A Guide to Operating Public Shelters in a Radiation Emergency

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National Center for Environmental Health
Division of Environmental Hazards and Health Effects

Contents

Preface

The multiagency collaboration to produce this guide began with a 2010 workshop in Atlanta, Georgia, organized by the Centers for Disease Control and Prevention (CDC) and the National Association of County and City Health Officials (NACCHO).[1] This workshop engaged mass care providers, radiation control officials, and public health personnel in a facilitated discussion to explore the unique challenges radiation emergencies pose for shelter operations. Representatives from the following agencies provided input and laid the foundation for continued work on this topic:

Alabama Department of Public Health
American Red Cross
Association of State and Territorial Health Officials (ASTHO)
Centers for Disease Control and Prevention (CDC)
Conference of Radiation Control Program Directors, Inc. (CRCPD)
Escambia County Health Department (Florida)
Georgia Department of Natural Resources
Harris County Public Health and Environmental Services (Texas)
Indiana State Department of Health
Leon County Health Department (Florida)
Linn County Public Health (Iowa)
Mississippi Department of Health
Multnomah County Health Department (Oregon)
National Association of County and City Health Officials (NACCHO)
Oak Ridge Associated Universities (ORAU)
Texas Department of State Health Services
Tarrant County Public Health (Texas)
U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)
U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response (ASPR)
Ventura County Department of Health (California)

Based on the discussion and analysis conducted during the 2010 workshop, CDC and NACCHO organized a working group to identify best practices that could be implemented by shelters in a radiation emergency. This working group reviewed existing regulations and standards concerning radiation exposure and radioactive contamination to determine which ones were applicable to mass care operations. The working group consisted largely of participants in the 2010 workshop.

In 2011, the activities of the working group focused on defining the needs of the target audience, establishing the scope of the document, and developing a chapter outline. In 2012, the working group began drafting and reviewing content for individual chapters.

[1] A report on the 2010 NACCHO/CDC *Workshop on Operating Public Shelters during a Radiation Emergency* is available at http://emergency.cdc.gov/radiation/pdf/NACCHO_report_on_operating_public_shelters.pdf.

In 2013, CDC, Oak Ridge Associated Universities (ORAU), and NACCHO staff completed an initial draft of the guide and solicited comments from working group members and other stakeholders. The draft was presented to these stakeholders for two rounds of comments and edits. Representatives from the following agencies served as reviewers for the draft guidance:

American Red Cross
Association of State and Territorial Health Officials (ASTHO)
Centers for Disease Control and Prevention (CDC)
Conference of Radiation Control Program Directors, Inc. (CRCPD)
Escambia County Health Department (Florida)
Georgia Division of Public Health
Georgia Emergency Management Agency
Linn County Public Health (Iowa)
Medical Reserve Corps Georgia East-Metro
Mississippi Department of Health
National Association of County and City Health Officials (NACCHO)
Oak Ridge Associated Universities (ORAU)
Texas Department of State Health Services
U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)

The numerical radiation dose and dose rate values specified in this guide are consistent with current and relevant guidelines and regulations, as referenced in the text.

The lead developers for this document are Armin Ansari, PhD, CHP, Centers for Disease Control and Prevention, and Kevin Caspary, MPH, Oak Ridge Associated Universities.

1.0 Introduction

1.1 Purpose

This document has been developed to assist with planning and response efforts related to shelter operations in a radiation emergency. The following chapters provide information and guidance about screening for radioactive contamination, decontamination, radiation monitoring, registration, health surveillance, and communications.

1.2 Intended Audience

This guide is intended for shelter operators, planners, and staff, as well as emergency managers, public health professionals, and radiation protection professionals who participate in shelter planning and could be called upon to support shelter operations.

1.3 Scope

This guide provides information on the incident-specific considerations that shelter operators will need to take into account in a radiation emergency. Shelter operations include other mass care and emergency assistance activities that are required to support a sheltered population, such as feeding, providing essential supplies, and assisting with reunification of family and friends. Guidance to support such activities can be found in other planning resources.[2] The information in this guide is intended to complement, not supplant, existing shelter protocols and responsibilities.

Each chapter in this guide features tables that summarize capabilities described in the text. These capabilities are organized into three categories – *Basic*, *Intermediate*, and *Advanced* – according to the level of complexity.

- *Basic* capabilities reflect the minimum capabilities necessary to operate a shelter in a radiation emergency. Many of the recommendations in this category are precautionary in nature, and they are representative of shelter operations that may not have access to radiation detection equipment and trained personnel.
- *Intermediate* capabilities reflect enhanced radiation detection capabilities and access to trained staff. However, these resources may be in limited supply, and shelter operators may need to prioritize tasks requiring the application of these resources.
- *Advanced* capabilities reflect shelter operations that have sufficient access to radiation detection equipment and trained staff to perform tasks requiring the application of these resources.

These capabilities can be used to guide shelter planning and are not intended to set a rigid benchmark for shelter operations. Some shelter operations may have basic capabilities in one category and advanced capabilities in another. Others may choose to work with their state radiation control officials to adopt modified standards for each category.

[2] The National Response Framework details the roles of agencies and organizations participating in or supporting shelter operations in the Emergency Support Function 6 Annex. Additional information is available at http://www.fema.gov/pdf/emergency/nrf/nrf-core.pdf.

1.4 Assumptions

This guide assumes that jurisdictions already have plans and procedures in place for establishing all-hazards general population shelters. This guide also assumes that neighboring jurisdictions have plans to provide mutual aid to the impacted jurisdictions, and that neighboring communities will host shelters for people evacuating the impacted area. While the recommendations in this guide may apply to emergency or temporary shelters in areas where there are elevated radiation levels, these types of shelters are not the focus of this guide. The shelters described in this guide are long-term shelters in areas where radiation levels are at or near natural background levels.

1.5 People with Disabilities and Others with Functional or Access Needs

People with disabilities and others with functional or access needs require equal access to emergency programs and services. Public shelter facilities must be compliant with the Americans with Disabilities Act of 1990 (ADA) prior to use. ADA compliance may require reasonable modifications to rules, policies, procedures, practices, structures, equipment, and communication methods pertaining to a shelter. Potential shelter residents with disabilities or with functional or access needs should be considered in shelter planning and during shelter operation.

This document contains limited specific guidance regarding people with disabilities or others with functional or access needs in a shelter in a radiation emergency. This document does not intend nor attempt to provide comprehensive guidance on addressing people with disabilities or others with functional or access needs.

1.6 Community Reception Centers and Shelters

Community Reception Centers (CRCs) and shelters are distinct and complementary operations that specialize in specific components of the response effort. CRCs provide population monitoring services, including contamination screening, decontamination, registration, and limited medical evaluation and care. Shelters provide temporary housing, security, food service, health and mental health services, ongoing health surveillance, and other similar services.

It is prudent to anticipate a need for more shelters than CRCs. This approach may be described as a network of CRCs feeding into a larger network of shelters, as illustrated in Figure 1.

Ideally, people will process through CRCs before reporting to shelters. However, shelter operators may encounter situations in which CRCs are not available. In either event, there are special considerations that will need to be made when operating a shelter in a radiation emergency to ensure the health and safety of shelter residents and staff. This document provides guidance regarding these considerations to those planning, operating, or working at shelters.

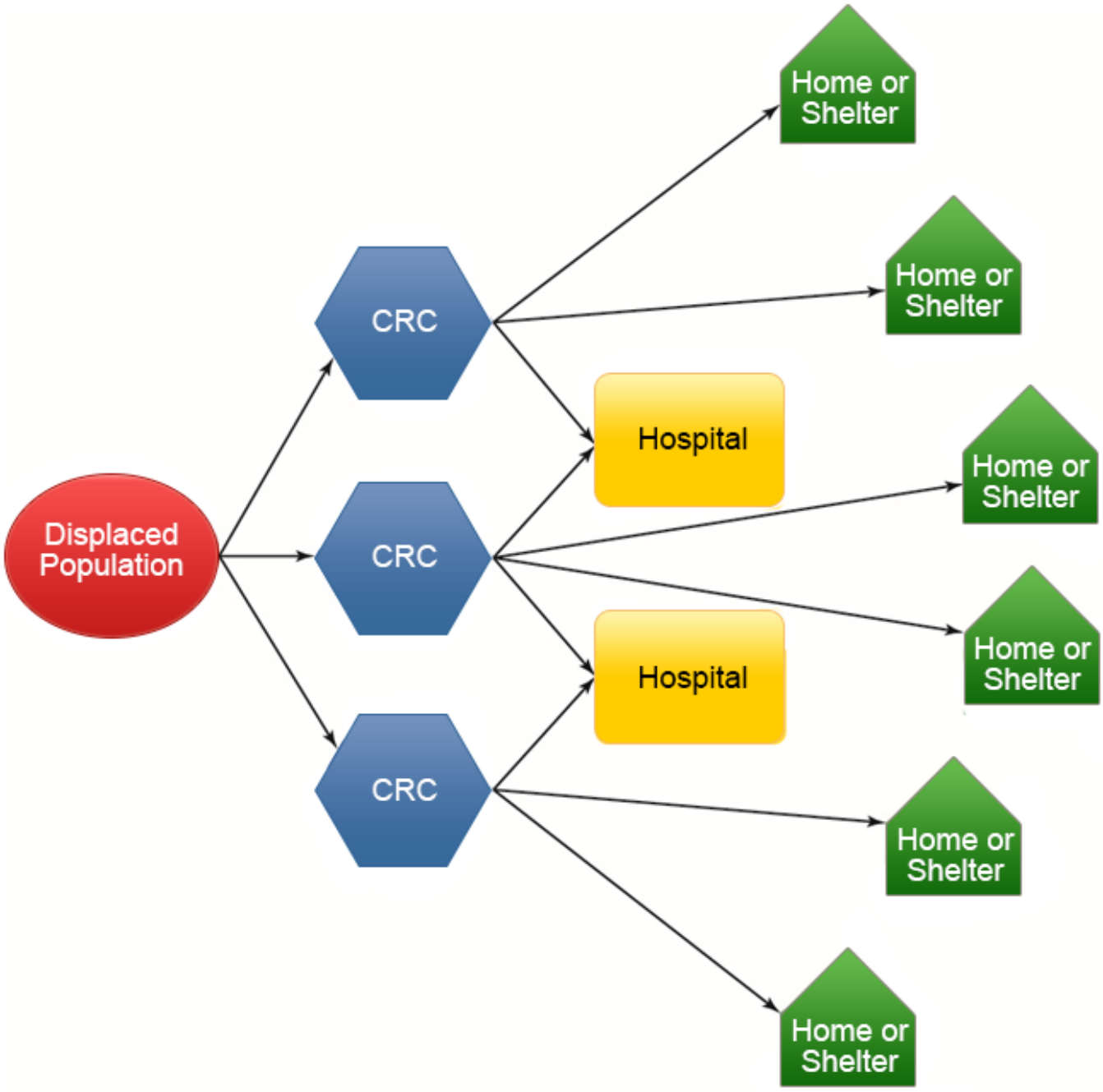


Figure 1: CRC and Shelter Network Diagram

1.7 Background

While many communities already have plans to shelter populations in the aftermath of natural disasters, such as tornadoes, hurricanes, floods, and wildfires, these plans may not be adequate for caring for people in a radiation emergency. Because the displaced population in a radiation emergency is potentially contaminated with radioactive material and may be at risk for developing radiation sickness, shelter operators should anticipate modifying routine services or adopting new services to protect residents from the radiation hazard.

Past international incidents provide some insight as to how many people can be displaced as a result of a radiation emergency. For example, on April 4, 1986, an explosion at the Chernobyl nuclear power plant damaged the reactor and triggered fires that burned for 10 days. Large quantities of radioactive material were released into the surrounding area, eventually leading to the evacuation of more than 300,000 people.[3] The 2011 incident at the Fukushima-Daiichi nuclear power plant in Japan also resulted in a large displaced population. The incident was triggered after an earthquake and resulting tsunami damaged the cooling system at the plant. Japanese authorities ordered the evacuation of nearly 200,000 people within 20 kilometers (12.4 miles) of the plant.[4]

Although a different type of disaster, Hurricane Katrina caused a mass evacuation which quickly expanded beyond the impacted region and its immediate surroundings. Figure 2 shows the nationwide distribution of the population displaced by Hurricane Katrina. Host communities throughout the region provided shelter and relocation services to Katrina evacuees for many months after the hurricane. In a radiation emergency, communities throughout the nation could receive a portion of the displaced population and should be prepared to provide shelter and associated health services. Shelters receiving evacuees may need to implement additional procedures to protect the residents and staff from radioactive contamination and radiation exposure.

These examples demonstrate the need for advanced planning for shelter operations in radiation emergencies. Planning should include partner agencies, such as the state radiation control authority, emergency management officials, and public health planners.

[3] International Atomic Energy Agency (IAEA). *Chernobyl's Legacy: Health, Environment, and Socio-Economic Impacts*. 2006. http://www.iaea.org/Publications/Booklets/Chernobyl/chernobyl.pdf.
[4] Nuclear Emergency Response Headquarters, Government of Japan (NERH GOJ). *Report of Japanese Government to the IAEA Ministerial Conference on Nuclear Safety: The Accident at TEPCO's Fukushima Nuclear Power Stations.* 2011. http://fukushima.grs.de/sites/default/files/NISA-IAEA-Fukushima_2011-06-08.pdf.

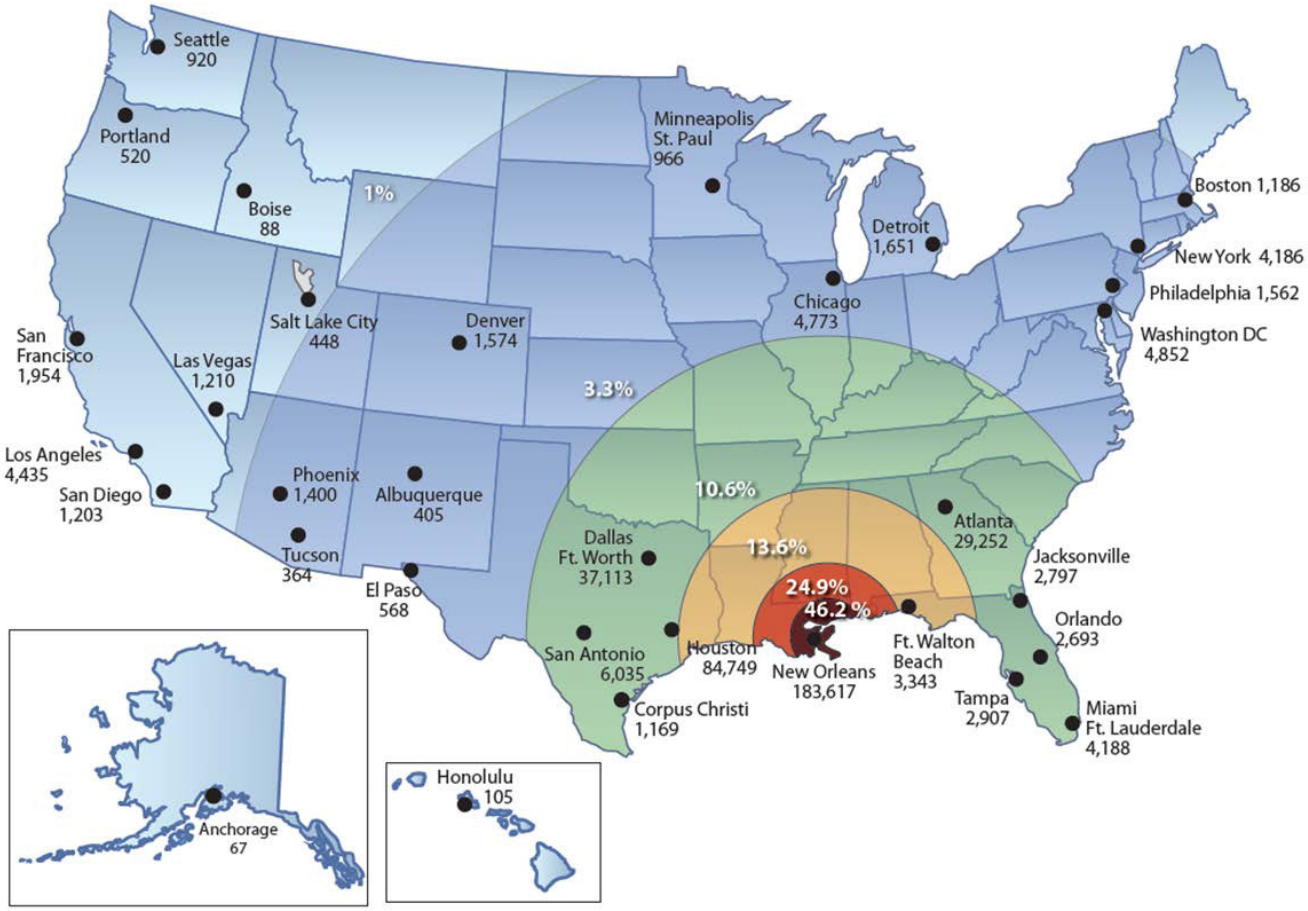


Figure 2: Geographical Distribution of the Displaced Population after Hurricane Katrina
(Sources: *The Times Picayune*, October 13, 2005; FEMA, Census Bureau, Queens College Sociology Department). The numbers on the map represent a sample of disaster assistance claims filed after Hurricane Katrina from select FEMA field offices. The percentages on the map indicate that, while the majority of the claims were filed close to the impacted areas, many people were displaced to other states.

2.0 Establishing the Shelter

The shelters discussed in this guide are long-term, public shelters that house people evacuated from the area impacted by a radiation emergency. These shelters provide temporary housing, security, food service, health and mental health services, and ongoing health surveillance. These core services will remain the same in a radiation emergency. However, shelter staff will need to take additional precautions to protect against radiation hazards. State radiation control officials can be a vital planning resource, and it is important to include them early in the planning process.

2.1 Choosing the Shelter Location

Many organizations have shelter plans for facilities in their communities. Depending on the nature of the radiation emergency, some of these facilities may not be suitable locations for shelter operations because of utility outages, infrastructure damage, or elevated environmental radiation levels. Shelter operators have standing protocols for managing and overcoming these first two obstacles, but may not be equipped or trained to assess environmental radiation levels. Shelters should be established in uncontaminated areas or in low background radiation areas, with environmental radiation levels below 1 µSv/h (0.1 mR/h).[5] Within the first 24-48 hours after the incident, emergency managers and radiation control officials are likely to have access to detailed maps that identify radiation control zones, and they can help shelter operators determine if their shelter locations are in low background radiation areas.

Shelters may initially be considered short-term operations until environmental monitoring efforts near the incident site are completed and radiation control zones are established. Shelters will need relocation plans in the event they need to be moved to lower background radiation areas.

Table 1 suggests capabilities for establishing the shelter location in a radiation emergency.

Table 1: Capabilities for Establishing the Shelter Location

Basic	Emergency management officials approve of the shelter location in coordination with radiation control officials.
Intermediate	Emergency management and radiation control officials use data from environmental monitoring maps of the impacted area to establish shelter locations in low background radiation areas (less than 1 µSv/h (0.1 mR/h)).
Advanced	Radiation professionals or staff trained in radiation detection provide ongoing on-site monitoring to determine background radiation levels at the shelter.

[5] Environmental Protection Agency (EPA), *PAG Manual: Protective Action Guides and Planning Guidance for Radiological Incidents*. 2013 (Draft for interim use and public comment).
http://www.epa.gov/radiation/docs/er/pag-manual-interim-public-comment-4-2-2013.pdf

2.2 Conducting a Hazard Assessment

Before opening the shelter, the safety officer should conduct a hazard assessment to identify radiation hazards and other health and safety concerns. Emergency management and radiation control officials can provide information about radiation levels in the area surrounding the shelter. The hazard assessment will help the safety officer determine what personal protective equipment (PPE), if any, is necessary for shelter staff. In addition, the hazard assessment can be used to establish or modify work practices or facility layout.[6]

2.3 Establishing the Shelter Floor Plan

Shelters established in a radiation emergency will need procedures for managing potentially contaminated people and service animals and may benefit from having additional procedures for managing potentially contaminated pets, personal possessions, vehicles, and trash. These shelters will need contamination control zones in which to conduct screening, decontamination, and other activities through which contamination of clean areas is possible. Other spaces that may be necessary or beneficial include dedicated decontamination areas for service animals and pets, secure areas for personal possessions that may be contaminated, separate parking areas for clean and potentially contaminated vehicles, and areas to store contaminated trash. A carefully considered shelter floor plan can ensure effective operations. Appendix A contains an example floor plan that has been adapted from an existing shelter layout for use in a radiation emergency.

Table 2 suggests capabilities for establishing the shelter floor plan in a radiation emergency.

Table 2: Capabilities for Establishing the Shelter Floor Plan

Basic	The shelter has: • Procedures for managing potentially contaminated people and service animals • Contamination control zones, including areas for decontaminating people and service animals
Intermediate	In addition to the capabilities above, the shelter has: • An identified on-site or off-site space and procedures for managing pets • A secure area to store and procedures for managing contaminated possessions • Adequate parking and procedures for managing potentially contaminated vehicles • A secure area to store and procedures for managing contaminated trash • Identified additional contamination vectors, such as location and operation of HVAC air intake
Advanced	In addition to the capabilities above, the shelter has: • Dedicated screening and decontamination facilities • Dedicated decontamination area and facilities for service animals and pets • A secure storage location for radiation detection instruments when not in use

[6] For example, the hazard assessment could identify potential contamination pathways in the shelter, such as routing contaminated people past an air intake for the HVAC system.

2.4 Radiation Workforce

Contamination screening and radiation monitoring in the shelter should be conducted by radiation professionals or trained staff. Only a limited number of radiation professionals are likely to be available to assist shelter staff in a radiation emergency. A number of states are cross-training staff and recruiting volunteer radiation professionals to augment staff resources.[7] It is important that shelter planners consult with their state radiation control officials to discuss pre-incident training options for staff or volunteers.

2.5 Monitoring Radiation Doses for Shelter Workers

Safety officers should work with radiation control officials to establish dosimetry programs for shelter staff working in contamination control zones within the shelter. The U.S. Environmental Protection Agency (EPA) PAG Manual provides guidance on acceptable doses to responders in radiation emergencies.[8] According to the PAG Manual, occupational exposures for workers not involved in lifesaving activities or operations to protect critical infrastructure should be limited to 50 mSV (5 rem) for the duration of the response. Safety officers seeking more protective dose limits for shelter staff should consult radiation control officials to establish those limits. In some cases, dose limits as low as 1 mSv (100 mrem) may be appropriate for shelter staff.[9]

2.6 Measuring Existing Background Radiation Levels

If radiation detection equipment is available at the shelters, radiation protection professionals or trained staff should measure and document existing background radiation levels throughout the shelter. These measurements need to be completed before residents arrive. Background radiation levels will serve as the baseline to which other contamination screening and radiation monitoring criteria are compared.

Staff should measure background radiation levels throughout the shelter, particularly in the following areas:

- Contamination screening areas
- Showers, wash facilities, and restrooms
- Sleeping quarters and activity areas
- Dining and food preparation areas
- Outside (e.g., parking lots, play areas, main entrances and exits, loading bays)

For large spaces, such as gymnasiums, staff may want to take multiple readings and average the results.

When measuring background radiation levels, it is important for consistency to use the same type of radiation detection equipment and units of measure that will be used for contamination screening and radiation monitoring. For example, if staff plan to use Geiger-Müller (GM) instruments that measure in counts per minute (CPM) for contamination screening, they would take background readings with a GM instrument and document those readings in CPM. Likewise, if staff plan to use instruments for

[7] Conference of Radiation Control Program Directors, Inc. (CRCPD). *A Plan for Incorporating Local Volunteer Radiation Professionals into Existing Health Volunteer Programs to Assist in Population Monitoring*. 2011. http://www.crcpd.org/Homeland_Security/RRVC_FinalReport.pdf.
[8] EPA PAGs, 2013.
[9] Nuclear Regulatory Commission (NRC). "Radiation Dose Limits for Individual Members of the Public." *Code of Federal Regulations Title 10, Pt. 20.1301, Subpart D. 1991*. http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-1301.html.

radiation monitoring that measure in µSv/h or mR/h, they would use that type of instrument to measure background radiation levels in µSv/h or mR/h. More information about contamination screening and radiation monitoring can be found in Chapters 3 and 4, respectively.

Finally, it is important to clearly communicate background radiation levels to staff performing contamination screening and radiation monitoring in the shelter. For staff unfamiliar with radiation, it may be necessary to explain what background radiation is and what sources contribute to background levels. The shelter safety officer can provide workers with written documentation of background readings in each part of the shelter. Additionally, the safety officer can consider posting signs with background levels in each area for quick reference.

Key Considerations for Establishing the Shelter

- Emergency managers and radiation control officials are likely to have access to detailed maps that identify radiation control zones, and they can help shelter operators determine if their shelter locations are outside of the radiation control zones.
- A carefully considered shelter floor plan can ensure effective operations.
- Background radiation levels need to be measured and documented before residents arrive.
- Shelter planners need to consult their state radiation control officials to discuss pre-incident training options for staff and volunteers.

3.0 Screening and Decontamination in the Shelter

In the context of this guide, the phrase "screening" refers to the process of checking people, animals, or objects for radioactive contamination. Ideally, anyone or anything arriving at the shelter has undergone contamination screening at a community reception center (CRC). Shelters coordinating closely with and receiving people directly from CRCs will not need to incorporate screening and decontamination into shelter operations.

However, in certain circumstances, CRCs may not yet be established. This chapter will discuss practical strategies for screening and decontaminating people, service animals, personal possessions, pets, and vehicles. Screening and decontamination staff will need to communicate clearly to ensure people arriving at the shelter understand the intake process and what actions are expected of them. More information about strategies for communicating with shelter residents can be found in Chapter 7.

Because shelters may have limited screening and decontamination resources, these services will need to be prioritized for people and then service animals. Resources should not be devoted to screening and decontaminating personal possessions and pets at the expense of screening and decontaminating people.

During the screening and decontamination processes, shelter workers must use good work practices – including the use of appropriate personal protective equipment (PPE) – to minimize the spread of contamination. People with disabilities or others with functional or access needs may require assistance, and children should not be separated from their parents.

3.1 Screening People

While this section describes screening people for radioactive contamination, people arriving at the shelter should also undergo a quick medical screening to identify health issues that may require treatment or referral. For life-threatening or other severe injuries, medical care takes priority over contamination screening and decontamination.[10,11,12]

***If CRCs are available**:*

- People who come to the shelter before going to a CRC should be directed to a CRC for initial screening and decontamination.
- People who come to the shelter after processing through a CRC will need their CRC discharge paperwork reviewed by shelter staff to confirm that appropriate screening and decontamination occurred at the CRC.

In some cases, CRCs may release people with detectable levels of contamination on their skin or clothes. These levels will not be harmful to those people or to others around them. However, if resources are available at the shelter, those people may be able to clean themselves or change clothes to further reduce their levels of contamination.

[10] Centers for Disease Control and Prevention (CDC). *Population Monitoring in Radiation Emergencies: A Guide for State and Local Public Health Planners, Second Edition*. 2014. http://emergency.cdc.gov/radiation/pdf/population-monitoring-guide.pdf.
[11] Radiation Emergency Assistance Center/Training Site (REAC/TS). *The Medical Aspects of Radiation Incidents, 2nd Edition*. 2011. http://orise.orau.gov/files/reacts/medical-aspects-of-radiation-incidents.pdf.
[12] National Council on Radiation Protection and Measurements (NCRP). *Report No. 165 Responding to a Radiological or Nuclear Terrorism Incident*: A Guide for Decision Makers. 2010. http://www.ncrponline.org/Publications/Press_Releases/165press.html.

If CRCs are NOT available and radiation detection equipment is available to screen people:

- Walk-through portal monitors (Figure 3) can be used to quickly screen a large number of people as they arrive at the shelter.
  - Portal monitors can only detect gamma radiation and some high-energy beta radiation.
- If portal monitors are not available, shelter staff can use handheld instruments (Figure 4) for contamination screening.
  - If screening for alpha contamination, an alpha scintillator (Figure 5) should be used.

If CRCs are NOT available and radiation detection equipment is NOT available to screen people:

- Conduct precautionary decontamination[13] of people before they enter the shelter clean zones.

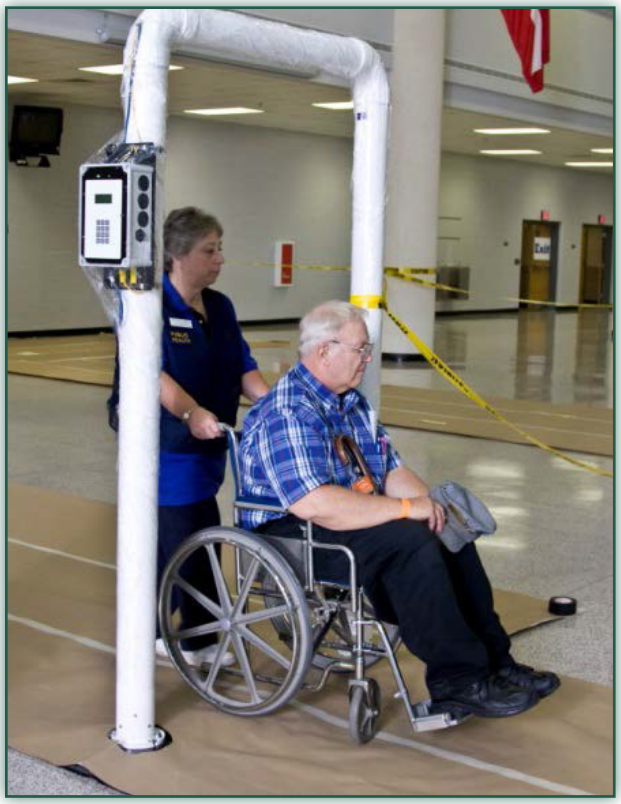


Figure 3: Radiation Portal Monitor
(Source: CDC)

[13] Precautionary decontamination refers to the process of having people conduct some measure of decontamination before entering the shelter, even though the presence of contamination was not confirmed using radiation detection equipment. Precautionary decontamination may be a necessary practice for shelter operations that do not have access to radiation detection equipment or trained personnel to screen people for contamination. The extent of decontamination performed depends on the resources available and could range from having people remove the exterior layer of clothing to having people shower and change into clean clothing.

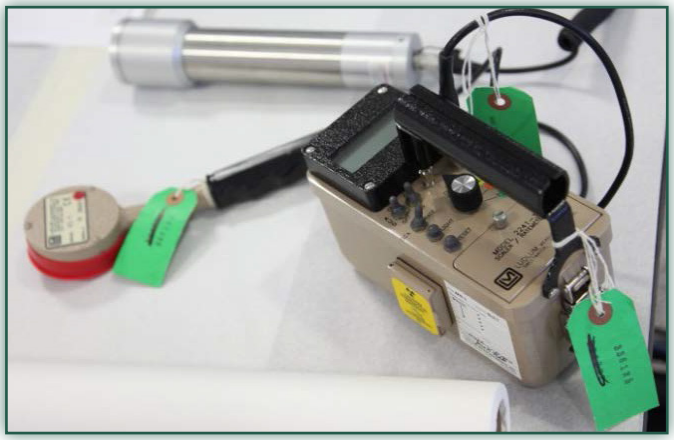


Figure 4: A Common Handheld Radiation Detection Instrument
(Source: CDC)

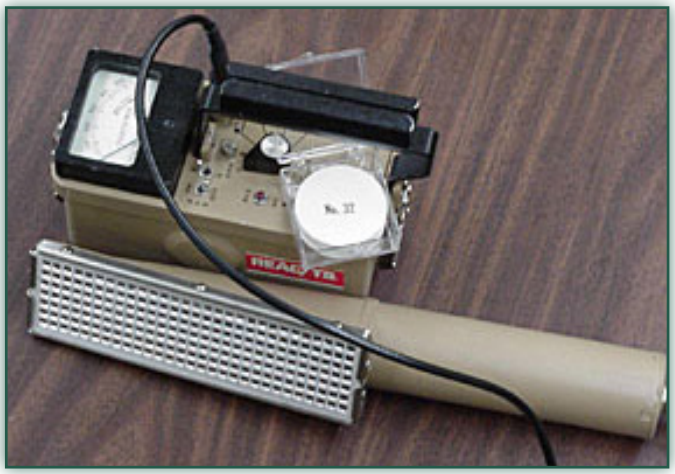


Figure 5: A Common Handheld Radiation Detection Instrument for Detecting Alpha Radiation
(Source: REAC/TS)

Proper handheld contamination screening involves methodically screening a person from head to foot (see Figure 6) at a rate of 1-2 inches per second and at a distance of one-half to one inch from the body. This survey takes about 4-6 minutes. Screening for alpha contamination using an alpha scintillator requires more time to perform a careful assessment. For this reason, shelter screening staff may need to modify the screening protocols to provide the best screening possible for the resources available. An example of a modified alpha screening protocols would be to perform a partial-body screening by focusing on the face, head, hands, and feet.

Handheld instrument operators may want to use earphones or a headset attached to the instrument to listen for the presence of contamination, as audible counts from the meter can cause anxiety among people being screened. Contamination screening job aids can be found in Appendix B, and a sample contamination assessment form can be found in Appendix C.

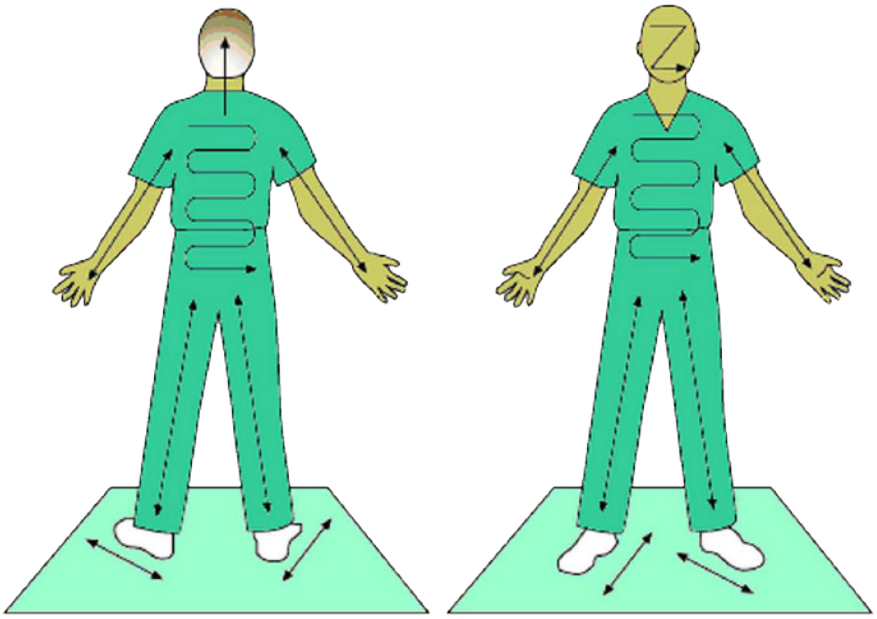


Figure 6: Screening Pattern for Conducting Handheld Radiation Survey
(Source: REAC/TS)

Table 3 suggests capabilities for radiation screening at the shelter. For shelters that have radiation detection equipment, staff will need to be adequately trained to screen people and document contamination levels.

Table 3: Capabilities for Contamination Screening at the Shelter

Basic	No equipment and/or personnel to conduct contamination screening, but able to conduct precautionary decontamination[13] and establish rigorous hygiene program (e.g., washing hands and face before eating).
Intermediate	Some equipment and personnel to conduct partial body contamination screenings.
Advanced	Equipment and personnel available to screen all people, animals, and possessions prior to entering the shelter clean zones. **OR** All people, animals, and possessions come from CRCs with robust screening capabilities and shelter has partial body contamination screening capabilities (see *Intermediate*).

Shelter operators should adopt screening criteria recommended by emergency managers and radiation control officials. Shelter operators may be advised to modify these criteria as circumstances change. Screening services and screening criteria should be scalable and flexible to accommodate the rate of arrivals. For example, a small incident with a manageable number of evacuees may allow staff to perform thorough full-body contamination screenings using a more stringent criterion, such as two times background radiation levels. An incident that displaces a large number of people may require screening staff to adopt an alternate screening protocol, such as partial-body screenings focusing on the head, face, hands, and feet, and potentially raise the screening criteria to ease the burden on decontamination services. Table 4 provides examples of scalable and flexible radiation screening criteria for various situations.

Table 4: Adopting Scalable and Flexible Screening Criteria

Situation	Screening Criteria
Screening resources available; manageable number of people reporting to the shelter	Twice existing background[14]
Screening resources available but limited; unmanageable number of people reporting to the shelter	Raise contamination screening criteria as appropriate; coordinate criteria with radiation control officials[15,16,17,18,19]
Screening resources unavailable	Conduct precautionary decontamination[13]

Staff working in the contamination screening area may need to wear personal protective equipment (PPE) to guard against cross-contamination. Standard medical precautions which include gloves, booties, a gown, eye protection, and a mask or respirator will generally provide adequate protection from cross-contamination.[20] Figure 7 provides examples of standard medical precautions for staff working in the contamination screening area.

Figure 7: Standard Medical Precautions
(Source: REMM)

[14] EPA PAGs, 2013.
[15] Ibid.
[16] CDC Population Monitoring Guide, 2014.
[17] Conference of Radiation Control Program Directors, Inc. (CRCPD). *Handbook for Responding to a Radiological Dispersal Device*. 2006. http://www.crcpd.org/rdd_handbook/rdd-handbook-forweb.pdf.
[18] IAEA *Manual for First Responders to a Radiological Emergency*. 2006. http://www-pub.iaea.org/mtcd/publications/pdf/epr_firstresponder_web.pdf.
[19] NREH GOJ Fukushima Report, 2011.
[20] Department of Health and Human Services (DHHS). *Radiation Emergency Medical Management (REMM).* http://www.remm.nlm.gov/radiation_ppe.htm#firstreceiver.

Safety officers, working with radiation control officials, may recommend a different PPE ensemble depending on the conditions at the shelter. For example, if staff are likely to encounter airborne contamination, safety officers may assign greater respiratory protection to workers in the contamination screening area. If people arriving at the shelter are minimally contaminated, safety officers may choose to relax PPE ensembles to reduce worker fatigue and the risks associated with prolonged use of PPE.

3.2 Decontaminating People

If radioactive contamination exceeding the established criterion is detected, the person exhibiting the contamination will need to be cleaned before entering the shelter clean zones. Decontaminating a person can be as simple as removing an article of clothing or it can require multiple showers or special techniques to remove stubborn contamination.[21] In general, people can be cleaned as if they were covered in dust or mud. People coming from CRCs should not need to decontaminate at the shelter. Job aids for decontamination can be found in Appendix D.

If CRCs are NOT available and radiation detection equipment is available to screen people:

- Screen everyone who comes to the shelter for contamination.
- Decontaminate only those who are contaminated at or above the established criterion.

If CRCs are NOT available and radiation detection equipment is NOT available to screen people:

- Assume everyone reporting to the shelter is contaminated.
- Conduct precautionary decontamination[13] before entering the shelter clean zones.

The availability of running water will impact decontamination procedures.

If running water is available:

- People should decontaminate by carefully removing their outer layer of clothing and showering or washing exposed skin at a sink. Individuals who are unable to perform these tasks by themselves will require personal assistance.

If running water is NOT available:

- People should carefully remove their outer layer of clothing and decontaminate exposed skin with moist wipes or damp towels, or use other dry decontamination techniques. Individuals who are unable to perform these tasks by themselves will require personal assistance.
- Dry decontamination techniques may also include using tape or lint rollers to remove visible dust from clothing or skin.

The following pages provide two examples of decontamination operation flow diagrams for a shelter. Figure 8 shows what decontamination operations might look like at a shelter with radiation detection equipment. Figure 9 illustrates what decontamination operations might look like at a shelter without radiation detection equipment.

[21] Special decontamination techniques for removing external contamination from the skin may include soaking a contaminated body part, promoting sweating, or covering the area until natural sloughing occurs. Additional information is available at http://www.remm.nlm.gov/ext_contamination.htm.

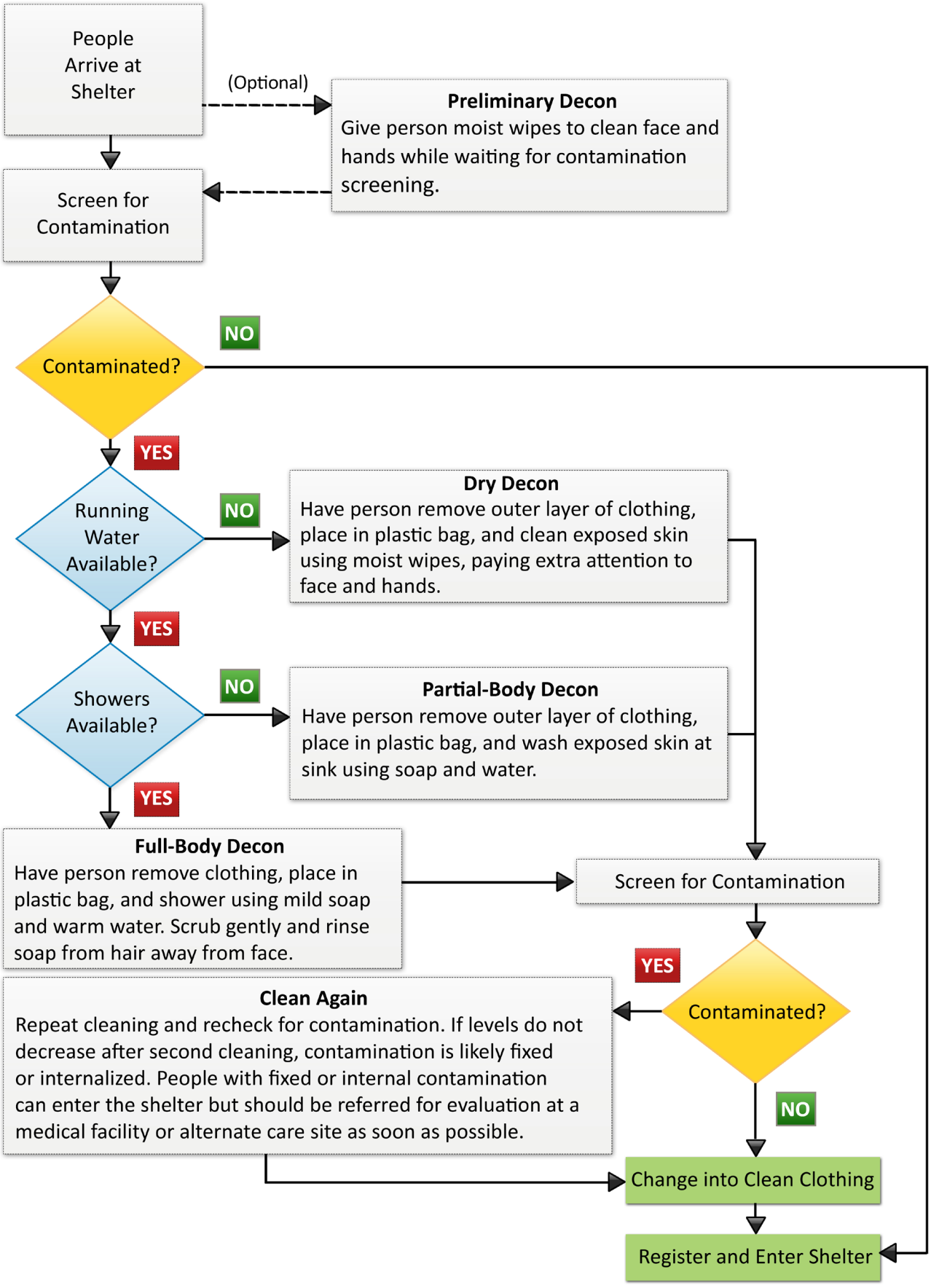


Figure 8: Decontamination Flow with Radiation Detection Equipment

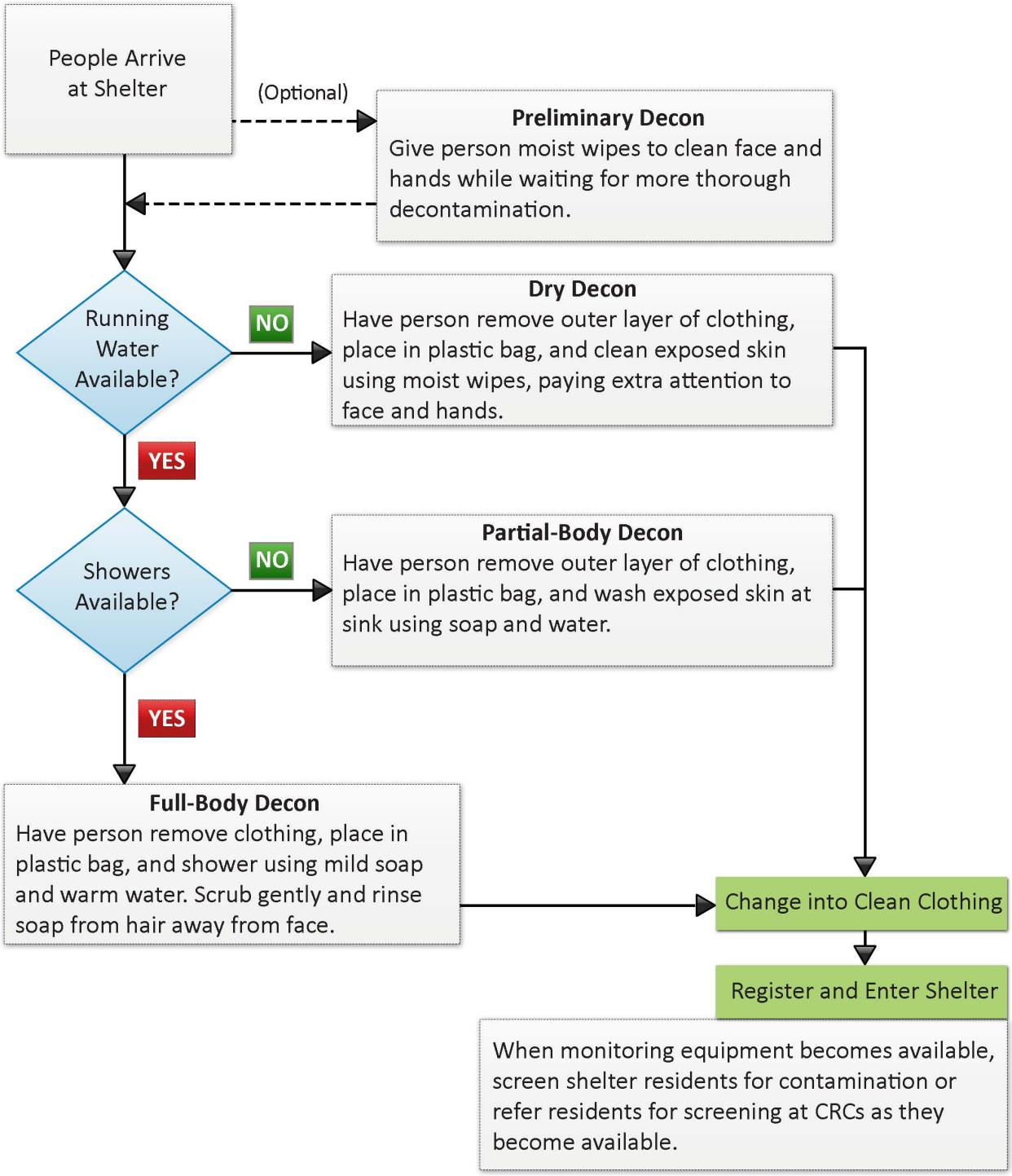


Figure 9: Decontamination Flow without Radiation Detection Equipment

People who are identified to be contaminated should clean themselves and then be screened again. If still contaminated, staff should document the readings and have them clean themselves a second time. If there is little change in the contamination levels after the second cleaning, the person may be internally contaminated and may require specialized screening, evaluation, and possibly medical care beyond the scope of the shelter resources. These individuals can enter and remain at the shelter, but would need to receive follow-up medical evaluation and care as resources become available.

People who are internally contaminated will excrete small amounts of radioactive material in their sweat, urine, and stool. These amounts will not pose a risk to others in the shelter and can be mitigated by routine radiation monitoring of the shelter. More information about radiation monitoring in the shelter can be found in Chapter 4.

If people report to the shelter with open wounds, these wounds may be contaminated. Shelter healthcare staff should work with screening staff to assess wounds for contamination.

If radiation detection equipment is available to screen wounds:

- Screen wounds for contamination.
- If contamination is not detected, then dress the uncontaminated wounds and carefully decontaminate areas around the wounds, if necessary.
- If contamination is detected, then clean the wounds according to the instructions below.

If radiation detection equipment is NOT available to screen wounds:

- Treat the wounds as though they are contaminated and clean according to the instructions below.

To clean a contaminated wound:

- Use damp gauze pads or moist wipes to clean the skin around the wound.
- Clean from the edges of the wound outward to prevent drawing contamination on the skin into the wound.
- Irrigate the wound using sterile saline or clean water.
- Direct the irrigation fluid into a drain, a container, or onto absorbent pads or towels.

Continue to irrigate the wound until the contamination readings are reduced to an acceptable level, such as twice background, or until readings stop improving. After the wound is irrigated, dress the wound and periodically recheck for contamination during bandage changes.[22,23]

It is important to remember that shelter staff working in contamination control zones within the shelter should be screened for contamination at the end of their shifts or any time they leave the contamination control zone, and, if necessary, be decontaminated. Furthermore, staff providing assistance with decontamination must use good work practices and wear PPE that provides splash protection and inhalation protection appropriate for the existing hazard. This type of PPE may include a pair of coveralls, gloves, rubber booties, and either a surgical mask with a face shield or a respirator and safety glasses or other eye protection. Figure 10 provides an example of splash protective PPE.

[22] REAC/TS Medical Aspects of Radiation Incidents, 2011.
[23] National Council on Radiation Protection and Measurements (NCRP). *Report No. 161 Management of Persons Contaminated with Radionuclides*. 2008.
http://www.ncrponline.org/Publications/Press_Releases/161press.html.

Figure 10: Personal Protective Equipment with Splash Protection
(Source: CDC)

Table 5 suggests supplies for conducting decontamination in the shelter, and Table 6 suggests capabilities for conducting decontamination in the shelter.

Table 5: Suggested Supplies for Decontamination

Minimum Decontamination Supplies	Ideal Decontamination Supplies
• Clean clothing or blankets for people who remove outer layer of clothing • Moist wipes or wet towels (can use bottled water if no running water) to clean hands and face • Lint brushes or tape for dry decontamination • Garbage bags to collect outer layer of clothing; labels or tags for bagged clothing or personal possessions • Personal protective equipment (gloves and masks) for staff	• Monitoring equipment to identify contaminated people • Showers with warm water • Liquid soap for cleaning skin and hair • Clean towels • Clean clothing • Personal protective equipment for staff (including splash protection for those working near showers) • Cleaning supplies to rinse/clean showers after each use • Sinks or basins for partial-body decontamination (including soaking hands to remove stubborn contamination)

Table 6: Capabilities for Decontamination in the Shelter

Basic	Precautionary decontamination[13] if no radiation detection equipment available. Dry decontamination capabilities if no water available, including plans to brush off visible dust from clothing or remove outer layer of clothing. People may change into clean clothing they have brought with them.
Intermediate	Plans for precautionary decontamination if limited screening capabilities present. Water available for washing and showering. Changes of clothing available for those who do not have their own.
Advanced	Isolated decontamination directed by good screening capabilities. Showering, washing, and special techniques to remove stubborn contamination.[21] Changes of clothing available for those who do not have their own.

3.3 Screening Service Animals and Pets

People arriving at the shelter may have service animals or pets that were not screened and decontaminated at a CRC and require screening and decontamination. Service animals are not pets. Screening service animals should take priority over screening pets. Service animals should be kept with owners or reunited with owners as soon as possible. For periods that owners and service animals are separated, owners may require personal assistance.

If radiation detection equipment is available to screen service animals and pets:

- Screen service animals and pets using the same criteria used for people.
  - Contaminated service animals should be decontaminated immediately. If decontamination is not immediately possible, contaminated service animals should be placed in a holding area until decontamination is possible and owners should be provided personal assistance.
  - Contaminated pets can be placed in a holding area until they can be decontaminated.
- Clean service animals can join their owners in the shelter clean zones.
- Clean pets can be transferred to an animal care facility.

If radiation detection equipment is NOT available to screen service animals and pets:

- Conduct precautionary decontamination[13] of service animals and return them to their owners in the shelter clean zones or provide personal assistance to the owners and place the service animals in a holding area until they can be screened for contamination.
- Place pets in a holding area until they can be screened for contamination.

3.4 Decontaminating Service Animals and Pets

The shelter can partner with animal care professionals to plan and establish decontamination operations for contaminated service animals and pets. Decontaminating service animals should take priority over decontaminating pets.

If decontamination resources are available to clean service animals and pets:

- Decontaminate service animals and return them to their owners in the shelter clean zones.
- Decontaminate pets before they are placed in the animal care facility.
- Proper PPE should be used to guard against cross-contamination.
- Note: In some situations, owners may be involved in decontaminating their service animals or pets.

Service animals that are still contaminated after a first cleaning should be cleaned a second time. Service animals that are still contaminated after the second cleaning may be internally contaminated and may require additional evaluation. Shelter staff will need to provide personal assistance to owners until their service animals can join them in the shelter. Animals that are unable to be returned to their owners need to be placed in an animal care facility in an area designated for contaminated animals. Because these animals may excrete radioactive material in their saliva, urine, and stool, staff caring for them should use extra precautions and appropriate PPE to control cross-contamination.

If resources are available, pets that are still contaminated after a first cleaning should be cleaned a second time. Pets that are still contaminated after the second cleaning may be internally contaminated. These pets need to be placed in an animal care facility in an area designated for contaminated animals. Because these pets may excrete radioactive material in their saliva, urine, and stool, staff caring for them should use extra precautions and appropriate PPE to control cross-contamination.

If decontamination resources are NOT available to clean service animals and pets:

- Place contaminated service animals in a designated contaminated-animal area of an animal care facility and provide owners with personal assistance.
- Decontaminate service animals when resources become available and then return the clean service animals to their owners in the shelter clean zones.
- Place pets in a contaminated-animal area of an animal care facility.
- Decontaminate pets when decontamination resources become available, but after service animals have been cared for.

Methods for decontaminating service animals and pets include:

- Washing with soap and lukewarm water
- Wiping from head to tail with a damp cloth or towel
- Vacuuming using a HEPA vacuum
- Shaving fur

Contaminated towels, rags, fur, and other materials should be bagged twice and stored in a secure location until the bags can be disposed of properly according to instructions by radiation control officials.

3.5 Screening Personal Possessions

People arriving at the shelter may have an assortment of personal possessions that were not screened and decontaminated at a CRC and require screening and decontamination. In some cases, people may be reporting to shelters with only the items they were wearing or carrying at the time of the incident. In other cases, people may have bags packed with clothing, medications, durable medical equipment (e.g., wheelchairs, walkers), important documents, and other items of personal significance.

Screening personal possessions is a lower priority than screening people and should only be initiated as resources become available. Screening essential items – items that contribute significantly to a person's functionality or well-being – is a higher priority than screening nonessential items. Examples of essential items include:

- Eyeglasses, medication, medical supplies, medical devices, prostheses, wheelchairs, and mobility aids
- Wallets, keys, mobile phones, identification, important documents, debit cards, and credit cards
- Photographs, wedding bands, religious texts, and religious symbols

If radiation detection equipment is available to screen personal possessions:

- Screen essential items first and nonessential items as time permits.

Screening staff at the shelter may use the same screening criteria for personal possessions as they do for contamination on people.[24] For example, if screeners are using a screening criterion of two times background for people, items contaminated above this criterion should be decontaminated or stored for proper disposal according to instructions from radiation control officials.

Storage areas for contaminated items should be located away from group living spaces, securely locked, and labeled with appropriate signs to indicate a contamination control zone. Items placed in contaminated storage areas should be bagged and labeled with the owner's name and tracking information. This information may be necessary for law enforcement and public health investigations, as well as for personal disaster assistance claims.[25]

3.6 Decontaminating Personal Possessions

Cleaning essential items, such as wheelchairs and medical devices, takes priority over cleaning nonessential items. Contaminated items of lesser importance can be stored in a controlled area until they can be cleaned by the owner or collected and disposed of as radiological waste. Contaminated car keys should be stored in a manner that makes them easily accessible because they may be needed to perform vehicle screening and decontamination, as described in the following sections. Personal possessions that are wearable, such as eyeglasses, rings, and watches, can be worn into a shower, washed in a sink, or cleaned with moist wipes.

For people who had the opportunity to pack bags at home before evacuating the impacted area, the items inside the bags will most likely be free of contamination. However, the outside of the bags may have been contaminated during the evacuation. If the outside of a person's bag is contaminated and cannot be easily cleaned, the clean contents can be removed from the bag and the bag can be decontaminated separately or disposed of with other contaminated items.

If radiation detection equipment is available to screen personal possessions:

- Clean only contaminated items.
- Clean essential items using soap and water or moist wipes.
- Store contaminated nonessential items in a controlled location until they can be cleaned or collected for disposal as radiological waste.

If radiation detection equipment is NOT available to screen personal possessions:

- Decontaminate essential items using soap and water or moist wipes as a precautionary measure.
- Store nonessential items in a controlled location until they can be screened for contamination or collected for disposal as radiological waste.

[24] EPA PAGs, 2013.
[25] For more information on working with law enforcement after a radiation emergency, see CDC's *Radiological/Nuclear Law Enforcement and Public Health Investigation Handbook*, September 2011, available at http://www.emergency.cdc.gov/radiation/pdf/radiological-nuclear-handbook-09-01-11.pdf.

3.7 Screening Vehicles

Vehicle screening may not be offered at CRCs, and people may arrive at the shelter in vehicles that are contaminated. It is necessary to screen and decontaminate vehicles to ensure people are not contaminated or recontaminated by their vehicles; however, addressing vehicle contamination is a lower priority than screening animals and personal possessions and may not be an option early in the response.

One method of identifying contaminated vehicles is to place screening staff in the parking lot to check vehicles as they arrive. If a drive-through portal monitor is available, screeners can use this instrument to quickly identify contaminated vehicles. Screeners using handheld detectors can quickly pass probes under wheel wells, over hoods, and over seats once vehicles are empty of people.

Radiation control officials may recommend a different screening criterion for vehicles than for people, animals, and personal possessions. Shelter operators should adopt screening criteria recommended by emergency managers and radiation control officials, but in the absence of specific guidance, screeners can use the same criterion for vehicles that they have adopted for screening people.

If radiation detection equipment is NOT available to screen EVERY vehicle:

- Vehicles of contaminated people should be given priority for screening.

Contaminated vehicles should be parked in a designated area. Some vehicles may need to be transported away from the shelter for decontamination or isolation. In these cases, owners should be informed of the action and provided with tracking information that will allow them to reclaim their vehicles at the appropriate time.

3.8 Decontaminating Vehicles

If available, HEPA vacuums can be used to clean the interior of contaminated vehicles. Regular vacuums are not suitable because they can suspend radioactive material in the air, presenting an inhalation hazard. If no HEPA vacuums are available, vehicle seats may be gently cleaned with moist wipes or a lint roller and then covered with plastic garbage bags. Engine and cabin air filters may accumulate contamination and should be changed as soon as possible. This information should be conveyed to vehicle owners.

If water is available, wash the exteriors of the vehicles to remove contamination. Coordinate with radiation control officials to properly manage runoff from vehicle decontamination. In some cases, directing runoff into sanitary sewers may be an acceptable practice. If no water is available to wash the exteriors of contaminated vehicles, exterior decontamination should wait until vehicle decontamination resources are available.

Key Considerations for Screening and Decontamination

- Shelters coordinating closely with and receiving people directly from CRCs will not need to incorporate screening and decontamination into shelter operations.
- Shelters may receive people before CRCs are available, necessitating practical strategies for screening people, service animals, pets, personal possessions, and vehicles for radioactive contamination and conducting decontamination, as appropriate.
- In instances of life-threatening or other serious injuries, medical care takes priority over contamination screening and decontamination.
- Screening criteria should be scalable and flexible to respond to different incidents and available screening capabilities.
- Decontamination plans should be scalable and flexible to respond to different incidents and available decontamination capabilities.
- Shelter staff working in contamination control zones should be screened for contamination at the end of their shifts and any time they leave the contamination control zone, and if necessary, be decontaminated.

4.0 Radiation Monitoring in the Shelter

Radiation levels inside the shelter have to be monitored throughout the duration of the sheltering activity. Routine radiation monitoring helps identify and control contamination and ensures ambient radiation levels inside the shelter stay below established limits.

4.1 Monitoring the Shelter Facility and Equipment

Environmental health staff are important for maintaining acceptable living standards for shelter residents. Some routine environmental health responsibilities in a shelter include ensuring residents have adequate and accessible

- Living space
- Food and water
- Restroom and shower facilities
- Hygiene programs and vector controls[26]

In addition to these responsibilities, environmental health staff will want to consider implications of additional hazards presented by actual or feared elevated levels of radiation. This is an area of practice for which staff may have little or no equipment, experience, or training. However, they can be supported by information and resources obtained from emergency managers and radiation control officials.

Additional radiation-related responsibilities for environmental health staff may include:

- Conducting regular contamination assessments of the living, eating, and sanitary spaces in the shelter
- Monitoring ambient radiation levels inside the shelter
- Ensuring contaminated clothing and supplies are properly collected and stored

If a shelter has staff trained to conduct radiation monitoring and use radiation detection equipment, environmental health staff can work with these staff members to develop a robust radiation monitoring program. A program for a well-equipped shelter may include daily monitoring of shared spaces, food preparation and food service areas, restrooms, infant care stations, and showers. A monitoring program may also include hand and face screenings for residents before meals and air sampling for airborne contamination. If air sampling equipment is not available, alarming dosimeters or area monitors can be used to measure radiation levels in shared spaces. Ambient radiation levels for shared spaces should not exceed twice existing background levels.[27] Area monitors in shared spaces should be set to alarm at this level to ensure maximum protection for shelter residents and staff. Table 7 provides capabilities for conducting radiation monitoring in the shelter.

If a shelter has limited radiation detection equipment available for monitoring activities, environmental health staff should prioritize hand and face screenings before meals and monitor shared spaces and other areas in the shelter as possible. The primary route of internalizing trace amounts of contamination in the shelter will likely be ingestion; for this reason routine hand and face hygiene

[26] Vectors are living organisms that can transmit infectious diseases between humans or from animals to humans. Examples include insects and rodents.
[27] EPA PAGs 2013.

before meals is emphasized. Even with residents receiving some degree of screening or decontamination before entering the shelter, radioactive material may be present in the shelter, especially if screening efforts are limited by staff or resource availability. It is important to take every available precaution to limit the spread of radioactive material.

If radiation detection equipment is not available, environmental health staff can establish practical measures for contamination control until such equipment is available. An example of a practical contamination control measure would be to establish a hand-face-hand washing program before meals, in which residents are instructed to wash their hands, then their faces, then their hands again to reduce the risk of ingesting radioactive material. Parents of young children should also take additional precautions, such as frequently cleaning toys and pacifiers, and helping their children wash their hands regularly. Shelter staff will also benefit by adopting the same hygiene and contamination control measures that are implemented for shelter residents.

Table 7: Capabilities for Radiation Monitoring in the Shelter

Basic	If no radiation detection equipment is available, establish practical measures for contamination control, such as hand and face washing before meals.
Intermediate	If a shelter has limited radiation detection equipment, prioritize hand and face screenings before meals and monitor shared spaces and other areas as possible.
Advanced	If trained staff and radiation detection equipment are available, conduct routine monitoring of shared spaces, food preparation and food service areas, restrooms, infant care stations, and showers. Also monitor trash to ensure radioactive material is separated from regular trash.

Although radiation hazards in a shelter environment present an additional layer of complexity to environmental health operations, practical interventions can effectively reduce or eliminate these hazards. Additionally, environmental health staff who are vigilant about detecting and mitigating radiation hazards may also find their radiation protection efforts positively impact other areas of concern such as group hygiene, disease control, and site safety.

4.2 Decontaminating the Shelter Facility and Equipment

If environmental health staff identify a contaminated area or piece of equipment in the shelter, it will need to be decontaminated as soon as possible. If the contamination levels are low, staff can cordon off the area using tape or physical barriers to keep people from entering until decontamination has taken place. State radiation control officials will have to perform a final screening at the end of shelter operations before releasing the site for normal use.

The ease of decontamination depends on the material that is contaminated. For example, nonporous surfaces such as restroom tile are easier to decontaminate than carpeting. In general, shelter staff can approach cleaning contaminated shelter facilities and equipment the same way they would clean these items if they were muddy or dusty. If contamination is identified on a surface, staff can decontaminate the surface by determining the extent of the contamination and then cleaning from the edges of the contaminated area inward, so as to not spread contamination.

One notable exception is the use of non-HEPA vacuums. Standard vacuums do not have the capture efficiency of HEPA vacuums and may suspend radioactive particles in the air, making them an inhalation hazard. If carpeting is contaminated and there is no HEPA vacuum available for cleaning, staff can cover the contaminated section with a durable material (e.g., heavy plastic sheeting, duct tape, cardboard, or plywood) until appropriate cleaning arrangements can be made.

4.3 Monitoring Trash

Contaminated trash will require special disposal and may need to be stored on site until proper collection and disposal can be arranged with radiation control officials. The storage area for contaminated trash must be separate from contaminated personal possessions. Environmental health staff should routinely check the dose rate at the perimeter of these storage areas to ensure it does not exceed 20 µSv/h (2 mrem/h).[28]

Items used for decontamination, such as moist wipes, towels, and used PPE should be double-bagged and stored with other contaminated trash until they can be properly disposed.

Resources permitting, shelter operators need to make every effort to keep contaminated items out of the regular trash. If screening resources are available, regular trash can be monitored before being removed from the shelter to safeguard against improper disposal of contaminated items. This screening can be conducted with either handheld instruments or portal monitors.

If using handheld instruments, shelter staff can hold the probe one-half to one inch away from the trash bags to check for elevated exposure rates. If the exposure rate exceeds twice background, shelter staff should double-bag the trash and place the bags in storage with other contaminated trash until they can be properly disposed.[29]

If using portal monitors, shelter staff can place the trash bags in the portal monitor. Some portal monitors have an occupancy sensor that needs to be activated. If the portal does not alarm, the bags can be disposed as regular trash. If the portal alarms, shelter staff should double-bag the trash and place the bags in storage with other contaminated trash until they can be properly disposed.

4.4 Leaving and Returning to the Shelter

Once people are settled in the shelter, they may venture out into the community, or they may be permitted to travel into the impacted area to collect items from their homes. A low-background area is classified as an area with environmental radiation levels below 1 µSv/h (0.1 mR/h).[30]

If the shelter is located in an uncontaminated area:

- Residents who stay in the uncontaminated area do not need to be screened for contamination when they return to the shelter.
- Residents who venture into low or high background areas should be screened again when they return.
- Animals, possessions, and vehicles that leave the uncontaminated area with the residents or that are brought back by the residents will need to be screened upon return.

[28] NRC Radiation Dose Limits for Individual Members of the Public, 1991.
[29] EPA PAGs, 2013.
[30] Ibid.

If the shelter is located in a low background radiation area:

- Residents, animals, and possessions that leave the shelter, even if they stay in the low background radiation area, should be screened for contamination, or staff should conduct precautionary decontamination,[13] as needed, upon their return to the shelter.
- Vehicles that have already been screened and that stay in the low background radiation area do not need to be screened upon return.
- Vehicles taken into a high background area should be screened for contamination upon return.
- Animals, possessions, and vehicles that have not been previously screened at the shelter and are brought back by shelter residents should be screened upon return.

Key Considerations for Radiation Monitoring

- Environmental health staff should work with trained staff to develop radiation monitoring protocols that are appropriate for the available resources.
- Hygiene and contamination control and reduction measures implemented for residents extend to shelter staff as well.
- Items used for decontamination, such as moist wipes, towels, used PPE, and other contaminated items must be kept separate from regular trash.
- People and animals leaving the shelter may need to be screened again upon reentry.
- State radiation control officials will perform a final screening before releasing the shelter facility for normal use.

5.0 Registration and Public Health Follow-up in the Shelter

Registration and public health follow-up are important components of population monitoring because of the additional health considerations posed by radiation exposure and radioactive contamination. Recording relevant information about shelter residents in a public health registry will help public health officials provide follow-up services and conduct epidemiological investigations.

The shelter registration process may be conducted using paper forms or an electronic database. Public health officials may also interview shelter residents in order to identify health problems that require follow-up care.

5.1 Registering People

At the shelter, registration staff can collect basic registration information and any additional information requested by state and local authorities. Information collected will need to be accurate and accessible for follow-up interviews and epidemiological or law enforcement investigations.

Many jurisdictions already have electronic databases that can be used for registering people during mass dispensing operations or large-scale evacuations. By using these systems in a radiation emergency response, CRCs, hospitals, and shelters can maintain consistent, accessible records for displaced people. This approach ensures a continuity of service that will benefit the displaced population as well as health officials tasked with short- and long-term follow-up.

If a shelter is receiving residents from CRCs, the shelter registration process would include determining which CRCs the individuals came from, reviewing screening and discharge paperwork that the individuals received at the CRCs, and then proceeding with more general shelter registration. If the shelter is receiving individuals who have not been screened at CRCs and if contamination screening is offered at the shelter, the registration paperwork should include a contamination assessment form – such as the one included in Appendix C – to be completed by screening staff. To the extent practical, CRCs and shelters need to coordinate registration materials in order to facilitate the transfer of individuals from the CRCs to shelters.

Public health officials may ask shelter staff to collect additional information to assess a person's need for medical follow-up services for radiation exposure. This information is similar to data collected at CRCs. The CRC Registration Form can be found in Appendix E. If possible, incorporating this form, or a similar questionnaire, into an electronic tracking system will facilitate data sharing with health departments and medical providers.

When a person leaves the shelter, documenting his or her intended destination and collecting accurate contact information will facilitate long-term follow-up and disaster assistance efforts.

Documenting a person's experience starting at his or her origin in the impacted area, continuing through the evacuation, and ending in a more permanent relocation site may seem resource intensive; however, all information does not need to be collected upon entry into the shelter. Rather, if staff

resources are limited, a minimal registration file can be created for each person or family entering the shelter, with additional information being collected over the next few days. Registration and public health follow-up in the shelter can remain scalable and flexible and may need to be adjusted or refined as the response expands.

Table 8 provides capabilities for registration and public health follow-up in the shelter.

Table 8: Capabilities for Registration and Public Health Follow-up in the Shelter

Basic	Using paper forms to gather name and contact information for follow-up efforts.
Intermediate	Using paper forms or a local database or limited-access server to collect basic information for follow-up efforts, plus information on where people are coming from (e.g., specific CRC, location at time of incident).
Advanced	Using an integrated electronic database linked to CRC and public health registries to collect follow-up and incident-specific information as well as health assessments.

5.2 Registering Pets and Service Animals

Many shelter operations have existing plans for managing service animals and pets. If these plans include placing animals in an animal care facility, staff will need careful records that link animals to their owners. This information would be provided to the owners along with information about visiting hours and instructions for claiming animals upon leaving the shelter. For more information on the process of moving animals through the screening and decontamination process, refer to Chapter 3. Best practices for handling situations concerning pets can be found through the U.S. Department of Homeland Security (DHS)/Federal Emergency Management Agency (FEMA) Lessons Learned Information Sharing site.[31]

5.3 Registering Personal Possessions

Contaminated personal possessions that are collected at the shelter must be registered, bagged, and labeled with the owner's name and contact information before being placed into storage. This information may be necessary for law enforcement and public health investigations, as well as for personal disaster assistance claims.

5.4 Registering Vehicles

Vehicles that are parked at the shelter should be linked to their owners and documented on the appropriate registration forms. In the event a vehicle is heavily contaminated and must be removed from the shelter premises for decontamination or disposal, the owner will need a tracking number for the vehicle and information about decontaminating the vehicle or recouping the loss of the vehicle. While these actions will not be the direct responsibilities of shelter staff, shelter staff can assist vehicle owners through the process to ensure they have the information they need.

[31] Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA). *Best Practice – Shelter Operations: Pet-Friendly Shelters*. http://lsart.org/sites/site-1707/documents/ShelterOperations-PetFriendlyShelters2.pdf.

Key Considerations for Registration and Public Health Follow-up

- Recording relevant information about shelter residents in a public health registry will help public health officials provide follow-up services and conduct epidemiological investigations.
- Ideally, shelter registration will be conducted using an electronic database that interfaces with CRC databases and existing tracking systems.
- Using existing systems, such as electronic databases that can be used for mass dispensing operations or large-scale evacuations, can help CRCs, hospitals, and shelters maintain consistent, accessible records for displaced people.
- If a suitable electronic database is not available, shelter operators need to keep written records to capture important information when people check into the shelter and when they check out.
- If contamination screening is offered at the shelter, a contamination assessment form should be completed by screening staff and included with each person's shelter registration.
- When a person leaves a shelter, documenting the intended destination and collecting accurate contact information can facilitate long-term follow-up and disaster assistance efforts.
- Registration and tracking processes will need to be put in place to keep track of personal possessions, animals, and vehicles.

6.0 Health Surveillance in the Shelter

It is important for healthcare staff to monitor the shelter population for common illnesses, infectious diseases, and complications from pre-existing medical conditions following a radiation emergency. Life-threatening injuries and illnesses require immediate transfer to a medical facility or alternate care site for advanced care. Lifesaving care should not be delayed because of concerns of cross-contamination.

Following a radiation emergency, it is also important for shelter healthcare staff to monitor people for injury caused by acute radiation exposure or radioactive contamination. The primary radiation-induced injuries are Acute Radiation Syndrome (ARS) and radiation burns. The information on ARS and radiation burns in the following sections is derived from publications available from the Radiation Emergency Assistance Center/Training Site (REAC/TS)[32] and the Armed Forces Radiobiology Research Institute (AFRRI).[33] The information is intended to provide awareness-level knowledge for shelter staff. Additional information on ARS and radiation burns can be found at the CDC Radiation Emergencies website[34] and the Radiation Emergency Medical Management (REMM) website.[35]

Shelter staff need to work with epidemiologists and public health officials to ensure adequate reporting of illness and injury. This information will be useful for identifying health needs of the impacted population and distributing medical resources to hospitals and shelters caring for the displaced population.

6.1 Scope of Radiation Health Effects for Different Incidents

The number of people who will be showing signs of radiation injury will vary depending on the type and size of the incident. Radiological incidents, such as a dirty bomb detonation or a nuclear power plant incident, are unlikely to distribute enough radioactive material to generate the acute doses or high levels of contamination needed to cause immediate health effects. Therefore, few people reporting to shelters should be expected to suffer from ARS or radiation burns. This does not mean health surveillance in the shelters is unnecessary in these circumstances, but that shelter staff are less likely to see overt symptoms of radiation injury.

Nuclear incidents, such as the detonation of an improvised nuclear device (IND), will cause a large number of fatalities and severe injuries because of thermal burns and blast effects. A nuclear detonation will also disperse significant amounts of highly radioactive contamination (fallout) that can cause acute health effects. Furthermore, an IND detonation in a major urban area will severely damage surrounding infrastructure and is likely to displace a large number of people.[36]

The combined effects of damaged medical infrastructure and a large displaced population could result in injured people seeking shelter before receiving treatment for injuries. Therefore, shelter healthcare staff can anticipate more people exhibiting symptoms of ARS and radiation burns following a nuclear

[32] REAC/TS Medical Aspects of Radiation Incidents, 2011.
[33] Armed Forces Radiobiology Research Institute (AFRRI). *Medical Management of Radiological Casualties, Fourth Edition*. 2013. http://www.usuhs.edu/afrri/outreach/pdf/4edmmrchandbook.pdf.
[34] More information about ARS is available at http://emergency.cdc.gov/radiation/ars.asp, and information on radiation burns is available at http://emergency.cdc.gov/radiation/cri.asp.
[35] REMM provides a collection of resources about the diagnosis and treatment of radiation casualties and is available at http://www.remm.nlm.gov/.
[36] Executive Office of the President, Office of Science and Technology Policy (OSTP). *Planning Guidance for Response to a Nuclear Detonation, Second Edition*. 2010. http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf.

incident. Shelter healthcare staff will also need to be prepared to treat minor lacerations and thermal burns. People with more severe injuries should be transferred to a medical facility or alternate care site for advanced care.

In either case, shelter healthcare staff will need to be familiar with signs and symptoms of radiation injuries and know where to refer people who need advanced care.[37] Table 9 provides capabilities concerning health surveillance in the shelter.

Table 9: Capabilities for Health Surveillance in the Shelter

Basic	Shelter healthcare staff are trained to recognize radiation-induced injury and illness.
Intermediate	In addition to the capabilities above, shelter healthcare staff coordinate with public health officials to prioritize people for follow-up services.
Advanced	In addition to the capabilities above, the shelter offers: • Physician consultation • Laboratory sample collection • Radiation dose assessment

6.2 Acute Radiation Syndrome (ARS)

Large, whole-body doses of radiation can damage or kill cells in the body and result in ARS. Cells that reproduce quickly, such as those in the blood and gastrointestinal tract, are particularly susceptible to ionizing radiation. People can receive a large radiation dose without being contaminated, so health surveillance activities are important for all shelter residents, not just those who were contaminated with radioactive material.

ARS has four phases of progression: a prodromal phase, a latent phase, an illness phase, and a phase of recovery or death. Table 10 provides more information about the stages of ARS and the appropriate actions for managing ARS in the shelter.

During the prodromal phase, a person with ARS may show signs of loss of appetite, nausea, vomiting, fatigue, diarrhea, and at higher doses, fever and respiratory distress. The onset of the prodromal phase can occur within minutes of a severe exposure or up to several days after a lower exposure. The prodromal phase typically lasts between one and two days. Therefore, healthcare staff working in the shelter will need to be watchful for the prodromal phase symptoms, especially during the first few days following the incident. Symptoms commonly exhibited during the prodromal phase of ARS are common for other illnesses. A person exhibiting severe gastrointestinal distress, high fever, or other symptoms of ARS should be transferred to a medical facility or alternate care site for further evaluation and care.

During the latent phase of ARS, a person will present no symptoms. The latent phase may last a few days to a few weeks, depending on the severity of the radiation dose. Higher radiation doses typically result in a shorter latent phase.

[37] The Radiation Injury Treatment Network (RITN) is a consortium of medical centers prepared to treat patients with radiation injuries. Additional information about RITN is available at http://www.ritn.net/.

During the illness phase of ARS, a person may show signs of infection, diarrhea, electrolyte imbalance, bleeding, cardiovascular collapse, and unconsciousness. A person exhibiting these symptoms should be transferred to a medical facility for further evaluation and care.

The final phase of ARS is the phase of recovery or death. Recovery is largely dependent on the radiation dose received; however, proper supportive care greatly increases a person's chance of survival.

Although people exhibiting signs of ARS will need additional medical care, ***ARS is not contagious and will not spread to others in the shelter.***

Table 10: Stages, Symptoms, and Appropriate Actions for Managing ARS in the Shelter

Stage of ARS	Symptoms	Action
Prodromal	Loss of appetite, nausea, vomiting, fatigue, diarrhea, fever, respiratory distress	Monitor residents for symptoms. Transfer to a medical facility if ARS is suspected.
Latent	No symptoms	For residents who transition from the prodromal phase to the latent phase while in the shelter, regularly monitor vital signs until it is possible to transfer them to a medical facility.
Illness	Infection, diarrhea, electrolyte imbalance, bleeding, cardiovascular collapse, unconsciousness	For residents who transition from the latent phase to the illness phase while in the shelter, provide supportive care until it is possible to transfer them to a medical facility.
Recovery or Death	Recovery or death	For residents who recover from ARS in the shelter, provide daily medical monitoring and refer them for public health follow-up monitoring. For residents who expire from ARS in the shelter, prepare the body for removal by mortuary services.[37]

6.3 Radiation Burns

Unlike blast injuries and thermal burns that appear immediately, radiation burns take days to weeks to develop. Radiation burns are the result of ionizing radiation damaging deep layers of skin tissue. They can range from mild swelling and reddening to severe ulcerations, depending on the radiation dose. People who show signs of radiation burns will need to be referred to a medical facility for further evaluation and treatment.

[38] For more information on mortuary services after a radiation emergency see CDC's *Guidelines for Handling Decedents Contaminated with Radioactive Materials*, available at http://www.emergency.cdc.gov/radiation/pdf/radiation-decedent-guidelines.pdf.

6.4 Radiation Exposure and Pregnancy

The effects of radiation exposure on unborn children may be a significant concern for expecting parents. Healthcare staff in the shelter will need to be prepared to address these concerns and provide referrals for pregnant women to continue their prenatal care in the host community.

Furthermore, nursing mothers who may be internally contaminated with radioactive material may need to take extra precautions to prevent transferring that contamination to their babies through breast milk. If possible, nursing mothers may consider temporarily stopping breastfeeding and switching to either baby formula or breast milk that was pumped and stored before the incident, until they can be seen by a healthcare professional.

Additional information on radiation exposure and pregnancy can be found at the CDC Radiation Emergencies website.[39]

6.5 Psychological Impact of Radiation Emergencies

The psychological impact of surviving a radiation emergency may be significant and should not be underestimated when staffing the shelter. It will be beneficial to have behavioral health specialists on hand to monitor people for signs of emotional strain and provide access to counseling services. Providing shelter residents with actions they can take to protect themselves and their families gives them a sense of self-efficacy and can alleviate feelings of helplessness. Whenever possible, shelter operators should provide residents with opportunities to take control of their own health and well-being. It would also be helpful if shelter staff are trained in the basic principles of psychological first aid, so they can better assist shelter residents.[40]

6.6 Worker Health and Safety

In addition to health surveillance activities for residents, shelter staff need to be continuously monitored for adverse health effects. The health risk to shelter staff from radiation in the shelter will be minimal; however, staff should still follow safety protocols established by the safety officer to keep radiation doses as low as reasonably achievable (ALARA).[41] A hazard assessment is needed before opening the shelter, and the shelter safety plan needs to address the hazards present. In addition to physical hazards in the shelter, staff may be at risk for psychological injury. Behavioral health specialists working in the shelter can monitor staff for signs of emotional strain and provide access to counseling services, if necessary.

[39] Additional information on radiation exposure and pregnancy is available at http://emergency.cdc.gov/radiation/prenatal.asp.

[40] For an example of such training, see CDC's *Psychological First Aid in Radiation Disasters*, available at http://www2a.cdc.gov/TCEOnline/registration/detailpage.asp?res_id=2490.

[41] ALARA is the key principle of radiation safety. The goal is to minimize radiation exposure. If there is no clear benefit to receiving a dose, it is better to avoid it. Safety officers can help staff limit their radiation dose by limiting their time near a radioactive source, maximizing the distance from a radioactive source, and, whenever possible, using practical shielding to attenuate radiation emitted from a source.

Key Considerations for Health Surveillance

- Healthcare staff need to monitor the shelter population for life-threatening injuries and illnesses that require emergency care at a medical facility or alternate care site.
- Healthcare staff need to monitor for common illnesses, infectious diseases, complications due to chronic conditions, and injuries caused by acute radiation exposure or radioactive contamination.
- Healthcare staff need to watch for the primary radiation-induced injuries, which are ARS and radiation burns.
- ARS is not contagious and will not spread to others in the shelter.
- Shelter staff need to work closely with epidemiologists and public health officials to ensure adequate reporting of illness and injury.
- Although health risk to shelter staff from radiation in the shelter will be minimal, shelter staff need to be continuously monitored for any adverse health effects including signs of emotional strain.

7.0 Communicating Radiation Risk to Shelter Staff and Residents

A radiation emergency creates communication issues beyond those experienced in conventional shelter operations. Shelter staff must be prepared to communicate with shelter residents about radiation screening, decontamination, the nature of radiation, and both the acute and ongoing health concerns of exposure and contamination. Radiation is invisible, silent, and odorless; it can only be detected with specialized equipment. It is also unfamiliar to and not well understood by the public. Concern may exist for possible long-term and delayed health effects, primarily cancers, many of which can only be diagnosed years after the exposure. Furthermore, pregnant women may be fearful of harm to their unborn children.

Social stigma is another possible consequence of a radiation emergency. Social stigma can be experienced by people who are contaminated or even potentially contaminated by radioactive material because other people fear that the contamination is contagious. Those who are housed in shelters after evacuating a potentially contaminated area may experience social stigma from the outside community. Public information officers at shelters can work with the media and other outside information channels to provide factual information to reduce social stigma. This is another reason for clear, correct, and open communication by shelter staff. Table 11 contains capabilities for communicating radiation risk in the shelter.

Table 11: Capabilities for Communicating Radiation Risk in the Shelter

Basic	• Staff know where to direct technical questions and media inquiries. • Resources are available for shelter residents who request additional information on radiation risks.
Intermediate	In addition to the capabilities above: • Staff are trained in basic psychological first aid. • Behavioral health specialists are available for counseling. • Healthcare staff are trained to discuss radiation risk.
Advanced	In addition to the capabilities above: • Radiation experts (e.g., health physicist, radiation technologist, medical physicist) trained in risk communication and psychological first aid are available to answer questions or offer daily briefings.

7.1 Communicating with Shelter Staff

Shelter staff will need to feel safe in the shelter in order to do their jobs effectively, but many may fear potential radiation hazards at the shelter. It will be important to explain clearly and concisely the risks to workers and to identify the precautions in place to protect staff. Appropriate precautions include locating the shelter in an uncontaminated or low background radiation area, monitoring radiation levels inside the shelter, and, if necessary, establishing dosimetry programs for workers.

This information will be better received if it comes from a trusted source who is knowledgeable about radiation, such as a shelter manager, radiation protection professional, health official, or physician. Furthermore, having that trusted source working in the shelter alongside staff will build confidence that staff can work safely in the shelter.

Shelter managers can use staff briefings to provide updates on the incident and shelter operations and answer questions from staff.

If possible, having a radiation professional on hand to answer questions will help build confidence among staff. Staff can receive an overview of the screening and decontamination operations, whether conducted at the shelter or at a CRC, so they will be able to answer basic questions from shelter residents.

It is important that shelter staff are aware of media policies at the shelter. Communications with media representatives visiting a shelter should be handled by the shelter public information officer or another designated staff member. Shelter staff should be familiar with the designated media areas within the shelter (if any) and credentials provided to the media for identification purposes. Screening procedures for media personnel, equipment, and vehicles would be determined by radiation safety personnel working with public information staff.

7.2 Communicating with Shelter Residents

Shelter residents may have questions about the incident and may express concerns about radiation exposure or contamination. Shelter operators need to ensure staff are trained to provide clear instructions, answer simple questions, and redirect technical or difficult questions to subject matter experts or designated personnel. Staff should also be proactive in reporting any rumors, common misperceptions, or misunderstandings of information to shelter managers to allow for quick adjustments in communication strategies. Good communications with shelter residents can help to ease psychological stressors and reassure residents that the shelter is a safe place for them and their families.

When communicating with shelter residents, all staff members will need to adopt basic psychological first aid techniques that increase the effectiveness of communications, including:

- Maintaining an open posture
- Engaging in active listening
- Providing accurate information
- Speaking calmly and respectfully

7.3 Communication Topics

Shelter residents may pose questions specific to radiation emergencies and expect shelter staff to respond. Their questions may include the following:

- Radiation-specific shelter operations – Shelter residents may be unfamiliar with screening and decontamination procedures that may be necessary. Shelter operators can anticipate this lack of knowledge and ensure that all people arriving at the shelter have clear guidance to lead them through the screening, decontamination, and registration processes.
- Contamination and exposure – Shelter residents may not understand the difference between radiation exposure and radioactive contamination. Screening, decontamination, and healthcare staff should be prepared to explain how they differ, how they impact people, and how they can be managed or minimized. Whenever possible, use plain language, common examples, and analogies to increase understanding of the hazard and risk.

- Health effects of radiation exposure – Shelter residents may be concerned about the short-term and long-term effects of radiation exposure. In addition to consulting with individual patients, medical personnel or shelter healthcare staff may consider holding group information sessions and making information available to shelter residents. Residents may request information about the signs of acute radiation syndrome, medical countermeasures, and long-term risk of radiation exposure. Pregnant women and nursing mothers will have unique concerns and will need appropriate medical advice.
- Contamination control – Access to some areas in the shelter will be limited because of potential cross-contamination or elevated radiation levels (e.g., storage areas for contaminated items). These areas must be clearly marked with signs and barriers. Shelter residents must be informed about these areas as a part of shelter intake or orientation procedures. Shelter staff may need to answer questions about the safety of contamination control zones and about procedures to ensure that the shelter clean zones remain uncontaminated.
- Information about contaminated personal possessions – Some people may arrive at the shelter with contaminated items that will need to be stored until they can be decontaminated or disposed of as radiological waste. People will want to know which items can be decontaminated, how to clean them, what happens to items that cannot be cleaned, and how items will be registered and tracked for follow-up purposes and disaster assistance claims.
- Information about hygiene – Showering and regularly washing hands play a major role in preventing and controlling cross-contamination. Shelter residents should receive hygiene information upon entering the shelter and be reminded of it regularly. Families with children or other dependent members need to be instructed on how to assist these members with hygiene procedures. Providing shelter residents with things they can do to protect themselves and their families gives them a sense of self-efficacy and can alleviate feelings of helplessness.
- Information about food and water safety – Residents may also have concerns about procedures to protect the food and water supply in the shelter. There may also be questions about contamination levels in drinking water and food sources. Radiation subject matter experts may need to address concerns about food and water safety.
- Information about long-term recovery – Shelter residents may have questions about environmental monitoring and recovery efforts in their communities. Information about health registries and population monitoring may help assure residents that there will be long-term assistance available. As information about environmental contamination is made available, radiation experts may be asked to help interpret measurement data for shelter populations and answer questions about when it will be possible to return to the impacted area.

7.4 Communication Strategies and Tools

Shelter operators should consider various strategies and tools to communicate to all audiences in the shelter, including residents, volunteers, and staff. If possible, materials should be tested before publication to ensure members of the public find the communications understandable, believable, and effective. This pretesting is especially important if the shelter operators anticipate receiving populations that may have difficulties comprehending health materials. Technical language and jargon should be avoided when possible, or if unavoidable, should be clearly defined. Where possible, communication materials should be produced in multiple languages as appropriate to anticipated audiences. Some strategies shelter staff can leverage to communicate to their target audience include the following:

- Signs – Providing general information (e.g., shelter rules, maps of the shelter) is routine, but posting additional information about radiation safety measures will help keep people informed and safe. Examples of radiation safety measures include posting results of daily radiation monitoring in common areas and identifying contamination control zones and elevated radiation exposure areas. If radiation monitoring results are posted, information to help put risks into relatable context should also be included.
- Infographics – Pictures that depict protective action procedures, basic information on radiation or services provided (e.g., contamination screening and decontamination) can be helpful for non-English speakers and people who have difficulty reading. Examples of infographics for decontamination and other radiation topics can be found at the CDC Radiation Emergencies website.[42]
- Basic radiation education for shelter staff – Training shelter staff on basic principles of radiation protection (e.g., contamination and exposure, procedures for screening and decontamination, available medical resources) prepares staff to address the concerns of shelter residents. Pre-incident training for shelter staff will also help alleviate safety concerns and answer questions about staff roles and responsibilities in the shelter.
- Radiation technical support – If available, especially in the first few days of shelter operations, radiation technical experts could answer questions from residents in the shelter. Having radiation experts in the shelter also provides assurance that the shelter is safe (i.e., if the experts are comfortable being in the shelter, then it should be safe for others). It is important that these technical experts have some training in psychological first aid and risk communication and are able to use nontechnical language to address concerns.
- Pamphlets and handouts – Information from credible sources can be reproduced and handed out to shelter residents (e.g., information about radiation exposure, radioactive contamination, radiation health effects). The materials can direct shelter residents to useful sources of information if they want to learn more. A list of frequently asked questions about radiation and its health effects can be found at the CDC Radiation Emergencies website.[43]
- Social media tools – Shelters with computer banks or where residents have smartphones or mobile devices can use social media tools to keep shelter residents informed of the conditions and initiatives in place at the shelter. These tools can also be used to connect with family and friends outside of the shelter and link shelter residents with credible information sources.

[42] Examples of infographics for decontamination and other radiation topics are available at http://emergency.cdc.gov/radiation/resourcelibrary/infographics.asp.
[43] A list of frequently asked questions about radiation and its health effects is available at http://emergency.cdc.gov/radiation/emergencyfaq.asp.

7.5 Communication Resources

The following resources provide additional information on risk communication following radiation emergencies and can be used to refine communications plans for shelter operations.

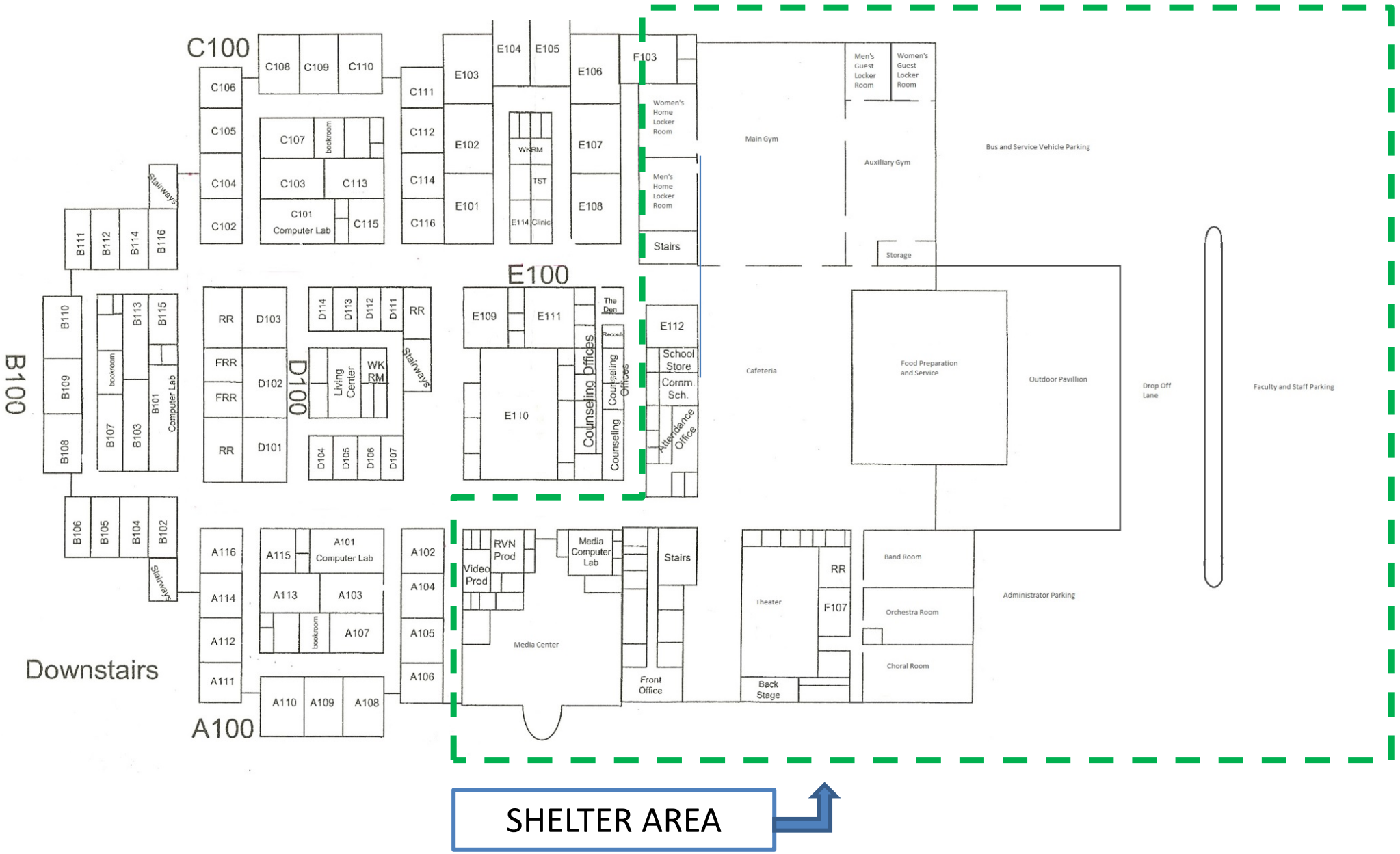
- Centers for Disease Control and Prevention (CDC). Radiation Emergencies Website
  http://emergency.cdc.gov/radiation
- CDC. Radiation Emergency Communications Research
  http://www.emergency.cdc.gov/radiation/audience.asp
- CDC Psychological First Aid for Radiation Disasters
  http://www2a.cdc.gov/TCEOnline/registration/detailpage.asp?res_id=2490
- Executive Office of the President, Office of Science and Technology Policy. Planning Guidance for Response to a Nuclear Detonation, 2nd Ed. 2010.
  http://www.remm.nlm.gov/PlanningGuidanceNuclearDetonation.pdf
- Environmental Protection Agency (EPA). Communicating Radiation Risks: Crisis Communications for Emergency Responders. 2007. Publication #402F07008.
  http://www.epa.gov/nscep/index.html
- FEMA. Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath. 2013.
  http://www.fema.gov/media-library/assets/documents/33036?id=7659
- FEMA. Communicating During and After a Nuclear Power Plant Incident. 2013.
  http://www.fema.gov/media-library/assets/documents/33011?id=7651

Key Considerations for Communicating Radiation Risk

- Clear, accurate, and open communication can address health concerns of shelter residents and help prevent social stigma from others within the shelter.
- Shelter operators need to ensure shelter staff are trained to provide clear instructions, answer simple questions, and redirect technical or difficult questions to subject matter experts or designated personnel.
- Shelter staff need to be prepared for questions about the nature of radioactive contamination and radiation exposure, decontamination practices, contamination control, the health effects of radiation exposure, and long-term recovery.
- Signs, infographics, pamphlets, handouts, and social media tools help deliver clear communications.
- Radiation protection professionals and subject matter experts can train staff and reassure shelter residents.
- The shelter can benefit from staff and volunteers who are trained in psychological first aid.

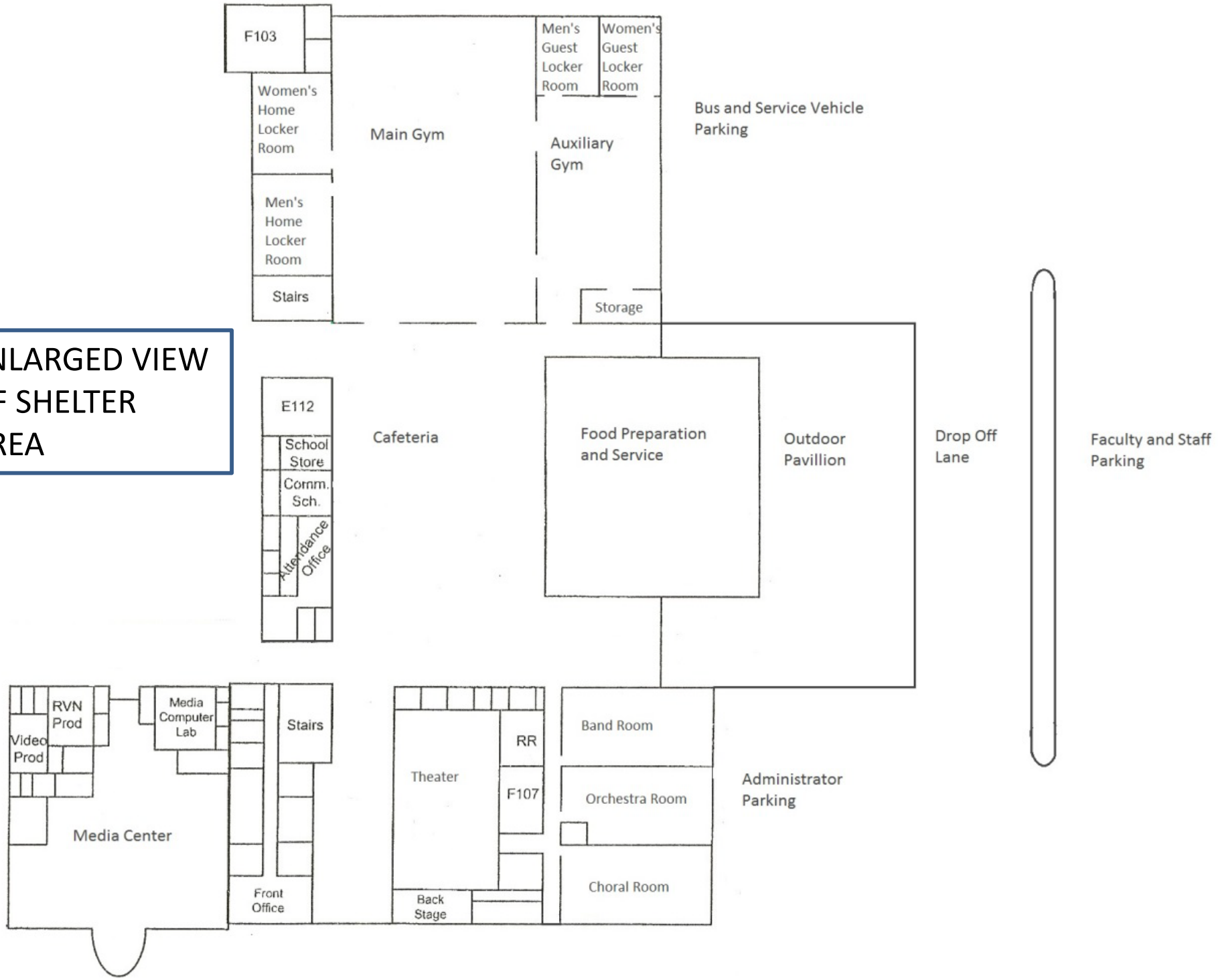
Appendix A:
Example Floor Plan for a Radiation Shelter

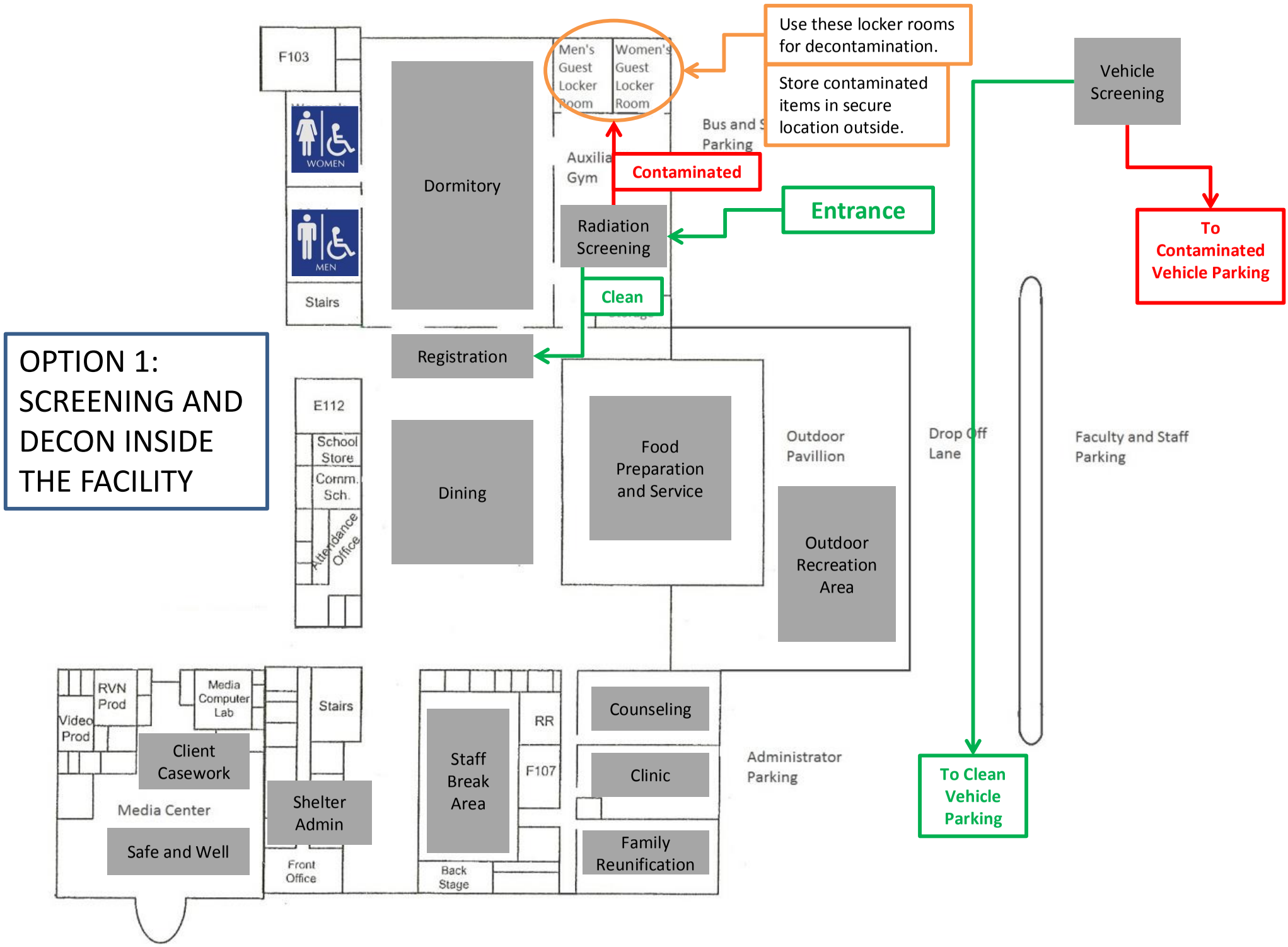
SHELTER FACILITY FLOOR PLAN

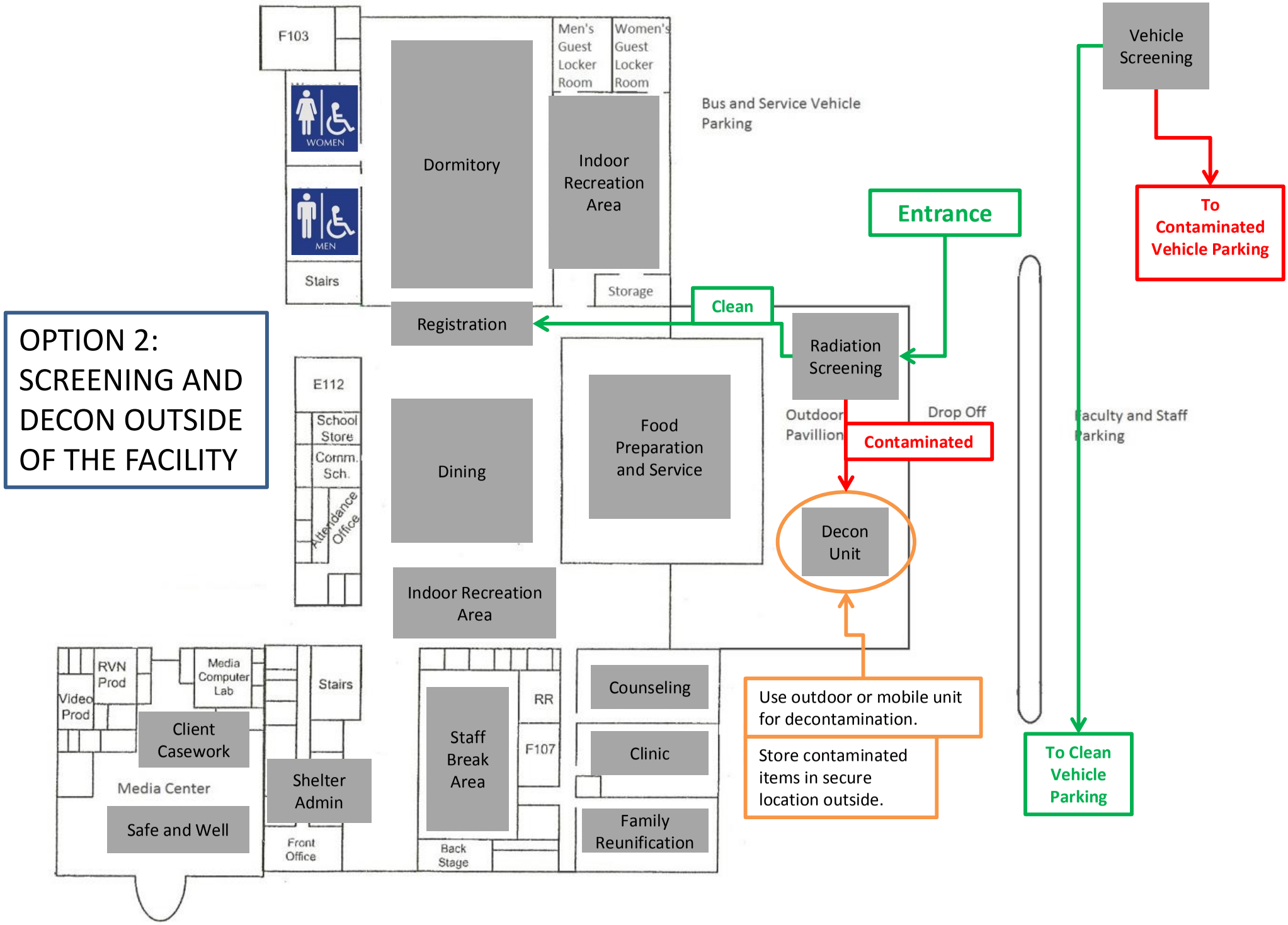


SHELTER AREA

ENLARGED VIEW OF SHELTER AREA




OPTION 1: SCREENING AND DECON INSIDE THE FACILITY
F103
Men's Guest Locker Room
Women's Guest Locker Room
Use these locker rooms for decontamination.
Store contaminated items in secure location outside.
Vehicle Screening
WOMEN
MEN
Stairs
Dormitory
Auxilia
Gym
Bus and
Parking
Contaminated
Entrance
Radiation Screening
To Contaminated Vehicle Parking
Clean
Registration
E112
School Store
Comm. Sch.
Attendance Office
Dining
Food Preparation and Service
Outdoor Pavillion
Drop Off Lane
Faculty and Staff Parking
Outdoor Recreation Area
RVN Prod
Media Computer Lab
Video Prod
Client Casework
Media Center
Safe and Well
Shelter Admin
Front Office
Stairs
Staff Break Area
RR
F107
Back Stage
Counseling
Clinic
Family Reunification
Administrator Parking
To Clean Vehicle Parking


OPTION 2: SCREENING AND DECON OUTSIDE OF THE FACILITY
F103
WOMEN
MEN
Stairs
Men's Guest Locker Room
Women's Guest Locker Room
Dormitory
Indoor Recreation Area
Storage
Bus and Service Vehicle Parking
Vehicle Screening
To Contaminated Vehicle Parking
Entrance
Clean
Registration
Radiation Screening
E112
School Store
Comm. Sch.
Attendance Office
Dining
Food Preparation and Service
Outdoor Pavillion
Drop Off
Contaminated
Faculty and Staff Parking
Decon Unit
Indoor Recreation Area
RVN Prod
Video Prod
Media Computer Lab
Client Casework
Media Center
Safe and Well
Stairs
Shelter Admin
Front Office
Staff Break Area
RR
F107
Back Stage
Counseling
Clinic
Family Reunification
Use outdoor or mobile unit for decontamination.
Store contaminated items in secure location outside.
To Clean Vehicle Parking

B

Appendix B:
Contamination Screening Job Aids

G–M DETECTORS JOB AID

About Geiger Müller (GM) Detectors

GM detectors, also known as Geiger counters, are common handheld radiation detectors. These instruments can detect alpha, beta, and gamma radiation and are routinely used for handheld contamination screening. GM detectors consist of a probe and a survey meter. On some models, the probe is connected to the survey meter by a coaxial cable. On other models, the probe is built into the survey meter. These detectors commonly measure radiation in counts per minute (cpm).

Quick Tips:

- **Check the batteries**
- **Take a background reading**
- **Scan the person slowly and closely**
- **Record your readings**

Figure 1: A pancake-style GM detector

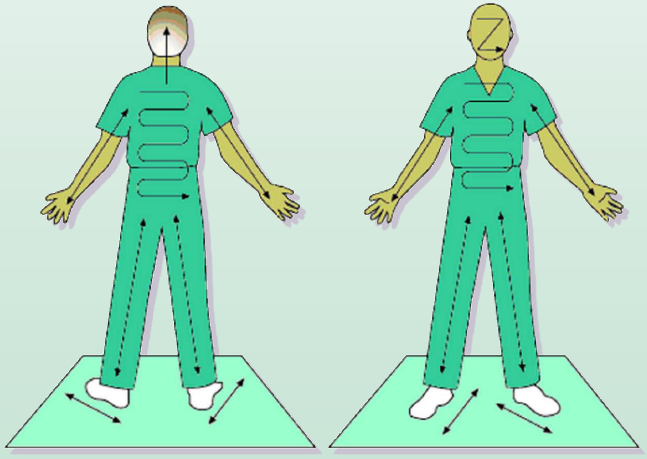


Figure 2: Contamination screening pattern

SAFETY NOTE:

Do not connect or remove the coaxial cable when the survey meter is turned on. You could receive an electrical shock.

Inspect the equipment.

A) Inspect the detector for obvious signs of damage (e.g., cracked display, broken probe window).

B) If using a model with a cable, inspect the cable that connects the probe to the survey meter. Connect the probe and cable, turn on the meter, and wiggle the cable near the connectors to see if this causes erratic behavior (e.g., changes in sound or readings). If so, the cable is defective.

Perform a battery check.

A) If the survey meter has a digital display, the battery life indicator will show the remaining charge in the batteries.

B) If the survey meter has an analog display, use the "Range" switch or "Bat" button to check the batteries. The needle should move to an area on the scale marked "Bat," indicating the batteries are charged.

C) Replace the batteries if necessary.

Conducting an operational check.

A) Place the probe close to a check source.

B) If the meter has a range selector, start on a low range and work up to a high range.

C) Verify the survey meter response (i.e., audible response and display).

D) If no source is available, assume the survey meter is working if the response to background is about 30 to 200 cmp.

Conduct a background reading.

A) Expect a background reading of 30 to 200 cmp.

B) Document the background reading for easy reference.

Conduct the contamination screening (see Figure 2).

A) Start at the head and work down to the bottoms of the feet. Pay particular attention to the face, feet, and hands.

B) Move the probe slowly (1 inch per second) and closely (1 inch away), without touching the body.

C) Locate the area that produce the most clicks and document the reading. Generally, areas with readings two times higher than the background reading are considered contaminated.

PLANNING NOTE:

For screening a large number of people, it may be necessary to perform only quick screenings of the head, face, shoulders, hands, and feet to save time.

PORTAL MONITOR JOB AID

About Portal Monitors

Portal monitors provide an efficient means of screening people for external contamination. These monitors can detect gamma and high-energy beta radiation, but not alpha radiation. Similar to metal detectors at airports, the portal monitor scans people as they walk through the device. An occupancy sensor (laser sensor) detects when a person is passing through the monitor. If the portal monitor detects radiation above the screening criteria, an alarm will sound and a red light will turn on.

Positioning the Portal Monitor

Because portal monitors are highly sensitive to gamma radiation, carefully consider where to place them in the facility. If not positioned properly, a highly contaminated person further back in line could set off the alarm when someone else is walking through the detector.

To avoid false alarms

1. Provide additional layers of radiation detection before people get to the portal monitor (e.g., high contamination screenings, partial-body contamination screenings).
2. Position the portal monitor to take advantage of shielding within the facility (e.g., corners, pillars, doors).

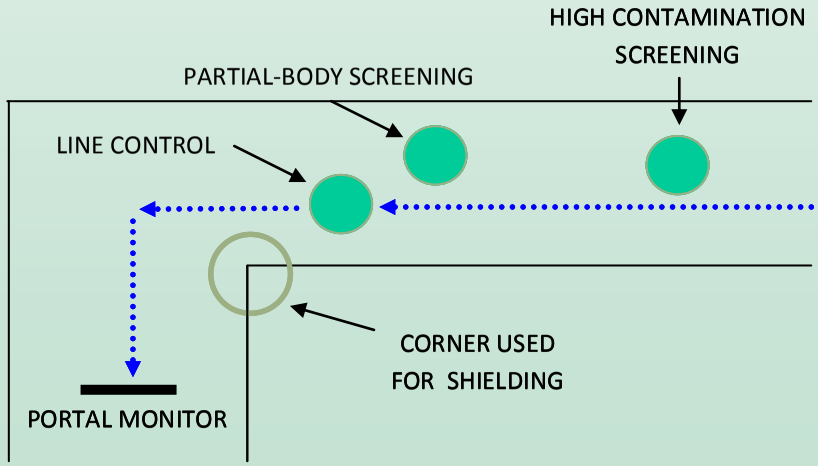


Figure 1: Positioning the portal monitor

Setting up the Portal Monitor

1. Review the manufacturer's instructions for assembly.
2. Assemble the unit where you intend to use it.
3. Check the cable connections and power source.
4. Turn on the portal monitor and allow it to perform its start-up check.
5. Conduct an operational check using a check source (e.g., button source).

Operating the Portal Monitor

1. Signal line control to send a person toward the portal monitor.
2. Ask the person to walk directly to the center of the portal.
3. Have the person pause for 1-2 seconds after entering the portal monitor.
4. Ensure the occupancy sensor has detected the person.
5. If the alarm sounds or if the red light comes on, ask the person to turn around and step out of the portal monitor. Have a staff member escort the person to the Wash Station for decontamination.
6. If the green light comes on, the person is not contaminated and can proceed to Registration.
7. When the path is clear, signal line control to send the next person.

Figure 2: Full-body contamination screening with a portal monitor

Appendix C:
Contamination Assessment Form

CONTAMINATION ASSESSMENT FORM

Name: _____
(Last) (First) (MI)

ID Number: _____ Date: _____ Time: _____

Has the person recently had a stress test, brachytherapy, PET scan, thyroid ablation, or other nuclear medicine procedure?

❒ **Yes** ❒ **No** If yes, contamination screening results may be elevated.

Screening Criteria**: _____** cpm (counts per minute) Background**: _____** cpm

Instructions:

- Record measured levels of contamination for specified areas.
- Mark contamination findings on diagrams.
- Identify contaminated wounds, if present.
- Place an "X" in the box if no measurements were taken.

Table 1: Pre-Decontamination Measurements (in cpm)

	Front	Back
Head		
Breathing Zone		
Torso		
	Left	**Right**
Arm		
Hand		
Leg		
Sole of Shoe		

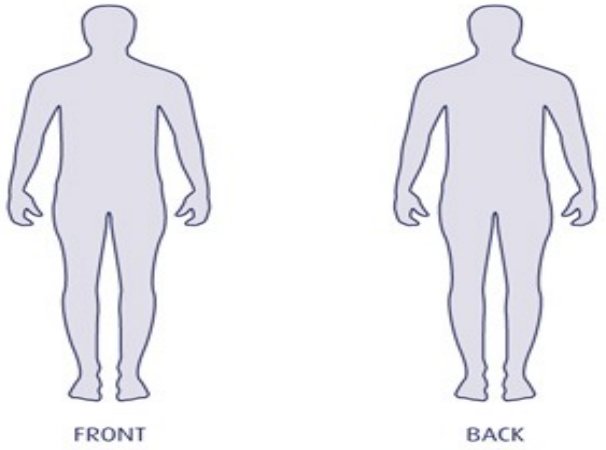
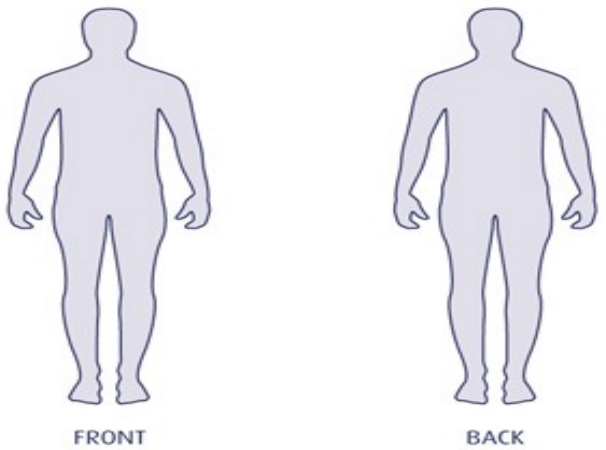


Table 2: Post-Decontamination Measurements (in cpm)

	Front	Back
Head		
Breathing Zone		
Torso		
	Left	**Right**
Arm		
Hand		
Leg		
Sole of Shoe		



Appendix D:
Decontamination Job Aids

DECONTAMINATION JOB AID

About Decontamination

Most radioactive contamination rests on the surface of the outer layer of clothing. It will be removed when the outer layer of clothing is removed. For contamination in the hair or on the skin, have the person wash using mild soap and lukewarm water. Some people may only need limited decontamination, such as removing an article of clothing or washing their hands, while others may need to shower. Review each person's contamination assessment form to determine the appropriate method of decontamination.
If resources do not permit individual review, ask everyone to report to this station to shower

Order of Operations

1. Fill out two ID tags with the person's name, ID number, time, and date. One is for the person's clothing, the other is for personal belongings.
2. Collect personal belongings (e.g., wallets, jewelry, keys) in a one-gallon ZipLoc® bag. Tape or tie one ID tag to this bag, and have the items screened for contamination.
3. Give the person a trash bag and provide instructions to carefully remove clothing. Tell the person to pull the shirt slowly over the head while holding breath, place the clothes in the bag, and tie it shut. Attach the other ID tag to this bag and store it in a secure location, away from people.
4. Provide a mild liquid soap for skin and hair decontamination, and give the person the following instructions:
    A) Wash your hair first. Tilt your head back to wash and rinse your hair.
    B) Gently wash your skin. Lather well but do not scrub hard.
    C) Rinse soap and water away from your face. Try not to get it in your eyes or mouth.
    D) Use a clean towel to dry your face first, then your hair, then your body.
    E) If you need help, ask a shower attendant.
5. When dry, provide temporary clothing or a clean towel (for cover-up) and dispose of all used towels.
6. Screen the person for contamination.

Determining the Next Step

If the person is clean
- Provide clean clothing.
- Return personal belongings.
- Send person to Registration.

If the person is still contaminated after the first shower
- Ask person to wash again, paying close attention to contaminated areas.

If the person is still contaminated after the second shower
- Person may be internally contaminated.
- Note this information on the contamination assessment form.
- Escort person to Registration.

Screening Criteria

milliR/hr
microR/hr
CPM
_____

Image 1: Storing contaminated clothing

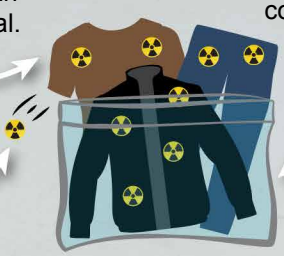
Image 2: Indoor shower facility for decontamination

DECONTAMINATION FOR YOURSELF AND OTHERS

1 TAKE OFF OUTER LAYER OF CLOTHING

Taking off your outer layer of clothing can remove up to 90% of radioactive material.

Be very careful in removing your clothing to prevent radioactive dust from shaking loose.



Put the clothing in a plastic bag or other sealable container.

Put the bag in an out-of-the-way place, away from other people and pets.

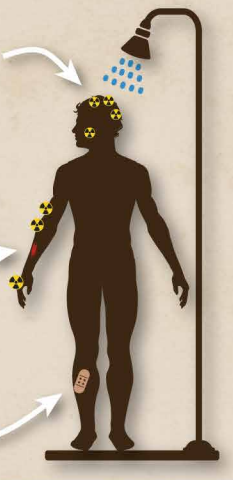
2 WASH YOURSELF OFF

If you can take a shower:

Use soap and shampoo. Do not use conditioner because it will cause radioactive material to stick to your hair.

Do not scald, scrub, or scratch your skin.

Keep cuts and scrapes covered when washing to keep from getting radioactive material in open wounds.



If you cannot take a shower:

Wash your hands, face, and parts of your body that were uncovered at a sink or faucet. Use soap and plenty of water.

If you cannot use a sink or faucet:

Use a moist wipe, clean wet cloth, or damp paper towel to wipe the parts of your body that were uncovered. Pay special attention to your hands and face.

Blow your nose and wipe your eyelids, eyelashes, and ears with a moist wipe, clean wet cloth, or damp paper towel.

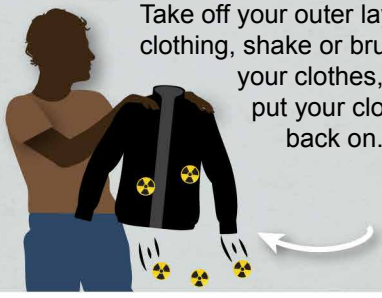
3 PUT ON CLEAN CLOTHES

If you have clean clothes:

Clothes stored in a closet or drawer away from radioactive material are safe to wear.

If you do not have clean clothes:

Take off your outer layer of clothing, shake or brush off your clothes, and put your clothes back on.



Rewash your hands, face, and exposed skin at a sink or faucet.

4 HELP OTHERS AND PETS

Wear waterproof gloves and a dust mask if you can.

Keep cuts and scrapes covered when washing to keep radioactive material out of the wound.

Rewash your hands, face, and parts of your body that were uncovered at a sink or faucet.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

STAY TUNED FOR UPDATED INFORMATION FROM PUBLIC HEALTH OFFICIALS.

http://emergency.cdc.gov/radiation

Appendix E:
Example Questionnaire

E

COMMUNITY RECEPTION CENTER (CRC) REGISTRATION FORM

STATION 1: INITIAL SORTING

Instructions: Attach ID band barcode label here OR enter ID Number.

A1. Barcode or ID Number:_____

A2. Date (MM/DD/YYYY): / /

A3. Time (Military Time): :

A4. What is your preferred spoken language? ☐ English ☐ Other _____

STATION 2: CONTAMINATION SCREENING

B1. Detector type: ☐Hand Held ☐Portal Monitor **B2.** Units: ☐ CPS ☐ CPM **B3.** Screening Criteria: _____

B4. Initial screening results: ☐ Negative for contamination ☐ Positive for contamination

Instructions: If "negative for contamination", send individual to Station 5: Registration using Express Lane. If "positive for contamination", officials conducting contamination screening should complete the table below and escort individual to Station 3: Wash.

Body Area	Contaminated?	If contaminated, measurement?	If contaminated, area of body?
Head/Neck	**B5.** ☐Yes ☐No	**B5a.**	**B5b** ☐ Face/front of neck ☐Other
Trunk	**B6.** ☐Yes ☐No	**B6a.**	**B6b.** ☐Left front ☐Right front ☐Left back ☐Right back
Upper Extremity	**B7.** ☐Yes ☐No	**B7a.**	**B7b.** ☐Left front ☐Right front ☐Left back ☐Right back
Lower Extremity	**B8.** ☐Yes ☐No	**B8a.**	**B8b.** ☐Left front ☐Right front ☐Left back ☐Right back

STATION 3: WASH

B9. Is the individual still contaminated after first decontamination has been completed? ☐ Yes ☐ No
Instructions: If "yes", complete a second decontamination. If no, send individual to Station 6: Radiation Dose Assessment.

B10 Is the individual still contaminated after 2 decontamination attempts? ☐ Yes ☐ No
Instructions: If "yes" or "no", send individual to Station 6: Radiation Dose Assessment.

STATION 4: FIRST AID

Instructions: If individual was referred directly to First Aid without going through Station 2, complete section B above.

C1. The individual was referred to the first aid station for: ☐ Open Wound: Site(s)_____
☐ Other: _____

C1a If referred for open wound(s), did the individual have contamination detected in open wound(s)? ☐ Yes ☐ No

C1b. If yes, was wound decontamination performed? ☐ Yes ☐ No

STATION 5: REGISTRATION

CONTACT INFORMATION

Instructions: Section D should be completed by the individual. Adults should complete the form for accompanying minors.

D1. Name (Last, First, Middle Initial):

D2. Date of birth (MM/DD/YYYY): / /

D3. Age: ☐ Years or ☐ Months

D4. Ethnicity:
☐ Hispanic
☐ Non-Hispanic
☐ Unknown
☐ Refused

D5. Race (check all that apply):
☐ White ☐ Black
☐ Asian/Pacific Islander
☐ Native American
☐ Unknown
☐ Refused

D6. Gender:
☐ Male
☐ Female
☐ Unknown
☐ Refused

D7. If female, pregnant?
☐ No ☐ Possible
☐ Yes ☐ Refused

D8. Best way to contact you within the next 30 days:
☐ Phone ☐ Mail ☐ Email
☐ Other: _____

D9. Primary Phone Number: _____-_____-_____

D10. Alternative Phone Number: _____-_____-_____

D11. Mailing Address:

D12. City:

D13. State:

D14. Zip code:

D15. Email Address:

COMMUNITY RECEPTION CENTER (CRC) REGISTRATION FORM

EXPOSURE INFORMATION

Instructions: Section E should be completed by the interviewer.

E1. Were you at/near [LOCATION] on [DATE] between [TIME RANGE]? ☐ Yes ☐ No

Instructions: If yes, complete E1. If no, skip to E2.

E1a. If yes, were you outside? ☐ Yes ☐ No **Instructions: If no, skip to E1c.**

E1b. How long were you outside before seeking shelter inside? From ____:____ ☐am ☐ pm to ____:____ ☐am ☐ pm

E1c. How long were you inside before evacuating the area? From ____:____ ☐am ☐ pm to ____:____ ☐am ☐ pm

E2. Since [TIME AND DATE OF INCIDENT], did you work as a responder in a contaminated area? ☐Yes ☐ No

Since [TIME AND DATE OF INCIDENT], have you or do you currently have any of the following symptoms?

E3. Vomiting or diarrhea more than once?	☐ Yes ☐ No
E4. Passing out or loss of consciousness?	☐ Yes ☐ No
E5. Loss of memory or disorientation?	☐ Yes ☐ No

Instructions: If "yes" to any of the following: E1, E2, E3, E4, E5, send individual to Station 6: Radiation Dose Assessment. Otherwise, send individual to Station 7: Discharge.

STATION 6: RADIATION DOSE ASSESSMENT

Instructions: Complete section D and E for those individuals who did not go through Station 5: Registration.

MEDICAL ASSESSMENT

Instructions: Section F should be completed by the public health professional conducting the medical assessment.

F1. Have you received nuclear medicine tests or therapy procedures during the last 30 days? Examples include cardiac stress test, lung scan, PET scan, bone scan, thyroid uptake or ablation, and implanted radioactive seeds (brachytherapy). ☐ Yes ☐ No ☐ Unknown

F2. What is your height? _____ feet _____ inches **F3.** What is your weight? _____ pounds

F4. Urine sample collected for bioassay? ☐ Yes ☐ No ☐ Refused

Instructions: Collect urine if B4 is "positive for contamination" AND E1 is "yes." These question numbers are marked with squares on the form. If urine collected, complete the rest of section F. If urine is not collected, continue completing the form at section G.

F5. If "yes", time since last urination: ☐ Don't know OR _____ ☐ Hours or ☐ Minutes

F7. Place Laboratory Barcode Label Sticker Here

F6. Bioassay priority: ☐ Yes ☐ No

Instructions: Priority is "yes" if B10, C1a, E2, E3, E4, or E5 is "yes", or if B5b is "face/front of neck", or if D3 is age less than 18 years, or if D7 is "yes" or "possible". These question numbers are marked with circles on the form. If yes, write "PRIORITY" on specimen container.

INTERNAL CONTAMINATION SURVEY

Instructions: Section G should be completed by the professional conducting the assessment for internal contamination.

G1. Detector type: _____ **G2.** Isotope(s)/Isotope Ratio: _____

G3. Body site assessed: ☐ Back of Chest ☐ Back of Abdomen **G4.** Probe distance: ☐ Contact ☐ 30 cm ☐ 100 cm ☐ 200 cm

G5. Gross count rate: _____ ☐ CPS ☐ CPM **G6.** Background count rate: _____ ☐ CPS ☐ CPM

G7. Route of Exposure: ☐ Inhalation ☐ Ingestion **G8.** Time since exposure: _____ hours

G9. Estimated effective dose: _____ ☐ mRem ☐ REM ☐ mSv ☐ Sieverts **G9a.** Isotope: _____

G10. Estimated effective dose: _____ ☐ mRem ☐ REM ☐ mSv ☐ Sieverts **G10a.** Isotope: _____

STATION 7: DISCHARGE

H1. Disposition: ☐ Released to home ☐ Referred to healthcare facility ☐ Other: _____

H2. Date (MM/DD/YYYY): ____/____/_____ **H3.** Time (Military Time): _____:_____

COMMUNITY RECEPTION CENTER (CRC) REGISTRATION FORM

INSTRUCTIONS

Question	Instructions
Station 1: Initial Sorting	
A1	Individual's ID number or attach individual's barcode label.
A2	Date individual enters CRC.
A3	Time individual enters CRC using Military Time (i.e., 1:15 pm is 13:15).
A4	Preferred spoken language. If language is "other", identify onsite interpreter or other language resources you can use to guide person through the CRC and obtain the information to complete this form.
Station 2: Contamination Screening	
B1	Type of radiation detector used for assessment.
B2	Units of radiation detection measurement.
B3	Screening criteria used.
B4	Results from contamination screening. If "negative for contamination", send individual to Station 5: Registration using Express Lane. If "positive for contamination", staff conducting contamination screening should complete the table below and escort individual to Station 3: Wash.
B5-B8	Contamination found on listed body part.
B5a-B8a	Contamination measurement found on that body part.
B5b-B8b	Specific location of contamination on that body part.
Station 3: Wash	
B9	After completing the first decontamination, indicate whether individual is still contaminated. If "yes", complete a second decontamination. If "no", send individual to Station 6: Radiation Dose Assessment.
B10	After completing the second decontamination, indicate whether individual is still contaminated. If "yes" or "no", send individual to Station 6: Radiation Dose Assessment for internal contamination evaluation.
Station 4: First Aid	
C1	Reason individual was referred to first aid station. If referred for open wound(s), indicate the body site(s) for those wounds. If referred for other reason, please describe.
C1a	If individual was referred for open wound(s), indicate whether contamination was detected in open wounds.
C1b	If contamination was detected in open wound(s), indicate whether open wounds were decontaminated.
Station 5: Registration	
Contact Information *(Should be completed by the individual.)*	
D1	Individual's last name, first name, and middle initial.
D2	Individual's date of birth.
D3	Individual's age. Indicate if this age is in years or months.
D4	Individual's ethnicity.
D5	Individual's race. Check all that apply.
D6	Individual's gender.
D7	If female, individual's pregnancy status.
D8	Best way to contact the individual within the next 30 days.
D9	Individual's primary phone number.
D10	Individual's alternative phone number.
D11	Individual's mailing address. Include street number and street name, apartment number, post office box, and any other relevant address information.
D12	Individual's city.
D13	Individual's state.
D14	Individual's zip code.
D15	Individual's email address.

COMMUNITY RECEPTION CENTER (CRC) REGISTRATION FORM

Exposure Information *(Should be completed by the interviewer.)*

- If the individual answers "yes" to any of the following: E1, E2, E3, E4, E5, send individual to Station 6: Radiation Dose Assessment.
- If the individual answers "no" to all of the following: E1, E2, E3, E4, E5, send individual to Station 7: Discharge.

E1	Individual's presence in the affected area during and following the incident. If "yes", complete section E. If "no", skip to E2.
E1a	Individual's location (i.e., indoors or outdoors) in the affected area. If inside, skip to D2.
E1b	Time interval that individual was outside in the affected area.
E1c	Time interval that individual was inside a building in the affected area.
E2	Individual's occupation as a responder at the [LOCATION] during and following the incident.
E3	Since incident date and time, indicate whether individual experienced vomiting or diarrhea more than once.
E4	Since incident date and time, indicate whether individual passed out or lost consciousness.
E5	Since incident date and time, indicate whether individual experienced loss of memory or disorientation.
Station 6: Radiation Dose Assessment (Staff at this station will also need to complete sections D and E for individuals who did not go through Station 5: Registration.)	
Medical Assessment *(Should be completed by the health professional.)*	
F1	Individual's history of nuclear medicine or radiation therapy procedures during the last 30 days. This may affect bioassay or internal contamination assessment results.
F2	Individual's height in feet and inches.
F3	Individual's weight in pounds.
F4	Indicate if individual provided a urine sample for bioassay analysis. Collect urine if answer to question B4 is positive for contamination AND E1 is "yes". If urine was collected, complete the rest of section F. If urine was not collected, continue completing the form at section G.
F5	If urine sample collected for bioassay, individual's time since last urination prior to sample collection.
F6	Individual's priority for bioassay analysis once urine collected. If "yes", write "priority" on specimen container. Assign a priority of "yes" if ANY of the following apply. These questions are also marked with circled question numbers on the form and include: • Question B5b: Contamination found in "face/front of neck" • Question B10: "Yes" to detectable contamination after 2 decontamination attempts • Question C1a: "Yes" to contaminated open cuts or wounds • Question D3: Age is less than 18 years • Question D7: "Yes" or "possible" pregnancy • Question E2: "Yes" to responder who worked at the incident • Question E3-E5: "Yes" to any symptoms
F7	Attach laboratory barcode in the box.
Internal Contamination Survey *(Should be completed by the professional conducting the assessment for internal contamination. Perform internal contamination surveys for individuals that meet "priority" criteria according to F6.)*	
G1	Type of radiation detector being used for internal contamination survey.
G2	Isotope(s) and/or isotope ratio.
G3	Indicate what individual's body part was assessed.
G4	Distance probe was held from body (in centimeters).
G5	Gross count rate measurement and units.
G6	Background count rate measurement and units.
G7	Route of exposure.
G8	Time since exposure in hours.
G9-G10	Estimated effective dose for each isotope.
Station 7: Discharge	
H1	Indicate individual's disposition. If other, specify.
H2	Indicate date of discharge.
H3	Indicate time of discharge using Military Time (i.e., 1:15 pm is 13:15).