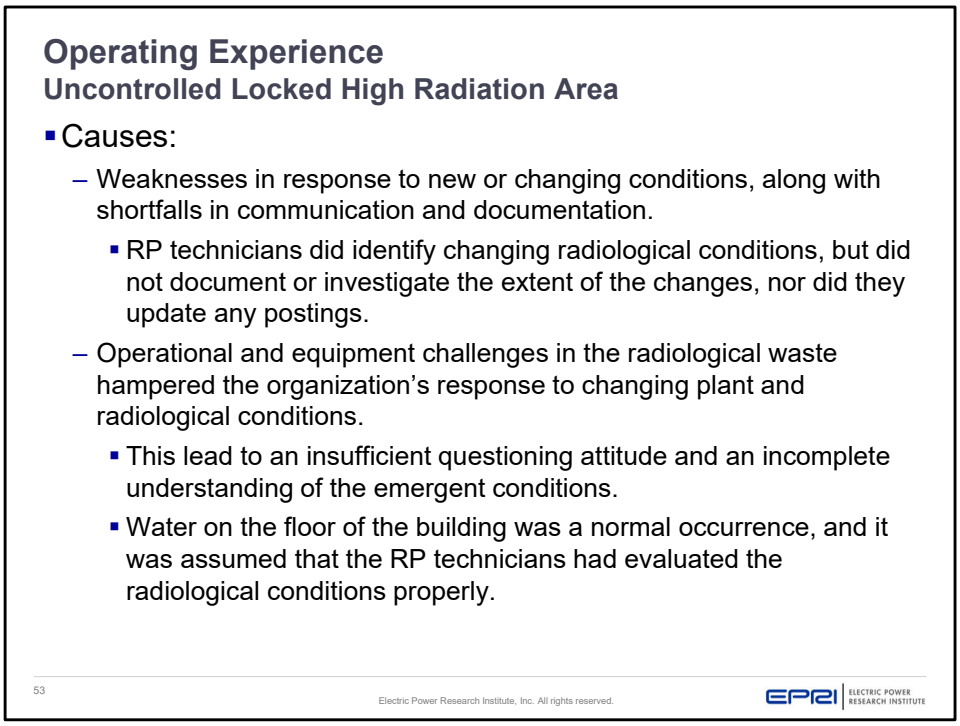
Operating Experience



In June 2012 at Perry Nuclear Power Plant, the failure of a resin transfer pump resulted in a water and resin spill, which subsequently overflowed into the general area hallway of the radiological waste building. The presence of the resin mixture in the hallway resulted in changing radiological conditions in the area that met the requirements of a locked high radiation area (LHRA). After being informed of the failed resin transfer pump by operations personnel, radiation protection (RP) technicians did not survey for changing radiological conditions for approximately five days, resulting in an undetected and uncontrolled LHRA. On several occasions, individuals were granted access to the uncontrolled LHRA without the required briefing and understanding of the hazards present; however, no individual exceeded exposure limits or received dose rate alarms.



Weaknesses in individual and organizational accountability in response to new or changing conditions, coupled with shortfalls in communication and documentation, led to the inadequate response. On several occasions, RP technicians identified changing radiological conditions, such as resin present in the water and increased dose rates, but did not document these indications on logs or survey maps. Even though dose rates were greater than expected, RP technicians did not take action to further evaluate the extent of the elevated levels. Although RP technicians verbally communicated that access to the area was restricted, they did not update postings or radiological work permits and did not document the change of access controls. As a result, appropriate physical barriers and controls were not established to restrict personnel access and protect workers. On three separate occasions, individuals had unrestricted access to all areas within the hallway, including the uncontrolled LHRA.

Ongoing radiological waste building operational and equipment challenges impeded the organization's response to changing plant and radiological conditions, resulting in an insufficient questioning attitude and an incomplete understanding of the emergent conditions. Supervisors were informed of the standing water but did not address the situation appropriately because standing water in the radiological waste building has been an ongoing and documented issue. Supervisors assumed that the quantity of standing water was the same as previous occurrences and that the RP technicians had

assessed the radiological conditions properly.

Operating Experience
Uncontrolled Locked High Radiation Area

- Lessons Learned
  - When the potential exists for changing radiological conditions within a work area, RP technicians should:
    - Fully assess and understand the risk
    - Perform regular monitoring
    - Update postings and documentation
    - Control all aspects of the work activity to ensure worker protection

Enabling Objective

1. Define the following terms
   - RCA
   - Radiation Area
   - High Radiation Area
   - Locked High Radiation Area
   - Very High Radiation Area
   - Neutron Area
   - Radiography Area
   - Contaminated Area
   - High Contamination Area
   - DRP Area
   - Alpha 2 Area
   - Alpha 3 Area
   - Airborne Radioactivity Area
   - Hot spot

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Enabling Objective

2. State the proper hierarchy for pocket inserts on postings.
3. State posting requirements for catch containments.
4. State posting and boundary requirements for a Neutron area.
5. State postings and boundary requirements for a Radiography area.
6. Identify the posting and boundary requirements for the following:
   - High Radiation Area
   - Locked High Radiation Area
   - Very High Radiation Area
   - Contaminated Area
   - High Contamination Area
   - DRP Area
   - Airborne Radioactivity Area

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Enabling Objective

7. State posting required for a ladder storage area (to include staged ladders, portable power lifts, and teletowers).
8. State the boundary controls and posting requirements for an Alpha 2 Area.
9. State the boundary controls and posting requirements for an Alpha 3 Area.
10. State the labeling requirements for containers with radioactive material.
11. State the containers which are exceptions to labeling requirements for containers with radioactive materials.

[Insert enabling objectives from the STE task analysis. Copy and paste slide as needed to include all enabling objectives.]

[Notes as needed]

Terminal Objective

- When working as an RP technician at a US nuclear utility, individual will be able to establish boundaries, barriers, and postings necessary to inform workers of the radiological hazards in the work area in accordance with the standards of NISP-RP-004, Nuclear Industry Standard Process for Radiological Posting and Labeling.

[Insert terminal objective from the STE task analysis]

[Notes as needed]

[STE Title] Training Conclusion:

- Questions:
- Feedback:
- Conclusions:

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Provide course feedback to EPRI STE program: clear@epri.com