

# Monitor Personnel Contamination and Unconditional Release

## STE RP 02.06 and RP 03.06

Revision 2



# 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.*

# Personnel Contamination Monitoring

## Overview / Importance

The purpose of this training is to provide you with methods to assess, investigate, and document personnel radioactive contamination events and to understand the process for performing external decontamination of personnel.

Weaknesses in contamination monitoring can cause personnel contamination to go unidentified, this could result in unplanned personnel exposure.



# Operating Experience

## INPO SER 42-85

### **Personnel Skin Contamination Due to Activated Stellite Particles**

Eight personnel at McGuire were found with highly radioactive particles (in microcurie range) on their skin.

It is thought these events were due to the use of protective clothing that still had microscopic particles containing cobalt-60 after laundering.

In one event, the worker's skin dose was calculated to be in the range of 1.06 rem to 10.6 rem and a whole body dose of 0.03 rem.

# Operating Experience

## INPO SER 42-85

### **Personnel Skin Contamination Due to Activated Stellite Particles**

Stellite particles from components in the primary systems, when activated by the reactor core, provide a significant source of Cobalt-60. An EPRI study has shown that stellite contributes more than 50 percent of the cobalt inventory in PWR reactor coolant systems.

A high level of good housekeeping during maintenance activities, such as recommended in EPRI report NP-3220, will minimize intrusion and reduce the possibility of stellite particles becoming a source of contamination.

The contribution of stellite to increased collective radiation exposure levels is recognized. However, these incidents show that stellite can also be an individual exposure control problem.

# Thinking and Engaged Workers

## SOER 10-2

- Are personally accountable for safe execution and seeking out operating experience
- Take time to do the job right the first time
- Stop if conditions are not as expected
- Model the use of error reduction tools
- Consider most likely undesired consequence, validate contingency actions
- Identify operational and nuclear safety impacts before work begins



# Terminal Objective

When working as an RP Technician at a US nuclear utility, perform proper monitoring and documentation of personnel for skin and clothing contamination and use proper personnel decontamination methods in accordance with the standards of NISP-RP-06, Nuclear Industry Standard Process for Personnel Contamination Monitoring.



**The STE Knowledge Examination requires a scoring grade of 80% to pass the examination.**

# Enabling Objectives

**Given and in accordance with NISP-RP-06, students will:**

1. Define the following terms: (RP 2.06 and RP 3.06)
  - Level 1 PCE
  - Level 2 PCE
  - Level 3 PCE
  - Discrete Radioactive Particle
2. Classify if an event is a PCE. (RP 2.06 and RP 3.06)
3. State the conditions when documentation of an event is not required. (RP 2.06 and RP 3.06)
4. State the requirements for performing an alpha contamination survey on contaminated personnel. (RP 2.06 and RP 3.06)
5. State the notification requirements for personnel contamination events. (RP 2.06 and RP 3.06)



# Enabling Objectives

Given and in accordance with NISP-RP-06, students will:

6. State indicators of internal contamination.  
(RP 2.06 and RP 3.06)
7. State the actions to be taken when internal contamination is suspected. (RP 2.06 and RP 3.06)
8. State actions to be taken when contamination is found on clothing. (RP 2.06 and RP 3.06)
9. State actions to be taken when naturally occurring isotopes or noble gas are the suspected cause of a personnel contamination monitor alarm. (RP 2.06 and RP 3.06)

# Enabling Objectives

Given and in accordance with NISP-RP-06, students will:

10. State the actions to take when a contamination event involves multiple personnel. (RP 2.06 and RP 3.06)
11. Describe follow-up survey requirements when the Personnel Contamination Event involves a shoe contamination. (RP 2.06 and RP 3.06)
12. Describe effective communication between the Radiation Protection Technician and the worker.  
(RP 2.06 and RP 3.06)

# Enabling Objectives

Given and in accordance with NISP-RP-06, students will:

Junior technicians are only responsible for information contained in objectives 1 through 12.

Senior Technicians are responsible for information provided for all objectives 1 through 18

13. State when skin decontamination should be terminated.  
(RP 3.06)
14. State release criteria for personnel involved in a Personnel Contamination Event. (RP 3.06)
15. State the conditions that require dose assessment to be performed. (RP 3.06)
16. Calculate the exposure time on skin for a given hot particle (RP 3.06)

# Enabling Objectives

Given and in accordance with NISP-RP-06, students will:

17. Describe the decon method that maybe used to remove skin contamination. (RP 3.06)
  
18. Describe how individuals can be released after decontamination has taken place. (RP 3.06)

# Contamination Monitoring

**All personnel must exit through a beta and gamma sensitive monitor(s) prior to final exit from the RCA (Radiologically Controlled Area). Contamination monitoring may also occur inside the plant in locations where the background is suitable for monitoring.**

## Responding to a Contamination Monitor Alarm

### If an individual alarms a contamination monitor:

- Note the location of the alarm and the activity.
- Instruct the individual to re-monitor.
- If no alarm occurs, the individual may exit or proceed to the final exit point for monitoring.
- If second alarm occurs, note the location and activity and proceed to step 2.8 of NISP-RP-06

**NOTE:** The individual may be concerned about the potential health effects of being possibly contaminated. If during the process you note a level of concern or uneasiness ask an RP Supervisor to help explain the process and the low level of risk involved.

# In the event of a second alarm, indicating a potential contamination event, immediately:

## Step 2.8 of NISP-RP-06

- Take actions to prevent the spread of contamination to the surrounding area and to other personnel.
- In a background area of 200 cpm or less, using a frisker or equivalent instrument, and maintaining a detector to surface distance of approximately ½ inch or less, slowly survey the individual with additional focus on suspected areas to determine the location and activity of contamination.
- Ensure areas are surveyed which could have been partially shielded from the detectors such as arm pits, folds in clothing, or tops of shoes.
- Ensure the individual is thoroughly surveyed. Individuals can be contaminated in more than one location or by more than one radiological concern.

## In the event of a second alarm, indicating a potential contamination event, immediately:

- Take into consideration the need to assess for alpha exposure based on the radiological hazards from the work area.
- If the individual was working in an area posted and controlled for alpha contamination then perform a survey using an instrument capable of detecting alpha contamination. If alpha contamination is detected notify RP Supervision.
- If needed transport the individual to the normal RCA exit point/decon area. Cover or remove contaminated clothing prior to transporting to prevent the spread of contamination.
- Survey the exit area and travel path of the individual to ensure no contamination spread occurred during the event. Document all surveys



## Ascertain the following:

- Did the individual have recently received medical testing/treatment involving radionuclides?
- Is the alarm caused by naturally occurring radioactive material such as tungsten welding rods or Radon?
- Notify RP Supervision of survey results and request assistance as necessary.

## Personal Contamination Event (PCE):

Contamination on an individual that meets the following criteria is a PCE:

1. The contamination is  $\geq 100$  ccpm by direct frisk.
2. The contamination is on the person, or their personal items such as shoes, personal clothing, modesty clothing, lanyards, or glasses (other than safety glasses)
3. The contamination is NOT from Radon or Noble Gases

**Objective 1: Define the following terms: Level 1 PCE, Level 2 PCE, Level 3 PCE, and Discrete Radioactive Particle**

# Personal Contamination Events (PCE):

- Personnel Contamination Events can be documented using the applicable Attachments in NISP-RP-06, “Personnel Contamination Monitoring”, equivalent site forms, or electronic processes. Use Attachment 3, PCE Classification Guidelines, to help determine if the event should be documented as a PCE.
- All personnel contamination events are documented on Attachment 4, Personnel Contamination Event Log.
- Personnel contamination events (PCEs) are documented on Attachment 1, Personnel Contamination Event, for Level 2 and 3 events.
- Documentation is not required for events involving noble gas, medical radioisotopes, naturally occurring radioactive material, or contamination <100 ccpm.

**Objective 2: Classify if an event is a PCE. (RP 2.06 and RP 3.06)**

**Objective 3 : State the conditions when documentation of an event in not required. (RP 2.06 and RP 3.06)**

## Personnel Contamination Events are classified using Attachment 3: PCE Classification Guidelines

PCE Classification upon Alarm at or Within RCA Boundary Caused by:	Classification
Noble Gas/Radon	Not PCE
Medical Radioisotopes	Not PCE
Contamination <100 ccpm	Not PCE
Personal Items: Shoes, Personal Clothing, Lanyards, Glasses*	PCE
Modesty Clothing	PCE
DLR	Not PCE
SRD	Not PCE
Internal Contamination Only	Not PCE
Firefighting equipment	Not PCE
Ice Vest	Not PCE
Hard Hat	Not PCE
Work Gloves	Not PCE

\*Safety glasses provided by the station would not be counted as PCE

**Objective 2: Classify if an event is a PCE. (RP 2.06 and RP 3.06)**

# Personnel Contamination Events are classified using the following criteria:

- Level 1            100 ccpm – 5000 ccpm
- Level 2            >5000 ccpm – 50,000 ccpm
- Level 3            >50,000 ccpm

**Objective 1: Define the following terms: Level 1 PCE, Level 2 PCE, Level 3 PCE, and Discrete Radioactive Particle**

# Discrete Radioactive Particle Definition

Discrete Radioactive Particles (DRPs) are small, loose, highly radioactive particles sometimes referred to as hot particles. Discrete particles can deliver a large dose to a small area and shall be captured and removed as quickly as possible. By definition discrete particles are greater than 50,000 ccpm.

Note: A high count rate in a small localized area can be an indication of a discrete particle.

**Objective 1: Define the following terms: Level 1 PCE, Level 2 PCE, Level 3 PCE, and Discrete Radioactive Particle**

## If a discrete radioactive particle is identified then:

- capture and remove the particle(s) using proper contamination controls.
- Note the location of the particle (skin or clothing).
- Document the survey results of the particle using a frisker, or if necessary, an open window ion chamber reading.
- If particle was found on clothing, survey and document the reading obtained on top and underneath the clothing (i.e. area in contact with skin).
- Secure the particle in the proper container and label as radioactive material.
- Send the discrete particle for isotopic analysis.

## **If Alpha contamination is suspected due to work location or as indicated by a personal monitoring alarm then frisk for Alpha.**

- Alpha frisking must be performed slowly and with the detector as close to the object as possible without touching.
- There is a potential for significant alpha exposure when an individual has a contaminated wound or cut.
- Mitigation of exposure through decontamination efforts is vitally important in the early phases of an incident.

**Objective 4: State the requirements for performing an alpha contamination survey on contaminated personnel.**



# Notify RP Supervision if you:

- Need assistance
- Have multiple monitoring alarms
- Suspect internal contamination
- Discover alpha contamination
- Have a contaminated wound
- Think a dose assessment may be needed
- Find a DRP that is 2mr/hr or greater

**Objective 5: State the notification requirements for personnel contamination events.**

# Indicators of Internal Contamination:

- Approximate equal counts on the chest and the back.
- Facial contamination inside the area normally protected by the sealing surface of a respirator.
- If contamination is detected around the nose, have the individual to blow their nose on a tissue. Treat the item as contaminated and analyze for presence of contamination. Any indications of radioactive material suggests the possibility of internal contamination.
- The inability to pass a gamma monitor, when alarms occur in the upper region of the body.

**Objective 6: State indicators of internal contamination.**



## When internal contamination suspected:

- **Notify RP Supervision**
- **Capture information for the needed documentation and dose assessment**
- **Remove external contamination per NISP-RP-06 section 3.3**
- **Have the individual shower and don paper suit**
- **Send the individual for a Whole Body Count**

**Remember RPM approval is required to release an individual if they cannot pass the portal monitors.**

**Objective 7: State the actions to be taken when internal contamination is suspected.**

## If the contamination is on clothing then:

- Remove the clothing using proper contamination controls to prevent the spread of contamination to other parts of the body or the surrounding area.
- Survey the area where the clothing was removed with a frisker. If there are no indications of contamination instruct the individual to re-monitor in beta and gamma exit monitors.
- Prior to the decontamination or disposal of the contaminated clothing ensure all survey data, or isotopic analysis, has been obtained to support skin dose assessments.

Remember folds or layers of clothing can act as a shield. Ensure all areas are thoroughly surveyed.

**Objective 8: State the actions to be taken when contamination is found on clothing.**

## Noble gas or naturally occurring radioactivity may be the cause if:

- Low level counts evenly spread over a wide area can be an indication of noble gas or naturally occurring radioactive material.
- Clothing (i.e. polyester) capable of carrying a relatively high electrostatic charge typically in high friction areas such as the knee and elbow.
- If the affected zone is 300 ccpm or less when monitored with a Geiger-Muller type frisker, and the net beta count to net alpha count ratio is between 0.4 and 5.0, then consider the contamination to be radon decay products.
- Naturally occurring radioactive materials have a half-life less than 30 minutes. Allow for time to decay and re-monitor. If counts are decreasing it can be an indication of noble gas or naturally occurring radioactivity.

**Objective 9: State the actions to be taken when naturally occurring isotopes or noble gas are the suspected cause of a personnel contamination monitor alarm.**

## If the contamination is from naturally occurring isotopes or noble gas then:

- Instruct the individual to remain in the area to allow for decay, and re-monitor after approximately 30 minutes.
- If preferred, the individual can replace the clothing suspected to be contaminated with naturally occurring isotopes or noble gas and re-monitor. If no alarm occurs the individual can exit the area.
- If counts have not decreased after 30 minutes then the activity may not be from natural products or noble gas. Re-survey for other causes of contamination alarms.

**Note:** Documentation is not required for events involving noble gas, medical radioisotopes, naturally occurring radioactive material, or contamination <100 ccpm.

**Objective 9: State the actions to be taken when naturally occurring isotopes or noble gas are the suspected cause of a personnel contamination monitor alarm.**

## Individuals can be conditionally released with radon or noble gas under the following conditions:

- RPM/Designee has approved the conditional release.
- Radon or noble gas has been confirmed to be the cause of the alarm by step 3.2.5.C. of NISP-RP-06, or individual has exited from confirmed noble gas or radon area.
  - Step 3.2.5.C. of NISP-RP-06, “If the affected zone is 300 ccpm or less when monitored with a Geiger-Muller type frisker, and the net beta count to net alpha count ratio is between 0.4 and 5.0, then consider the contamination to be radon decay products”.
- Individual was not working in a posted contaminated area.
- Individual is instructed to re-monitor prior to exit from the site.

**Objective 9: State the actions to be taken when naturally occurring isotopes or noble gas are the suspected cause of a personnel contamination monitor alarm.**

## If a contamination event involves multiple personnel then:

- Contact RP Supervision for additional assistance.
- Maintain contamination control by keeping those individuals suspected of contamination segregated in one area. Provide instructions to individuals on where they should be located and why.
- If the event involves foot contaminations provide protective shoe covers or mats to prevent the spread of contamination to clean areas while individuals are being processed.
- Maintain the clean area clean, perform frequent surveys and decon as needed.
- As quickly as possible, determine the cause of the event and the route taken to the monitoring location so additional contamination surveys can be performed in the appropriate locations to prevent additional contamination events.
- If internal contamination is suspected then notify RP Supervision so that air samples can be obtained from the work area.

**Objective 10: State the actions to take when a contamination event involves multiple personnel.**



## Follow up actions for personnel contamination events:

Gather as much information as possible from the individual(s) involved, this will be needed for dose assessments and to help determine the cause of the event. Keep RP Supervision informed. Use a Questioning Attitude and consider the following:

- Was there a failure of protective clothing?
- Has a leak or spill occurred?
- Was there a failure of HEPA ventilation / Vacuum equipment in the area?
- Was there grinding, burning, or flapping on potentially contaminated surfaces?



# Follow up actions for personnel contamination events (cont.):

- Has there been a change in work scope or work process such as implementation of a different tool or opening of a different component?
- Is there a reason to suspect the contamination levels at the work site may have changed?
- Has the environmental conditions (increase in temperature) at the work site changed?
- What are the results of the follow up surveys taken in the work area?



## **If the event involves shoe contamination then:**

- **Notify RP supervision so they can send help**
- **Survey from the work location to the monitoring location, to identify and control the spread of contamination**
- **Use a shoe cover if the individual needs to move to a decon area**
- **Survey the portal monitor for contamination**

**Objective 11: Describe the follow-up survey requirements when the personnel contamination event involves a shoe contamination.**

# Communication

**Remember you are the professional therefore:**

- Stay Calm
- Communicate clearly
- Keep the individual at ease
- Follow the communication guidelines in NISP-RP-06  
Attachment 2

**Objective 12: Describe effective communication between the Radiation Protection Technician and the worker.**

# Communication

## Follow the guidelines in NISP-RP-06 Attachment 2

- Avoid using slang terms which can cause confusion or anxiety with the worker such as “crapped up” or “you’re hot”.
- Take into consideration the gender of the individual. Typically the same gender will support the surveying requirements for a contamination monitor alarm.
- Explain your actions before you take them. Help the worker understand the reason for the action.

**Objective 12: Describe effective communication between the Radiation Protection Technician and the worker.**

# Communication Continued

## NISP-RP-06 Attachment 2 (Cont.)

- Be sensitive to the workers concerns. This may be the first time they have experienced a contamination monitor going into alarm and may have true anxiety. Explain the low level detection ability of the unit. If needed, provide an opportunity for the individual to speak to the RPM or RP Management about personnel monitoring.
- Provide accurate survey results to the worker in ccpm.
- If decontamination is required explain the process before any actions are taken.
- Ensure the individual that their privacy will be protected at all times.

**Objective 12: Describe effective communication between the Radiation Protection Technician and the worker.**

## Decontamination

- Only ANSI qualified RP Technicians can perform or direct decontamination activities on personnel.
- Medical assistance is required for decontamination of wounds or around the eyes or for decontamination methods other than those listed in this procedure.
- If an injury has occurred, the medical needs take precedence over the decontamination process.
- If natural occurring radioactive material or noble gas is suspected, individuals can be decontaminated by allowing for radioactive decay.
- Proper contamination controls must be used by the RP technician while performing or assisting in personnel decontamination. As a minimum this includes wearing protective gloves.

## Decontamination

*RP Supervision/RP Management is required to approve decontamination methods other than those described below:*

- To decontaminate a discrete particle on clothing:
  - Capture with masking or duct tape.
  
- To decontaminate a discrete particle on skin:
  - Capture with Wet One wipe or similar material.



# Review Question # 1

Define the following terms:

- Level 1 PCE
- Level 2 PCE
- Level 3 PCE
- Discrete Radioactive Particle



LO 1

## Review Question # 2

Classify if an event is a PCE.



LO 2

## Review Question # 3

State the conditions when documentation of an event is not required.



LO 3

## Review Question # 4

What are the requirements for performing an alpha contamination survey on contaminated personnel?



LO 4

## Review Question # 5

What are the notification requirements for personnel contamination events?



LO 5

# Review Question # 6

Name the indicators of internal contamination.



LO 6

## Review Question # 7

What actions should be taken for suspected internal contamination?



LO 7

## Review Question # 8

What actions are to be taken when contamination is found on clothing?



LO 8



## Review Question # 9

What actions should be taken when naturally occurring isotopes or noble gas are the suspected cause of a personnel contamination monitor alarm?



LO 9

## Review Question # 10

What are the actions to be taken when a contamination event involves multiple personnel?



LO 10

# Review Question # 11

What are the follow up actions required when a personnel contamination event involves a shoe contamination?



LO 11

## Review Question # 12

Describe effective communication between Radiation Protection Technicians and workers.



LO 12

# **Personnel Contamination Monitoring**

**Junior technicians are only responsible for information contained in objectives 1 through 12.**

**Senior Technicians are responsible for information provided for all objectives 1 through 18**

**Objective 13 begins on the following slide of this lesson plan.**

# Decontamination

**If the contamination on the skin, other than the facial area, then take the following actions:**

- Decontaminate the skin using mild soap and tepid water. Observe the skin during the decontamination process and stop if redness of the skin occurs.
- Survey the affected area after each decontamination attempt. If contamination is still indicated repeat the decontamination process up to three times. If contamination is still indicated contact RP Supervision.
- When the contamination has been removed instruct the individual to re-monitor in beta and gamma exit monitors
- Document the survey results for each decontamination attempt.
- RP Supervision may authorize a more aggressive decontamination method, medical assistance may be required.

**Objective 13: State when skin decontamination should be terminated**

# Decontamination

## If the contamination on the clothing:

- Remove the clothing taking care not to spread contamination.
- Survey the area of skin beneath the clothing to identify if skin contamination is present.
- Return the clothing after it has been decontaminated, and if clears the being worn through the contamination monitors by the individual.
  - If the individual is not available, then the clothing can be released based on requirements in NISP-RP-07, Control of Radioactive Material.

## **Release Criteria for a an individual involved in a PCE:**

Once an individual has alarmed an exit monitor they must clear the same type of monitor before being released.

To be released an individual must successfully pass beta/gamma personnel monitors without alarming.

If they alarm due to internal contamination or incomplete decontamination, you must have RPM approval to release the individual from the RCA.

**Objective 14: State release criteria for personnel involved in a Personnel Contamination Event.**



# Dose Assessment

**Skin dose shall be assessed if there is the potential for 500 mrem or greater.** Recording and reporting is required under NRC regulations

- The station may decide to calculate and assess skin dose at a value lower than 500 mrem.
- The Station may utilize a “prospective determination” to document that individuals are not likely to receive in excess of 10 percent of the limits. With a “prospective determination” recording and reporting of identified contamination is voluntary, unless the exposure actually exceeds 5000 mrem in the calendar year.

**Objective 15: State the conditions that require dose assessment to be performed.**

# Dose assessments

Are required for any of the following:

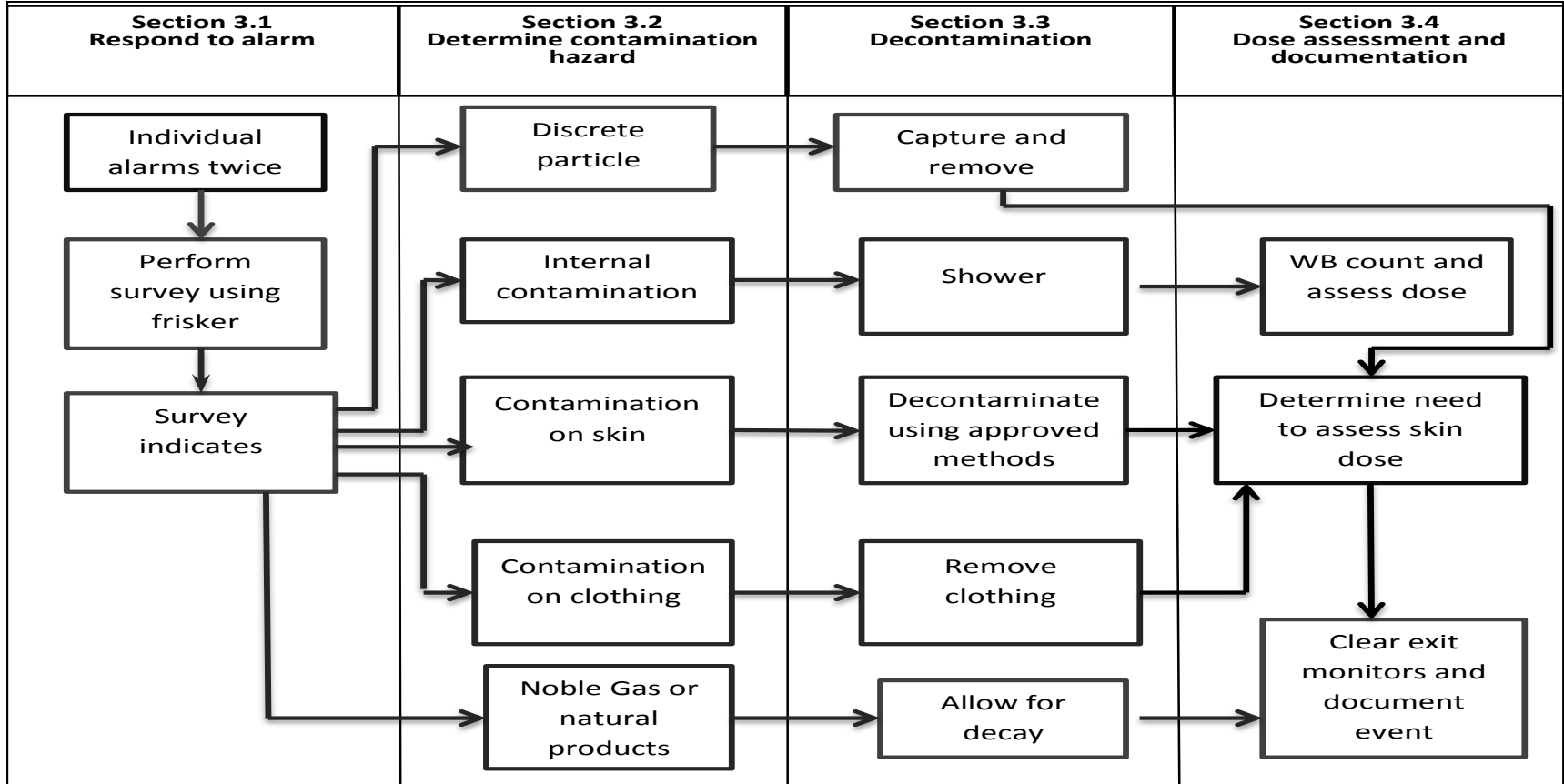
- Suspected internal contamination
- Contaminated wound
- Discrete particle exposure of  $\geq 50,000$  ccpm
- Skin contamination of  $\geq 50,000$  ccpm
- Contamination on skin is  $\geq 250,000$  ccpm-hours  
(count rate (ccpm) X time (in hours))

## **NOTE:**

*Based on site specific isotopes of concern the station may complete a prospective analysis and provide additional guidance for when skin dose assessments are required.*

**Objective 15: State the conditions that require dose assessment to be performed.**

# Personnel Monitoring Process Flow Chart



# DOCUMENTATION

Once all of the data has been gathered document the event in accordance with NISP-RP-06, Section 3.4.

All PCEs are documented on Attachment 4, Personnel Contamination Event Log:

## Attachment 4, Personnel Contamination Event Log

PCE # <sup>1</sup>	Date/Time <sup>5</sup>	Name/ID #	RWP and Task #	Work activity	Work location <sup>2</sup>	Activity level in ccpm <sup>3</sup>	Discrete Particle	Skin/Clothing <sup>4</sup>	Decon Successful/Time <sup>6</sup>	Worker Signature <sup>7</sup>	Inst. #	RP Tech Print/Sign
							Yes No	Skin Clothing	Yes No _____			
							Yes No	Skin Clothing	Yes No _____			
							Yes No	Skin Clothing	Yes No _____			

### Instruction notes

1. Next sequential number starting at YY-XXX.
2. Provide as specific information as possible on work location so follow up surveys can be obtained if necessary.
3. Record activity for all locations found.
4. Check both boxes if contamination was found on skin and clothing
5. Record the time of discovery
6. Record the time decon was completed
7. Worker sign acknowledging decontamination is complete and successful re-monitoring

# DOCUMENTATION

## Attachment 4, Personnel Contamination Event Log

PCE # <sup>1</sup>	Date/Time <sup>5</sup>	Name/ID #	RWP and Task #	Work activity	Work location <sup>2</sup>	Activity level in ccpm <sup>3</sup>	Discrete Particle	Skin/Clothing <sup>4</sup>	Decon Successful/Time <sup>6</sup>	Worker Signature <sup>7</sup>	Inst. #	RP Tech Print/Sign
							Yes No	Skin  Clothing	Yes No _____			
							Yes No	Skin  Clothing	Yes No _____			
							Yes No	Skin  Clothing	Yes No _____			

### Instruction notes

1. Next sequential number starting at YY-XXX.
2. Provide as specific information as possible on work location so follow up surveys can be obtained if necessary.
3. Record activity for all locations found.
4. Check both boxes if contamination was found on skin and clothing
5. Record the time of discovery
6. Record the time decon was completed
7. Worker sign acknowledging decontamination is complete and successful re-monitoring

# DOCUMENTATION (cont.)

Level 2 and 3 Events PCEs require more information to properly assess potential dose, therefore further documentation is required on NISP-RP-06 Attachment 1, "Personnel Contamination Event"

Log #: _____	*Action Level    2    3	Date: _____	Time: _____
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Action Level – circle the appropriate level – (Action Level 2 is > 5,000 ccpm - 50,000 ccpm), (Action Level 3 is > 50,000 ccpm).

## Section 1 – Event General Information

Name of Individual: _____	ID #: _____
Time/Date of Detection: _____ / _____	Estimated Exposure Time: _____
hours	
RWP and Task #: _____	Individual's Department or
Company: _____	
Unit/Building/Elevation/Room/etc: _____	
Survey Instruments (ID# / Cal. Due Date): _____ / _____	_____ / _____
IF above Instrument used for Skin Dose Assessment, verify current source checked, Initial/date _____ / _____	
Brief Description of Incident: _____	

## Section 2 – Clothing/Shoes

Item Contaminated:	Original Activity	*Type of Contamination	
_____	_____ ccpm	<input type="checkbox"/> 1	<input type="checkbox"/> 2
_____	_____ ccpm	<input type="checkbox"/> 1	<input type="checkbox"/> 2
_____	_____ ccpm	<input type="checkbox"/> 1	<input type="checkbox"/> 2

\* Type of contamination – check appropriate box (1) – distributed contamination (2) – discrete radioactive particle

Disposition of Clothing:     Decontaminated     Disposal     Other (Specify) \_\_\_\_\_

# DOCUMENTATION (cont.)

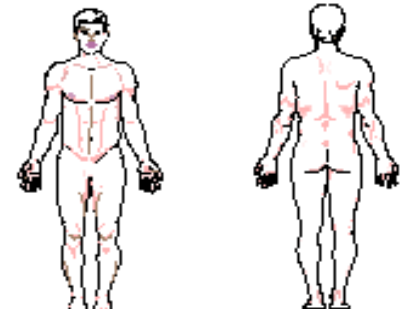
Level 2 and 3 Events PCEs require more information to properly assess potential dose, therefore further documentation is required on NISP-RP-06 Attachment 1

## Section 3 – Skin

Contaminated     
  Not Contaminated     
  Facial Region?

Body Location	*Type of Contamination	Initial Activity in ccpm	Activity After 1 <sup>st</sup> Decon	Activity After 2 <sup>nd</sup> Decon	Activity After 3 <sup>rd</sup> Decon	Approx Exposure Time	Final Activity
	1 <input type="checkbox"/> 2 <input type="checkbox"/>						
	1 <input type="checkbox"/> 2 <input type="checkbox"/>						
	1 <input type="checkbox"/> 2 <input type="checkbox"/>						
	1 <input type="checkbox"/> 2 <input type="checkbox"/>						

\* Type of contamination – check appropriate box (1) – distributed contamination (2) – discrete radioactive particle



### Decontamination Outcome:

Successful     
  Contamination Remains (Specify Location/Level): \_\_\_\_\_

Decontamination method \_\_\_\_\_

Decontamination Completed: Date: \_\_\_\_\_ Time: \_\_\_\_\_ RP Initials and ID #: \_\_\_\_\_/\_\_\_\_\_

The decontamination process was explained to me and I have been given an opportunity to have any questions/concerns about this event answered to my satisfaction.

Individual Print/Sign: \_\_\_\_\_/\_\_\_\_\_ Date: \_\_\_\_\_ Phone (ext): \_\_\_\_\_

# DOCUMENTATION (cont.)

- Determine the cause using the cause codes in NISP-RP-06 section 2.15.5:
  - R1 – Clean area: Contamination occurred outside of a posted contamination area.
  - R2 – Poor work practice: Contamination occurred for reasons like improper dress out, not following RWP instruction, improper doffing, or touching exposed skin inappropriately.
  - R3 – Inadequate rad controls: Contamination caused by, for example, a failure to prescribe adequate protective clothing, inadequate decontamination or control of contamination, or an unnoticed change in radiological conditions.



# DOCUMENTATION (cont.)

- R4- Equipment failure or spill related: Contamination occurred due to equipment failure (such as valve leak) or an spill (such as improper valve manipulation)
- R5 – Protective clothing: Contamination caused by defect of the protective clothing such as a tear, or caused by existing contamination of the protective clothing. This code may also be used when it is determined that “wicking” or “sweat through” of the PCs has occurred while in the respective work area.

## Calculate the exposure time on skin for a given hot particle:

Dose assessment is required for any of the following:

1. Suspected internal contamination
2. Contaminated wound
3. Discrete particle exposure of  $\geq 50,000$  ccpm
4. Skin contamination of  $\geq 50,000$  ccpm
5. Contamination on skin is  $\geq 250,000$  ccpm-hours (count rate (ccpm) X time (in hours))

Residence time of the discrete particle or distribute contamination (Items 4 and 5 above) can be conservatively estimated from the initial log on time on their RWP until the contamination was removed during the decon process.

Security log times may also be used if a security door or turn stile was used to gain access to a radiologically controlled area (RCA). Multiply count rate of the contamination times the estimated residence time of the contamination on the individual.

Example: A discrete particle reading 60,000 ccpm with a residence time of 4 hours would equal 240,000 ccpm-hours

**Objective 16: Calculate the exposure time on skin for a given hot particle.**

# Describe the decon method that maybe used to remove skin contamination

- Proper contamination controls must be used by the RP technician while performing or assisting in personnel decontamination. As a minimum this includes wearing protective gloves.
- To decontaminate a discrete particle on clothing, capture with masking or duct tape.
- To decontaminate a discrete particle on skin, capture with Wet One wipe or similar material.
- To decontaminate skin use mild soap and tepid water. Observe the skin during the decontamination process and stop if redness of the skin occurs. Three attempts can be made using soap and water. Contact RP Supervision for additional instructions after three attempts, or redness of the skin occurs.
- RP Supervision/RP Management is required to approve decontamination methods other than those described in the steps above. Consider obtaining medical assistance for aggressive decontamination methods or contamination that needs to be surgically removed.

**Objective 17: Describe the decon method that maybe used to remove skin contamination.**

## Describe how individuals can be released after decontamination has taken place.

Contaminated clothing shall be removed taking care not to spread contamination. The area of skin beneath the clothing shall be surveyed to ensure no additional contamination is indicated.

Clothing identified as contaminated, cannot be returned unless it has been decontaminated and worn through the contamination monitors by the individual.

If decontamination is completed later, and the individual is not available, then the clothing can be released based on requirements in NISP-RP-07, Control of Radioactive Material.

If natural occurring radioactive material or noble gas is suspected individuals can be decontaminated by allowing for radioactive decay.

To be released individuals must successfully pass beta/gamma personnel monitors without alarming. In some cases, such as internal contaminations or incomplete decontamination, individuals may cause an alarm but can only be released with the approval of the RPM.

**Objective 18: Describe how individuals can be released after decontamination has taken place.**

# Review

The purpose of this training has been to provide you with methods to assess, investigate, and document personnel radioactive contamination events and to understand the process for performing external decontamination of personnel.



## Review Question # 13

When should skin decontamination be terminated?



LO 13

## Review Question # 14

What is the release criteria for personnel involved in a personnel contamination event?



LO 14

## Review Question # 17

Describe the decon method that maybe used to remove skin contamination.



LO 17



## Review Question # 15

What are the conditions requiring dose assessment to be performed?



LO 15

## Review Question # 16

Calculate the exposure time on skin for a given hot particle



LO 16

## Review Question # 18

Describe how individuals can be released after decontamination has taken place.



LO 18

# Terminal Objective - Review

When working as an RP Technician at a US nuclear utility, perform proper monitoring and documentation of personnel for skin and clothing contamination and use proper personnel decontamination methods in accordance with the standards of NISP-RP-06, Nuclear Industry Standard Process for Personnel Contamination Monitoring.



# Personnel Contamination Monitoring

## What Questions Do You Have for Me?



## Together...Shaping the Future of Electricity