

Course Title: Radiological Control Technician
Module Title: Personnel Decontamination
Module Number: 2.14

Objectives:

- 2.14.01 List the three factors which determine the actions taken in decontamination of personnel.
- ☞ 2.14.02 List the preliminary actions and notifications required by the RCT for an individual suspected to be contaminated.
- ☞ 2.14.03 List the actions to be taken by the RCT when contamination of clothing is confirmed.
- ☞ 2.14.04 List the actions to be taken by the RCT when skin contamination is confirmed.
- ☞ 2.14.05 List the steps for using decontamination reagents to decontaminate personnel.

References: (Site Specific)

Instructional Aids:

- 1. Overheads
- 2. Overhead projector/screen
- 3. Chalkboard/whiteboard
- 4. Lessons learned

I. MODULE INTRODUCTION

A. Self Introduction

1. Name
2. Phone number
3. Background
4. Emergency procedure review

B. Motivation

In our work environment, one of the major concerns of radiological protection is the prevention of personnel contamination. When personnel contamination has been identified, it is the responsibility of RCTs to control or oversee the decontamination of the individual using the best method available.

C. Lesson Overview

1. Personnel decontamination
2. Basic factors
3. Suspected personnel contamination
4. Contaminated clothing
5. Skin contamination
6. Documentation
7. Decontamination reagents

D. Introduce Objectives

Show O.H.: Objectives

II. MODULE OUTLINE

A. Personnel Contamination

1. Monitoring

The potential for personnel contamination, either external or internal, is normally identified through one of five monitoring methods:

- a. Hand Held Count Rate Meters: external
- b. Personnel Contamination Monitors: external
- c. Partial Body Monitors: external
- d. Whole Body Counts: internal (In Vivo)
- e. Excreta Analysis: internal (In Vitro)

2. Work conditions

In some cases the presence of contamination is assumed prior to personnel monitoring.

- a. Exposure of individual to known contaminated liquid.
- b. Exposure of individual to airborne contamination without proper protection devices.
- c. Improper work practices within contamination area.
 - 1) Improper removal of protective clothing or devices.
 - 2) Improper work practices with contaminated material.
 - 3) Failure to follow the radiological control requirements set for work performed.
 - 4) Unknowingly working with material discovered to be contaminated.

B. Basic Factors

Once Health Physics has knowledge of potential contamination to an individual, the actions taken by the RCT will be controlled by three basic radiological control factors.

1. Physical condition of worker

Objective 2.14.01

2. Location of contamination on worker
3. Activity of nuclide(s) present
1. Physical condition

The primary concern is the physical condition of the individual. All actions will be determined by the present condition of the individual.

 - a. Is the individual free from any known injury?
 - b. If an injury has occurred, identify conditions.
2. Location of contamination

Once the physical condition of the individual has been identified, the location of the contamination must be determined.

 - a. Is the contamination localized on the general skin surface?
 - b. Is the contamination located at body orifice or is a body orifice in close proximity?
 - c. Is the contamination located in or around a break in the skin structure of the individual?
 - 1) Abrasions
 - 2) Punctures
 - 3) Lacerations
 - d. Is there any type of skin condition present in the vicinity of the contamination?
 - e. Is the contamination on the clothing of the individual?
3. Activity and type of nuclides

The activity of the contamination must be determined as well as the type of nuclides present.

- a. What is the beta-gamma activity of the nuclides present?
 - b. What is the alpha activity of the nuclides present?
- C. Preliminary RCT Actions for Personnel with Suspected Contamination

Objective 2.14.02

Upon notification of a potential personnel contamination, the initial actions taken are established by procedure.

See DOE RCS Art. 541

(Insert site specific material here)

Typical actions include:

1. Obtain instruments and proceed to location.
2. Assess conditions
 - a. Make necessary notifications in case of injury.
 - b. Survey for quick indication of contamination levels and location.
 - c. Ask questions about potential contamination event.
 - d. Assess need to notify RC to request support.
 - e. Remove levels of contamination immediately on skin or clothing. Retain removed contamination for dose assessment by Dosimetry.
3. Perform a detailed, whole body survey of exposed surfaces (PCs, personal clothing and/or skin), for both alpha and beta-gamma contamination. Starting at the head and proceeding to the feet, pay particular attention to the following areas:
 - contaminated area (if known)
 - nose and mouth
 - hands
 - skin folds

- buttocks
 - knees
 - feet
- a. Verify that the instrument is in service (e.g., turn the monitor on, check the battery, source response, and calibration) set it to the proper scale and adjust the audio output so it can be heard during the survey.
 - b. Hold the probe less than 1/2 inch from the surface being surveyed for beta and gamma contamination, approximately 1/4 inch for alpha contamination. Do not touch the area being surveyed with the probe to preclude contaminating the probe.
 - c. Move the probe slowly (approximately 2 inches per second) over the surface.
 - d. If the count rate increases during the survey, pause for 5 to 10 seconds over the area to provide adequate time for instrument response.
 - e. If the count rate increases to a value greater than a pre-established contamination limit or the instrument alarms, presence of contamination is confirmed. If contamination is confirmed, remain in the area and notify radiological control personnel.
 - f. The whole body survey should take several minutes. Do not hurry the survey and survey all areas that could be contaminated.
4. If the following conditions exist, contact RC supervision and Medical personnel as appropriate:
 - a. Extensive whole body contamination
 - b. An uptake is possible because facial contamination is present
 5. If the contaminated individual must be moved to another location (e.g. hospital or decontamination facility),

contain the contamination as much as possible before allowing the person to move by:

- a. Removing and bagging shoes and/or covering feet with plastic shoe covers/booties.
- b. Covering the hands of the individual with gloves, preferably "Surgical" gloves.
- c. Donning a clean set of Anti-C's over contaminated clothes or merely wrapping the individual with any covering.

D. Contaminated Clothing

When the clothing of an individual is found contaminated, advise the individual to refrain from moving around or touching the contaminated area and follow the specified procedures for decontamination.

(Insert site specific material here)

Typical actions include:

1. Contain and remove areas of gross contamination including hot particles by pulling off with tape or cutting out the area and securely bagging the contamination.
2. Carefully remove and securely bag all contaminated clothing. Properly store and save the contaminated clothing worn by the individual for analysis by dosimetry if there is skin contamination or a possible uptake of radioactive material.
3. Perform a personnel whole body survey after removal of contaminated clothing to determine that the individual is not recontaminated.

Objective 2.14.03

Note: Clothing contamination should be treated just as seriously as skin contamination until the clothing has been removed and it has been verified that no skin contamination is present.

- a. If contamination persists consider moving to a decontamination facility.
- b. Assess potential for internal deposition (airborne, puncture) by surveying outside and inside of masks, surveying facial area, and taking mouth or nasal smears.

E. Skin Decontamination

When the skin of an individual is found contaminated, follow the specified procedures for decontamination.

(Insert site specific material here)

Typical actions include:

1. Immediately remove hot particles and other high levels of contamination. The time spent to determine the activity and area of contamination should be minimized when high doses are possible.
2. Notify the RC supervisor or designated facility contact.
3. Determine the condition of the skin (cuts, sores, abrasions, irritations, etc.) and decontaminate if appropriate.
 - a. Treatment of contaminated skin with skin conditions (including wounds) is usually reserved for medical personnel. Flushing minor wounds with plain tepid water may be permitted.
 - b. Whole skin can be decontaminated by wiping with moist towlettes, flushing with plain tepid water, or washing with mild non abrasive soap and tepid water. Tape should only be used in areas where there is minimal hair and hair can only be trimmed with permission of the individual.

Objective 2.14.04

Note: Stop the decontamination effort if the skin becomes irritated or the individual complains of discomfort.

- c. Retain particles or other samples of contamination for analysis and dose assessment by Dosimetry.
- d. Assess potential for internal deposition (airborne, puncture) by surveying outside and inside of masks, surveying facial area, and taking mouth or nasal smears.

F. Documentation

After decontamination has been completed, it is essential that the proper documentation is completed for proper records.

(Insert site specific material here)

Typical documentation includes:

1. An estimate of skin area and location affected and the activity involved.
2. The decontamination process including levels and iterations.

G. Decontamination Reagents

(Insert site specific material here)

Typical steps in the use of decontamination techniques are:

1. Washing with mild non-abrasive soaps, flushing with plain tepid water, and sweating techniques should be used for initial decontamination. Always begin with the least irritating agents before proceeding to stronger agents. These techniques may be employed by RCTs in the field.

Sticky tapes may also be used initially as long as the potential for skin irritation is kept in mind.

2. Stronger and more abrasive soaps (Tide, Clorox, or cornmeal) may dislodge the contamination but are generally used by medical personnel because of their potential for damaging the skin.

Objective 2.14.05

Note: Stop the decontamination effort if the skin becomes irritated or the individual complains of discomfort.

3. Stronger chemical techniques such as those using Potassium Permanganate (KMnO_4), Sodium Bisulfite (NaHSO_3), DTPA (as a wash), or CaDTPA (as a wash) are not often needed, but when they are, they should be used only by trained medical personnel.

III. SUMMARY

- A. Review major points
 1. Personnel decontamination
 2. Basic factors
 3. Suspected personnel contamination
 4. Contaminated clothing
 5. Skin contamination
 6. Documentation
 7. Decontamination reagents
- B. Review learning objectives

IV. EVALUATION

Evaluation should consist of a written examination comprised of multiple choice, fill-in the blank, matching and/or short answer questions. 80% should be the minimum passing criteria for examinations.