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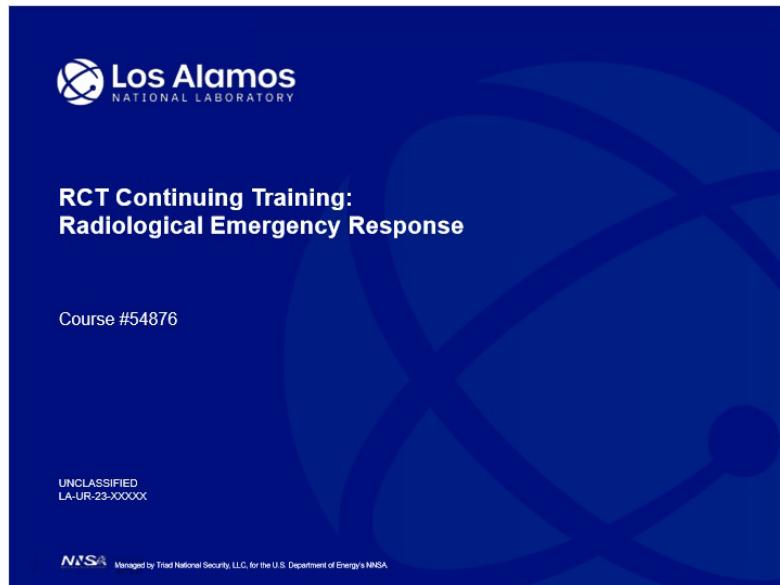
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RCT Continuing Training:

Radiological Emergency Response

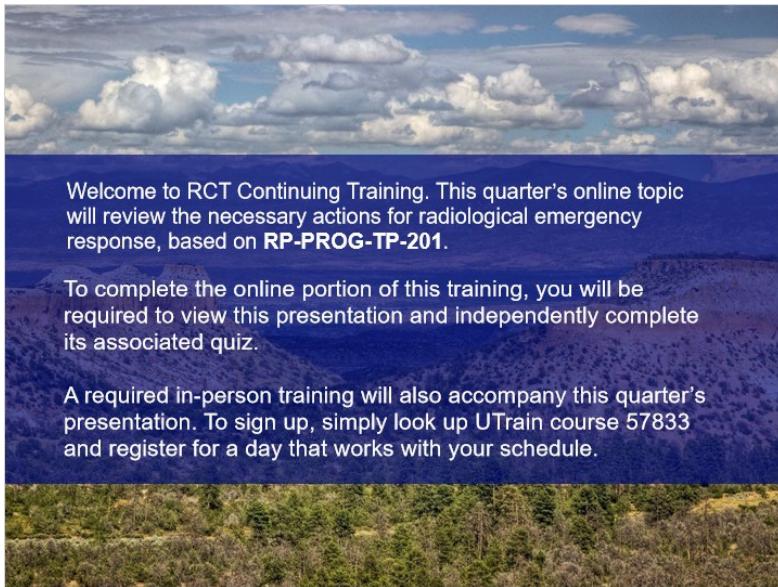
1. RCT Continuing Training - Radiological Emergency Response

1.1 Radiological Emergency Response Training



Notes:

1.2 Introduction



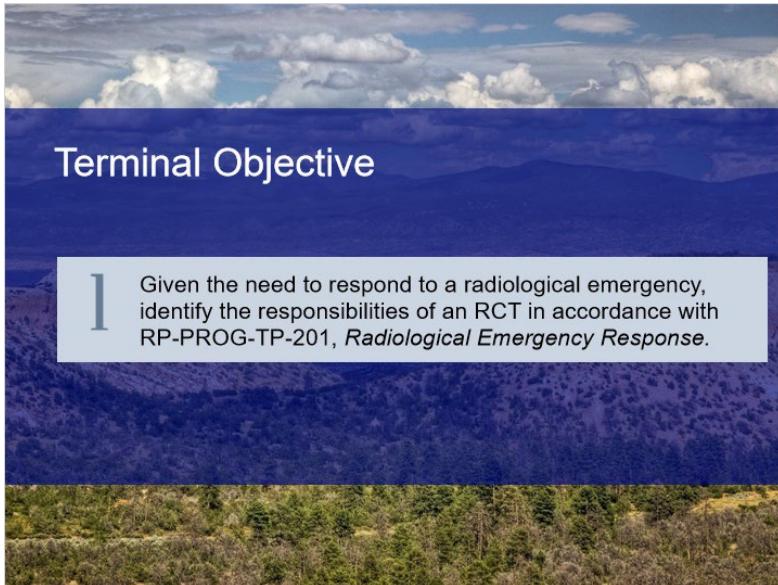
Welcome to RCT Continuing Training. This quarter's online topic will review the necessary actions for radiological emergency response, based on **RP-PROG-TP-201**.

To complete the online portion of this training, you will be required to view this presentation and independently complete its associated quiz.

A required in-person training will also accompany this quarter's presentation. To sign up, simply look up UTrain course 57833 and register for a day that works with your schedule.

Notes:

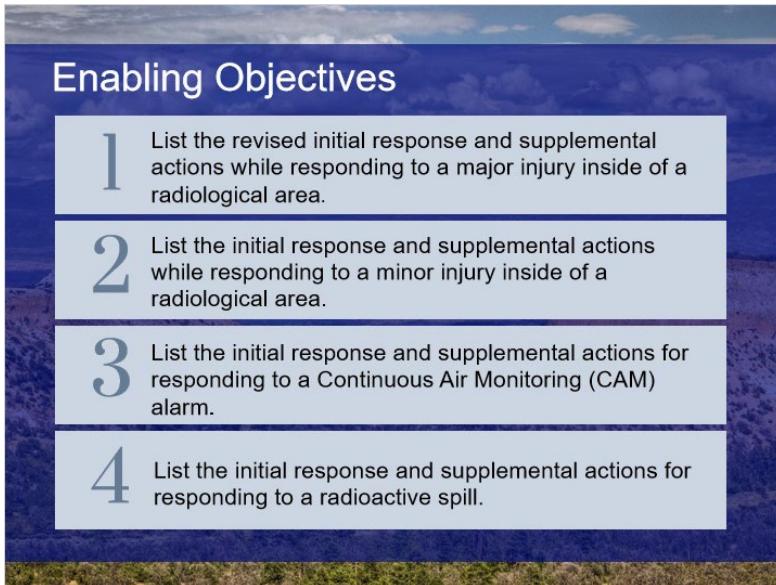
1.3 Terminal Objectives



Terminal Objective

I Given the need to respond to a radiological emergency, identify the responsibilities of an RCT in accordance with RP-PROG-TP-201, *Radiological Emergency Response*.

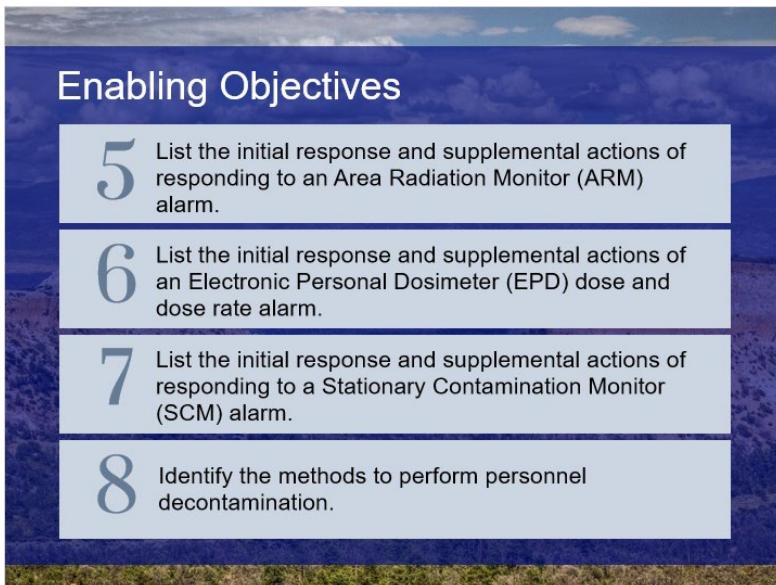
1.4 Enabling Objectives



Enabling Objectives

- 1** List the revised initial response and supplemental actions while responding to a major injury inside of a radiological area.
- 2** List the initial response and supplemental actions while responding to a minor injury inside of a radiological area.
- 3** List the initial response and supplemental actions for responding to a Continuous Air Monitoring (CAM) alarm.
- 4** List the initial response and supplemental actions for responding to a radioactive spill.

1.5 Enabling Objectives Cont.



Enabling Objectives

- 5** List the initial response and supplemental actions of responding to an Area Radiation Monitor (ARM) alarm.
- 6** List the initial response and supplemental actions of an Electronic Personal Dosimeter (EPD) dose and dose rate alarm.
- 7** List the initial response and supplemental actions of responding to a Stationary Contamination Monitor (SCM) alarm.
- 8** Identify the methods to perform personnel decontamination.

1.6 Training Purpose



Training Purpose

The Radiation Protection Program provides for worker safety, emergency response, regulatory compliance & oversight, facility operability, and programmatic support through:

- Core, centralized, and deployed capabilities from RP Division
- Facility-specific radiation protection requirements
- Line & facility organization implementation of requirements

Understanding the necessary actions during a radiological emergency is the responsibility of an RCT in order to achieve this scope for the LANL Radiation Protection Program.

Notes:

1.7 Lesson Modules

Radiological Emergency Response Lesson Modules

1: Major/Minor Injury

2: CAM Alarm

3: Radioactive Spill

4: ARM Alarm

5: EPD Alarm

6: SCM Alarm

7: Personnel Decontamination

Click the next button after completing all lessons

1.8 Conclusion

Conclusion

Congratulations! You have successfully completed the online instruction of this RCT Continuing Training. To receive credit for the online course, you must complete the associated quiz. Please note that you must also attend in person training for this quarter by signing up on UTrain course 57833. Click the EXIT COURSE button below to close this lesson.



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EXIT COURSE

2. ARM Alarm

2.1 ARM Alarm



2.2 ARM Alarm Initial Actions

ARM Alarm Initial Actions

RP-PROG-TP-201, 4.7 ARM Alarm

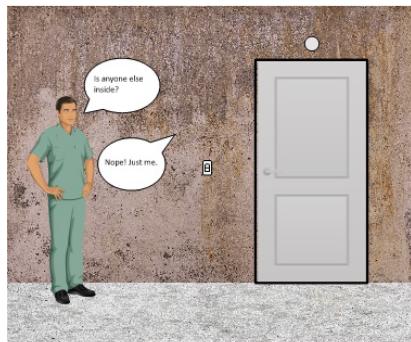
1. Ensure all personnel evacuate the area.
2. Prevent personnel from entering the area.



2.3 Evacuate

1. Ensure All Personnel Evacuate the Area

Evacuate the area and exit to an area of lower background radiation. Notify others in the area of the alarm. The magnitude of the radiation levels have exceeded the alarm set point and the source location may not be known. Radiation surveys will assist in locating areas of low radiation.



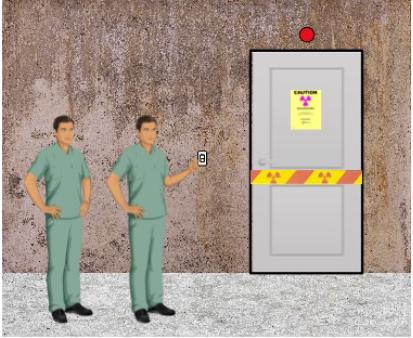
2.4 Prevent Entry

2. Prevent Personnel From Entering the Area

Use barriers, notifications, postings, or personnel if necessary to keep personnel out of the affected area. Until the area is characterized by survey, radiation levels will remain unknown, and could lead to dose limits being exceeded if entry is made.

Do not leave an unposted area unattended.

If an area will be posted as an HJEA, an RCT knowledgeable of the area must remain to guard the entrance.



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2.5 Supplemental and Follow-Up Actions

Supplemental and Follow-Up Actions

- Obtain the name and Z number of all personnel in the area at time of the alarm.
- Notify the HPFC, Team Leader, and management as appropriate. Request assistance as needed.
- Check ARM remote indicators if available.
- Determine the cause of the ARM alarm.
- Perform re-entry IAW section 4.12.
- Initiate an RPIN.

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2.6 ARM Alarm Knowledge Check

(True/False, 10 points, 1 attempt permitted)

It is permitted to leave a room unguarded with an ARM alarm while you search the area for postings.

- False
- True

Correct Choice

X False

True

Correct (Slide Layer)

It is permitted to leave a room unguarded with an ARM alarm while you search the area for postings.

- False
- True



Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

It is permitted to leave a room unguarded with an ARM alarm while you search the area for postings.

False
 True



Incorrect

That is incorrect. Please try again.

[Try Again](#)

3. Radiological Spill

3.1 Radioactive Spill



3.2 Hazardous Material Exception

Radioactive Spills Initial Actions

RP-PROG-TP-200, 4.6 Radioactive Spills

WARNING
Do NOT attempt to stop or secure the spill if taking action will result in bodily injury, personnel contamination, or inhalation.

If the spill involves known or suspected hazardous materials or highly toxic chemicals, then:

- Immediately exit the area. Do not attempt to stop or secure the spill.
- Follow facility-specific response plans, and contact all of the following:
 - 911
 - Emergency Operations Support Center (EOSC)

EOSC Phone Number: 505-667-2400



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3.3 Initial Response Overview

Radioactive Spills Initial Actions

RP-PROG-TP-200, 4.6 Radioactive Spills

If the spill does not involve known or suspected hazardous materials or highly toxic chemicals, then:

- Stop or secure the operation causing the spill.
- Warn others in the area.
- Isolate the spill to prevent further spread of contamination.
- Prevent personnel from entering the affected area.
- Secure unfiltered ventilation.



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3.4 Stop the Spill

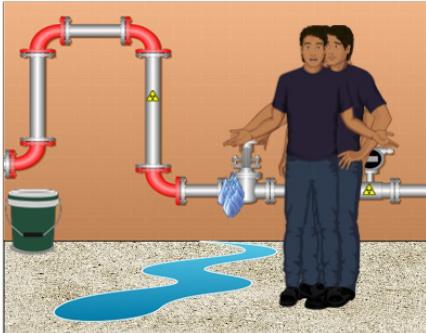
1. Stop or Secure the Action Causing the Spill

Stopping the spill is the first action that should be taken to minimize the further spread of contamination.

Examples of stopping a spill:

- Shutting a valve
- Securing a pump
- Covering with absorbent
- Placing the container upright

If you are not trained on operation of the leaking components or it is unsafe to stop the spill, move onto the next actions and ensure the spill is communicated to the necessary personnel.



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3.5 Warn Others

2. Warn Others in the Area

Warning others in the area can help prevent personnel from coming in contact with the spill and further spreading the contamination. Getting the word out will also start the process of getting other RCT's to the scene and provide additional assistance.

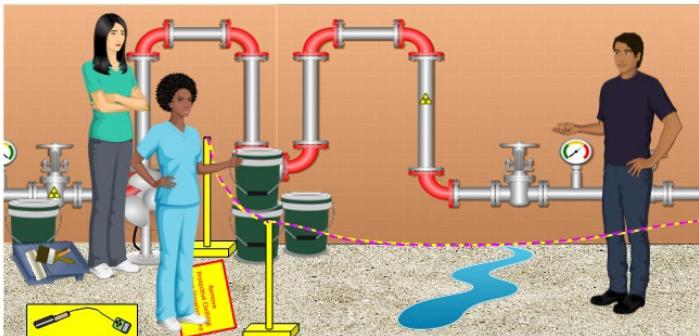


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3.6 Isolate the Area

3. Isolate the Spill to Prevent Further Spread

Isolate the affected area by means of physical barriers, notifications, and personnel if necessary. This protects unininvolved personnel from exposure and allows for easier recovery from the release.



3.7 Prevent Personnel Entry

4. Prevent Personnel from Entering the Area

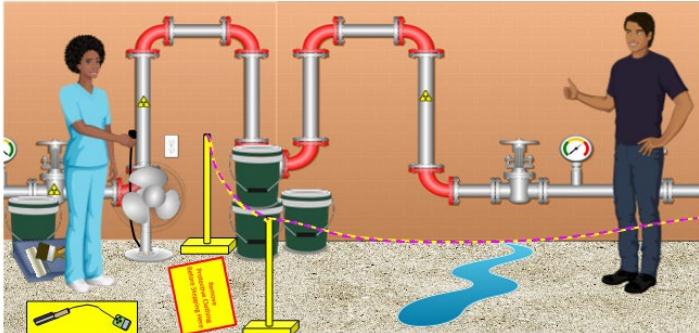
In addition to barriers, responding personnel should remain vigilant of those not obeying posted boundaries so personnel contamination does not occur.



3.8 Secure Unfiltered Ventilation

5. Secure Unfiltered Ventilation

Airflow from ventilation has the potential to spread contamination from the spill to other areas or even into other rooms. This is especially true for dry radiological spills. To prevent or mitigate this from occurring, secure any unfiltered (non-HEPA) ventilation.



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3.9 Supplemental Actions

Radioactive Spill Supplemental Actions

RP-PROG-TP-201, 4.6.2

1. Obtain the names and Z numbers of all personnel in the area at the time of the spill.
2. Notify the HPFC, Team Leader, and management as appropriate, and request assistance as needed.
3. Monitor potentially contaminated personnel, if contamination is found, then go to section 4.10, *Personnel Contamination*.
4. Perform area re-entry in accordance with Section 4.12, *Re-Entry*.

RP-PROG-TP-201, 4.6.3

1. Initiate a Radiation Protection Initial Notification (RPIN).



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3.10 Additional Spill Considerations

Radiological Spill Considerations

- Utilize damp absorbents to cover dry spills until it can be cleaned up to prevent the contamination from going airborne
- Only use HEPA-filtered vacuums to clean up dry spills
- Verify spill did not fall down to lower levels (as applicable)
- Monitor radiation levels of spill cleanup material to prevent inadvertently creating an HRA
- Establish airborne monitoring (CAM, giraffe, etc.)
- Spill cleanup may take some time so post the area accordingly (CA, HCA, etc.)



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3.11 Radioactive Spill Knowledge Check

(Multiple Choice, 10 points, unlimited attempts permitted)

A piping system you're unfamiliar with is labeled radioactive and leaking a liquid onto the floor. It appears the leak can be isolated by shutting a valve. What should you do to stop the spill?

- Make sure the liquid has a drain it can flow into
- Shut the valve to stop the further spread of contamination
- Contact the facility operations center
- Leave the area

Correct Choice

Make sure the liquid has a drain it can flow into

	Shut the valve to stop the further spread of contamination
X	Contact the facility operations center
	Leave the area

Correct (Slide Layer)

A piping system you're unfamiliar with is labeled radioactive and leaking a liquid onto the floor. It appears the leak can be isolated by shutting a valve.

What should you do?

- Make sure the area is safe
- Shut the valve to stop the leak
- Contact the facility operations center
- Leave the area

 Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

A piping system you're unfamiliar with is labeled radioactive and leaking a liquid onto the floor. It appears the leak can be isolated by shutting a valve.
What should you do?

- Make sure the piping is labeled radioactive.
- Shut the valve to stop the leak.
- Contact your supervisor.
- Leave the area.

Incorrect

That is incorrect. Please try again.

Try Again

4. SCM Alarm

4.1 SCM Alarm



4.2 SCM Alarm Initial Actions

SCM Alarm Initial Actions

RP-PROG-TP-201, 4.9.1 SCM Alarm

1. Perform a whole body frisk on the individual with a handheld instrument.
2. IF contamination is detected and radon is NOT suspected, THEN GO TO Section 4.10, *Personnel Contamination*.
3. IF no contamination is detected OR there is indication of radon, THEN:
 - a) Allow time for radon to decay.
 - b) Instruct the individual to count on the same SCM that alarmed.
 - IF the SCM that the individual alarmed is not available, THEN escort the person to the nearest available SCM
 - c) IF the SCM does NOT indicate the presence of contamination, THEN the individual can be released.
 - d) Document the name and Z number of the individual AND the reasoning for the individual's release in the RCT logbook.
 - e) IF the SCM alarms, THEN GO TO Section 4.10.



4.3 WBF

1. Perform a Whole Body Frisk on the Individual with a Hand-held Instrument

Most stationary contamination monitors only provide a general area to search. A more detailed survey is necessary to identify the area of contamination.

If no contamination is found by frisk, the person may enter the SCM to be monitored again.



4.4 Finding Contamination

2. If Contamination is Detected and Radon is not Suspected, Perform Personnel Decontamination.



Contamination has been confirmed on the worker and must be removed.



4.5 Radon

3. If Radon is Suspected, Allow Time for the Radon to Decay

There are multiple factors that can lead to suspecting radon such as a beta to alpha activity ratio of about 2:1, work areas of low air flow, weather conditions, the contamination is located on plastic/polyester material, etc.

Radon and its decay products have a half-life of approximately 30 minutes. Time for decay must be allotted to allow contamination levels to fall below P121 table 14-2 limits.



4.6 2nd SCM Processing

4. Process Personnel Through a SCM Again



Assuming the radon has decayed or there was an error with the initial count verified by personnel frisk, the worker should pass the second screening through the contamination monitor. Another SCM may be used if the initial SCM is unavailable or potentially defective. Document the name and Z number of the individual and the reason for their release in the RCT logbook.



4.7 2nd SCM Alarm

4. If the Stationary Contamination Monitor Alarms, then Proceed to Decontaminate the Person

Either contamination has been confirmed on the worker and must be removed or there is a detector failure on the SCM. In either case, it is safer to take precautionary measures to isolate potential contamination before troubleshooting.



4.8 SCM Alarm Knowledge Check

(Multiple Choice, 10 points, unlimited attempts permitted)

What scenario should actions for personnel decontamination be taken when responding to a SCM alarm?

- A. Contamination is found and radon is suspected
- B. The SCM alarms on the second attempt at processing
- C. Contamination is found and radon is not suspected
- D. There is visible dirt on the worker's body
- E. Both A and C
- F. Both B and C

Correct	Choice
	A. Contamination is found and radon is suspected
	B. The SCM alarms on the second attempt at processing
	C. Contamination is found and radon is not suspected
	D. There is visible dirt on the worker's body
	E. Both A and C
X	F. Both B and C

Correct (Slide Layer)

What scenario should actions for personnel decontamination be taken when responding to a SCM alarm?

- A. Cont...
- B. The S...
- C. Cont...
- D. There...
- E. Both...
- F. Both...



Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

What scenario should actions for personnel decontamination be taken when responding to a SCM alarm?

- A. Cont...
- B. The S...
- C. Cont...
- D. There...
- E. Both...
- F. Both...



Incorrect

That is incorrect. Please try again.

[Try Again](#)

5. Major/Minor Injury

5.1 Major/Minor Injury



5.2 Injury Classification

Major/Minor Injury Classification

Major Injury (LAMC)

- Any head injury
- Any disorientation
- Loss of motor function
- Amputations
- Inhalation of abnormal substance
- Extensive bleeding
- Loss of consciousness
- Loss of sensation
- Limbs at abnormal angles
- Abnormal breathing
- Any chemical, thermal, and/or radiation burn

Minor Injury (OCCMED)

An injury which poses no significant risk to the health or life of the victim and does not fall under the list above. Typically can be treated at Occupational Medicine.

What is the difference between a major and minor injury?

Two male doctors in green scrubs are standing together against a blue background. One doctor is pointing towards the other.

Notes:

5.3 Major Injury Initial Response

Major Injury Initial Actions

RP-PROG-TP-201, 4.2.1 Major Injury

1. Call 911.
2. IF it is safe to do so, THEN attend to the victim until medical help arrives.
3. Protect yourself.
4. Provide reassurance to the individual.
5. IF it is apparent that failure to move the victim would result in further injury or loss of life, THEN move the victim.
6. IF trained AND volunteer to do so, THEN apply first aid.
7. Notify medical response personnel of actions taken, hazards, radiological conditions, and any information that may aid in their response upon arrival.
8. If an RP Communication Checklist is available and completed, then provide a copy to medical response personnel.
9. Assist on-scene medical response personnel as requested.
10. Identify an RCT to accompany the injured individual in the ambulance if contamination is present or suspected on the victim.

WARNING

Medical response to major injuries takes precedence over radiological control measures.



5.4 Call 911

1. Call 911

When tending to an injured person with a major injury, instruct an individual, if one is present in the area, to call 911.



Contacting 911 as soon as possible is crucial to get medical responders onto the scene quickly. If nobody is around to assist in calling 911, you should immediately do so.

Failing to perform this initial action may cause a delay in medical response and potentially lead to increased risk to the victim.

Supervisors should contact LAMC about radiological conditions.



5.5 Attend to the Victim

2. If Safe to Do So, Attend to the Victim

Assess the situation prior to attending to the victim. The emergency does not need to be further complicated with another victim. Pause, review the area for potential hazards, and then go to the victim if you feel safe doing so.



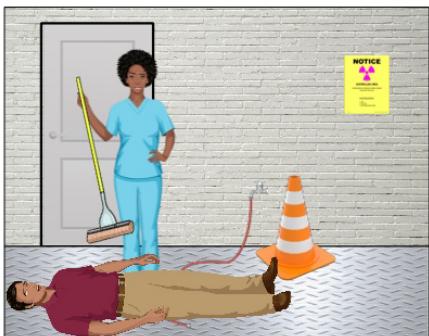
Examples of hazards in the area:

- Electrical
- Toxic gas
- Toxic chemicals
- Lack of oxygen (tanks, vaults)
- Slips, trips, falls
- Fire
- Falling objects

5.6 Protect Yourself

3. Protect Yourself

Ensure you remain vigilant and protect yourself from any potential hazards. This may include actions such as placing absorbents over spilt water, wearing PPE, or placing a barrier around a fall hazard.



5.7 Provide Reassurance

4. Provide Reassurance

While attending to them ensure you provide reassurance. In a medical emergency the victim may be scared or even go into shock. This positive encouragement can be very helpful to the injured individual while you are waiting for medical assistance.



Tips while providing reassurance:

- Listen to the victim
- Remain calm
- Lighten the mood
- Address concerns head on
- Express empathy
- Provide status updates

5.8 Move Victim

5. Move victim if potential for more harm exists

If the location will cause further harm to the victim, move them to a safer area. Examples of this can be if the victim is near a door or high traffic area, fall hazards are present, hot/cold conditions exist, and industrial hazards are present.



5.9 Provide First Aid

6. Provide First Aid if Trained and Volunteer to Do So

Only if you are trained and volunteer to do so, provide first aid for the victim. Ensure you do not go beyond your training capabilities and cause more harm. Continue to provide reassurance to the victim if first aid cannot be provided.



5.10 Brief Medics

7. Inform Actions Taken and Hazards to Medical Response

Once the medical response has arrived on scene inform them of the actions you have taken, as well as any hazards in the area. Remember, medical treatment takes precedence over radiological concerns so you should not worry about the need to issue dosimetry or PPE.



5.11 RP Communications Checklist

RP Communication Checklist

Front:

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Back:

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Emergency Communication

ATTACHMENT 2 - RP COMMUNICATION CHECKLIST

Effective Date: 04/25/2023

Title: Radiological Emergency Response	No: RP-PROG-TP-201
Revision: 2	Page 30 of 33

Communication Checklist

1. Is there a patient for the individual to be communicated? If it is unknown, assume the individual is contaminated.
 - [NRC] Call EOC (627-2405) to communicate chemical and/or radioactive material and RMC are notified.
2. Will additional contact information be required?
 - The documentation should include the name of individual and non-radiological contaminants they may be hospital. If there is any priority for the speed of communication, or if the unknown whether the individual is contaminated. That information should be included in the communication.
3. Will additional contact or additional RMC be required for the medical and providing institution?
 - [NRC] Communicate with RMC who may be required for radiological hospital. In most cases, internal procedures use the protocol mutual aid from Radiologic Emergency Plan (RERP) is sufficient for communication control.
 - Access control should be established for all individuals working in the decontamination areas.
 - Additional contact should be made to medical personnel and released by the RMC.
 - Additional Controls
 - Additional RMC
4. Where any other hazards (i.e. chemical, material, nonradiological) present at the scene of the incident? If so, release, under unknown.
 - Release Request
5. Will a second contact be required? If so, contact RMC for further assistance.
 - If additional contact is required to the medical and providing institution
 - [NRC] Communicate with RMC who may be required for radiological hospital. In most cases, internal procedures use the protocol mutual aid from Radiologic Emergency Plan (RERP) is sufficient for communication control.
 - Access control should be established for all individuals working in the decontamination areas.
 - Additional contact should be made to medical personnel and released by the RMC.
 - Additional Controls
 - Additional RMC
 - Will any other hazards (i.e. chemical, material, nonradiological) present at the scene of the incident? If so, release, under unknown
 - Release Request
 - Will a second contact be required? If so, contact RMC for further assistance
 - Release Request

5.12 Assist Medics

8. Assist the Medical Response Team as Requested

While the medical response team tends to the victim assist them as requested. Do not interfere with their actions. Good practice is to monitor where they travel and how long they are in certain locations. This can help with future dose assessments and give an idea of where to monitor for the spread of contamination.

An illustration showing a medical response team in a clinical setting. On the left, a row of grey metal lockers is visible. In the center, a man in a maroon t-shirt and tan pants is holding his neck, appearing to be in distress. He is surrounded by three medical professionals in blue scrubs. To the left of the victim, a man in blue scrubs stands with his hands on his hips. To the right, a woman in blue scrubs holds a black medical kit with 'MEDICAL' and a red cross on it. Another woman in blue scrubs stands further to the right, holding a small device. In the background, a large screen displays a grid of names and data, likely a patient database. A wooden bench is in the foreground on the left.

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5.13 Ride in Ambulance

9. Identify an RCT to Ride in the Ambulance

An RCT should accompany the victim in the ambulance to assist with any radiological concerns of the medical team. The RCT will also need to monitor for any potential spread of contamination inside of the ambulance. Typically, more RCTs should be tasked to meet the ambulance at the hospital to assist with the radiological monitoring.



5.14 Medical Staff Training for Response to a Major Injury

Medical Staff Training for Response to a Major Injury

Video courtesy of Oak Ridge Institute for Science and Education (<https://orise.orau.gov/resources/reacts/index.html>)

5.15 Knowledge Check 1

(Multiple Choice, 10 points, unlimited attempts permitted)

The EMTs arrive on scene to help an injured worker. As you assign an RCT to ride in the ambulance, an EMT tells you that they do not want anyone riding along in the ambulance to the hospital. What should you do?

- Direct the assigned RCT to follow the ambulance to the hospital in a government vehicle.
- Tell the EMT that the RCT must ride in the ambulance and demand that space be made for them.
- Call the hospital, brief them on the controls they need to implement, and do not send an RCT to the hospital.
- Medical personnel have been taught basic radiological controls through REAC/TS training. They should be fine on their own.

Correct	Choice
X	Direct the assigned RCT to follow the ambulance to the hospital in a government vehicle.
	Tell the EMT that the RCT must ride in the ambulance and demand that space be made for them.
	Call the hospital, brief them on the controls they need to implement, and do not send an RCT to the hospital.
	Medical personnel have been taught basic radiological controls through REAC/TS training. They should be fine on their own.

Feedback when correct:

That's right! You selected the correct response.

Correct (Slide Layer)

The EMTs arrive on scene to help an injured worker. As you assign an RCT to ride in the ambulance, an EMT tells you that they do not want anyone riding along in the ambulance. What should you do?

- Direct the RCT to be the driver of the ambulance.
- Tell the RCT to be mad at the EMTs.
- Call the EMTs and tell them not to let anyone ride in the ambulance.
- Medical, let the RCT ride in the ambulance. They should be fine on their own.

 **Correct**

That's right! You selected the correct response.

Continue

That space, and do, ugh REAC/

Try Again (Slide Layer)

The EMTs arrive on scene to help an injured worker. As you assign an RCT to ride in the ambulance, an EMT tells you that they do not want anyone riding along in the ambulance. What should you do?

- Direct the RCT to be the driver of the ambulance.
- Tell the RCT to be mad at the EMTs.
- Call the EMTs and tell them not to let anyone ride in the ambulance.
- Medical, let the RCT ride in the ambulance. They should be fine on their own.

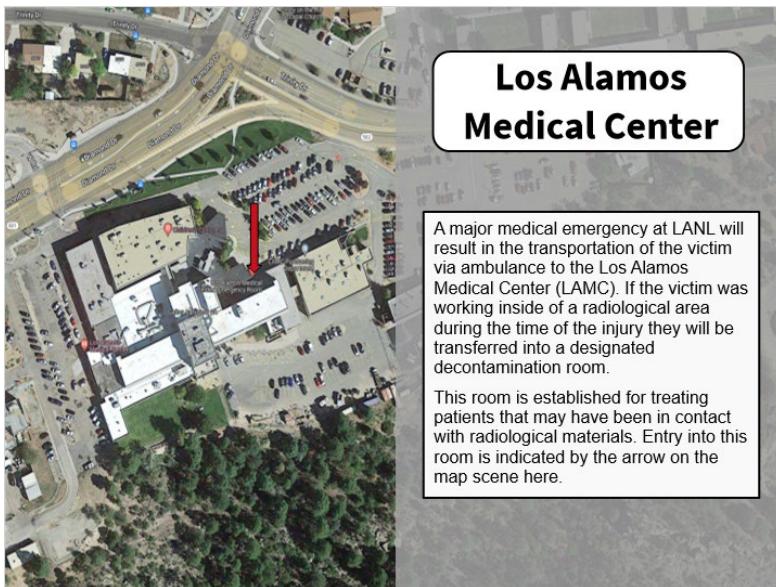
 **Incorrect**

That is incorrect. Please try again.

Try Again

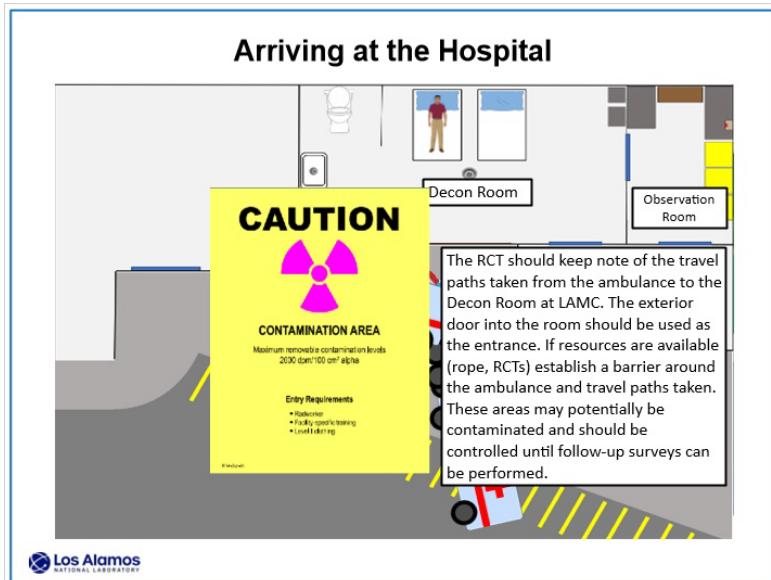
That space, and do, ugh REAC/

5.16 LAMC Arrival

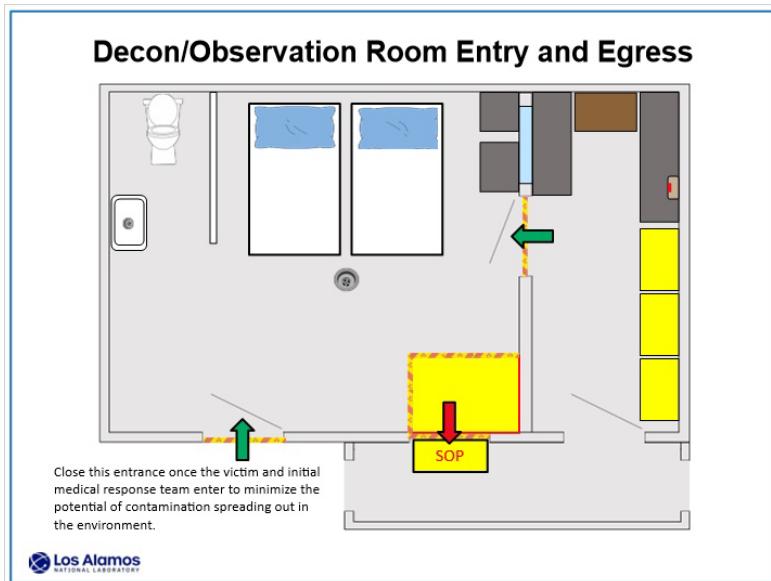


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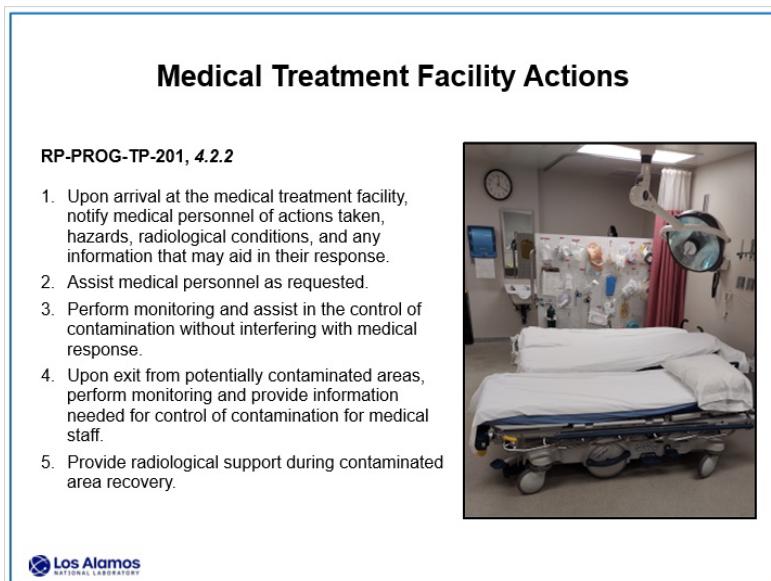
5.17 LAMC Arrival Cont.



5.18 Decon/Observation Room Entry and Egress



5.19 LAMC Coverage



5.20 Additional On Scene Actions

Additional On-Scene Actions

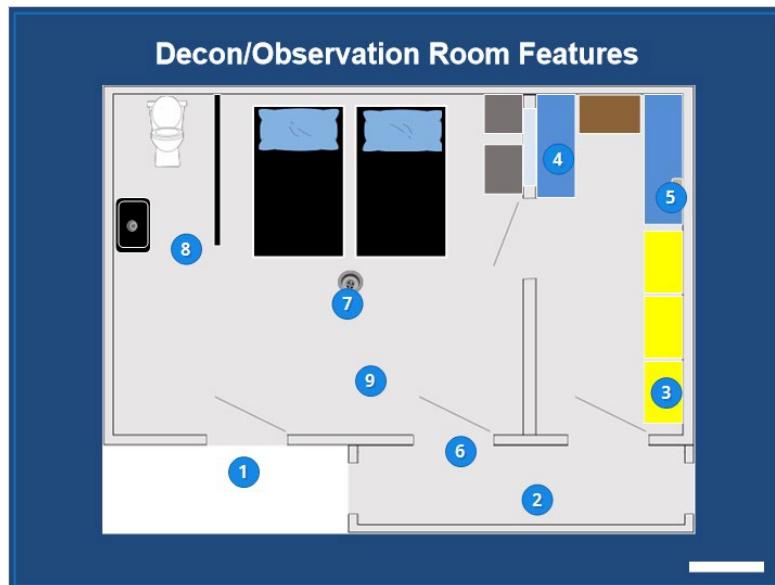
RP-PROG-TP-201, 4.2.3

1. Notify facility management to obtain additional assistance and for notification purposes as required by facility level emergency response.
2. Without interfering with medical efforts, control the spread of contamination by:
 - Segregating potentially contaminated personnel
 - Placing a disposable surface on the egress route
 - Directing personnel to don proper PPE
 - Surveying the egress route after medical evacuation has occurred
3. Control the egress route to prevent the spread of contamination following evacuation of the injured person by medical response personnel.



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5.21 Decon/Observation Room Features



5.22 LAMC Wound Count

Need a Wound Count at the Emergency Room?

HPAL has a portable wound counter on hand to be taken out to medical facilities. They may be contacted at the following numbers:

- 505-665-8888
- 505-664-8138 (pager)

They can only count victims with no exterior contamination and request to know what nuclides are suspected.



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5.23 Additional LAMC Tips

Things to Consider

Instruments Bring a contamination instrument to monitor the victim. Additional instruments will be available for use at LAMC upon arrival. 	Survey Form If the injured victim has contamination on them, note the levels to be logged on a survey form later. 	Terminology The medical staff will not understand units of contamination or radiation. When relaying levels to the medical team, use terms such as "no", "low", "high", or "dangerous" levels. 	Ambulance The ambulance will need to be controlled with postings or guards until it can be thoroughly surveyed. Assign an RCT to start this process as soon as possible. 
---	--	---	---

5.24 Additional RCT Assistance

RCT Additional Assistance

Major medical injuries inside of radiological areas will need the assistance of multiple RCTs. When it is known that the victim is going to be transferred to LAMC, an HPFC or the Person in Charge (PIC) should assign additional RCTs to go to the hospital to help prepare materials and assist as needed. Some of these actions may include:

- Establishing boundaries such as travel paths, SOP, control point, etc.
- Getting the instruments at the medical facility ready for use (these are routinely checked as an RMI from RP-FS)
- Working as the inside RCT that will assist in monitoring the victim and hospital staff inside of the Decon Room
- Work as the outside RCT to assist the inside RCT in monitoring survey material, document results, hand-in supplies, and survey personnel leaving the Decon Room
- Survey the ambulance for release (important for ambulance to be placed back in service for potential emergency needs)



5.25 Major Injury Knowledge Check 2

(Multiple Choice, 10 points, unlimited attempts permitted)

Medical staff ask you to survey a victim's injured arm. Frisking the area, your meter reads <20 DPM/100cm² alpha and <1,000 DPM/100cm² beta. What is the best response?

- There is no contamination concern for the arm
- The arm is below P121 table 14-2 limits
- It's NDA
- The arm is less than 20 DPM/100cm² alpha and 1,000 DPM/100cm² beta

Correct	Choice
X	There is no contamination concern for the arm

The arm is below P121 table 14-2 limits

It's NDA

The arm is less than 20 DPM/100cm² alpha and 1,000 DPM/100cm² beta

Feedback when correct:

That's right! You selected the correct response.

Correct (Slide Layer)

Medical staff ask you to survey a victim's injured arm. Frisking the area, your meter reads <20 DPM/100cm² alpha and <1,000 DPM/100cm² beta. What is the best response?

- There is no radiation.
- The arm is contaminated.
- It's NDA.
- The arm is above the limits.



Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

Medical staff ask you to survey a victim's injured arm. Frisking the area, your meter reads <20 DPM/100cm² alpha and <1,000 DPM/100cm² beta. What is the best response?

- There is no radiation.
- The arm is contaminated with alpha radiation.
- It's NDA.
- The arm is contaminated with beta radiation.

Incorrect

That is incorrect. Please try again.

Try Again

5.26 Minor Injury

Minor Injury Initial Response

Direct AND/OR assist injured personnel to exit the immediate area.



Egress the injured person promptly to be seen by a medical professional. Minor injuries in industrial or hazardous areas can quickly escalate to major ones if not given the attention and treatment needed before returning to work.

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5.27 Wound Actions

Minor Injury Supplemental Actions

Is there a wound?



If there is no open wound, and no further radiological emergencies are present, process the victim out of the facility for further medical attention at OCCMED.

Any wound requires a survey.

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5.28 Wound Count

Minor Injury Supplemental Actions

Is a wound count needed?

Wound counts are required if contamination is found on the wound or the following is true:

- A wound is or is thought to be sustained (including skin irritation, abrasion, cuts, and tearing)
- nuclides involved are known or thought to be α or hard to detect β/γ emitters AND
- the injury occurred in a CA, HCA, ARA, from an engineered barrier breach, or from a contaminated object.



If in doubt, perform a wound count.

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5.29 Lessons Learned

Lessons Learned with Regard to Wound Counts

The supplemental actions for minor injury were revised after an incident involving the intake of plutonium 238 was nearly missed as summarized below from the lesson learned [LANL-2019-1672](#).

- A worker replacing cables in a glovebox felt a “poke.”
- No blood, redness or irritation was seen at the site of the poke.
- Skin contamination was seen but removed by tape press.
- Plutonium under the skin is not detectable by frisk.
- No wound count was performed because no intake was suspected.
- The intake was only discovered by bioassay.



5.30 Prep for OCCMED

Minor Injury Supplemental Actions

Preparation for OCCMED



If a wound count is to be performed:

- Cover the wound with non-restrictive dressing
- Cover any contaminated areas
- Do not cover any orifice on the face
- Notify OCCMED that a potentially contaminated person is arriving
- Accompany the victim in a government vehicle
- Ensure the object that caused the injury is surveyed
- Notify supervision and request help as needed



5.31 OCCMED Arrival

Minor Injury Supplemental Actions

Arrival at OCCMED

- Enter through the northern sliding doors at OCCMED
- Provide a briefing to medical personnel
- Assist OCCMED personnel as requested
- Monitor and assist in controlling the spread of contamination, but do not interfere with medical actions
- Support contaminated area recovery actions



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5.32 Minor Injury Knowledge Check

(Multiple Choice, 10 points, unlimited attempts permitted)

An injured person needs a wound count. What two organizations are capable of performing a wound count?

Health Physics Analysis Laboratories (HPAL) and Occupational Medicine (OCCMED)

Occupational Medicine (OCCMED) and Emergency Operations Support Center (EOSC)

Los Alamos Medical Center (LAMC) and Health Physics Analysis Laboratories (HPAL)

Emergency Operations Support Center (EOSC) and Los Alamos Medical Center (LAMC)

Correct	Choice
X	Health Physics Analysis Laboratories (HPAL) and Occupational Medicine

(OCCMED)
Occupational Medicine (OCCMED) and Emergency Operations Support Center (EOSC)
Los Alamos Medical Center (LAMC) and Health Physics Analysis Laboratories (HPAL)
Emergency Operations Support Center (EOSC) and Los Alamos Medical Center (LAMC)

Feedback when correct:

That's right! Both OCCMED and HPAL are capable of performing wound counts. Their phone numbers are:

505-667-0660 / 505-667-2400 (After Hours) for OCCMED

505-665-8888 / 505-664-8138 (After Hours Pager) for HPAL

Correct (Slide Layer)

An injured person needs a wound count. What two organizations are capable of performing a wound count?

Health Physics Analysis Laboratories (OCCMED)
 Occupational Medicine (EOSC)
 Los Alamos Medical Center (HPAL)
 Emergency Operations Support Center (LAMC)

✓
Correct

That's right! Both OCCMED and HPAL are capable of performing wound counts. Their phone numbers are:

- 505-667-0660 / 505-667-2400 (After Hours) for OCCMED
- 505-665-8888 / 505-664-8138 (After Hours Pager) for HPAL

Continue

Try Again (Slide Layer)

An injured person needs a wound count. What two organizations are capable of performing a wound count?

- Health I (OCCME)
- Occupa (EOSC)
- Los Alar (HPAL)
- Emerge (LAMC)

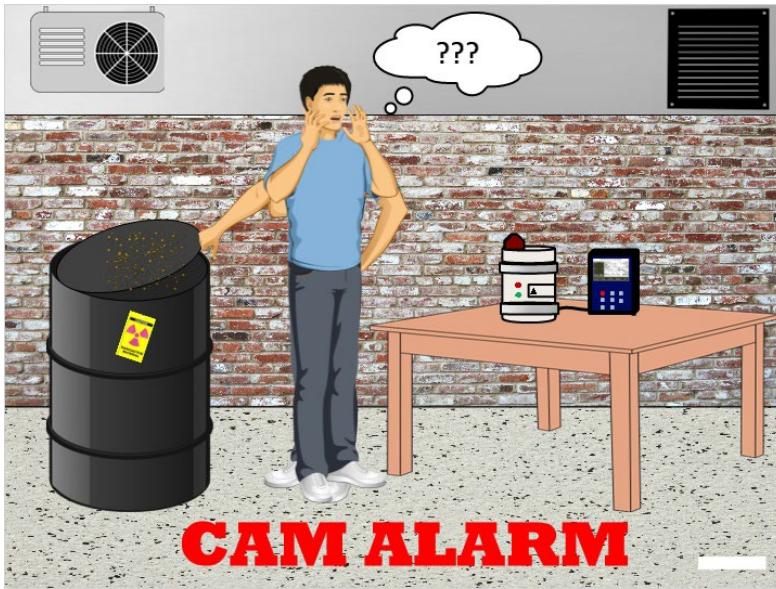
×
Incorrect

That is incorrect. Please try again.

[Try Again](#)

6. CAM Alarm

6.1 CAM Alarm



6.2 Different Types of CAMs

CAM Examples at LANL

The image displays three different Continuous Air Monitoring (CAM) systems used at LANL. On the left is the **Alpha 7**, a compact unit with a small display and control buttons. In the center is the **Alpha Sentry**, a more complex unit mounted on a stand with a display screen and various sensors. On the right is the **AMS 4 Beta Monitor**, a large industrial-grade unit with a keypad, display, and numerous status lights and indicators. Labels below each unit identify them.

6.3 Exception to CAM Alarms

Exception to CAM Alarm Initial Actions

RP-PROG-TP-200, 4.5 Continuous Air Monitoring (CAM) Alarm

3. If all of the following are true, then work may continue:

- A CAM alarm is expected
- Workers were previously provided specific instructions in the work document regarding CAM alarms
- It is safe to continue work

The illustration shows two workers wearing respirators and safety gear. One worker is pointing towards a CAM unit (a cylinder on a stand with a control box) on a workbench. The other worker is standing with arms crossed, looking towards the unit. The Los Alamos National Laboratory logo is in the bottom left corner.

6.4 The Two Types of CAM Alarm Response

Response to a CAM Alarm		
<p>Continuous Air Monitoring (CAM) systems are found throughout the Laboratory to help provide a response for airborne radioactivity levels.</p> <p>In the case of one of them alarming, different initial responses will need to be followed dependent on the situation. We will discuss these different scenarios as well as supplemental actions that should be followed.</p>		
	<p>No respirator or insufficient protection</p>	<p>With a respirator</p>

Notes:

6.5 Initial Response Overview

CAM Alarm Initial Actions

RP-PROG-TP-201, 4.5.1 CAM Alarm

1. If personnel are not wearing respiratory protection or respiratory protection is not adequate, then:
 - a. Immediately evacuate the area in a safe manner.
 - b. Prevent personnel from entering the area.
 - c. If wearing a respirator, then direct personnel to not remove their respirator until told to do so unless immediate medical actions are necessary.
2. If personnel are wearing respiratory protection and a CAM alarm is not expected, then:
 - a. Place the work in a safe configuration.
 - b. Evacuate the area in a safe manner.
 - c. Prevent personnel from entering the area.
 - d. Direct personnel to not remove their respirator until told to do so unless immediate medical actions are necessary.



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6.6 Evacuation

Evacuation



Without sufficient respiratory protection, all personnel must evacuate the area immediately, minimizing exposure to airborne radioactivity.

When there is sufficient protection, there is less risk to personnel and they may take time to place work in a safe condition prior to evacuation, which may isolate the source of airborne radioactivity and prevent its spread.

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6.7 Prevent Entry

Preventing Entry

Use barriers, notifications, postings, or personnel if necessary to keep personnel out of the affected area. No one should re-enter the area until a plan has been made by supervision to recover the area from the source of the CAM alarm.

Do not leave an unposted area unattended.

If an area will be posted as an HJEA, an RCT knowledgeable of the area must remain to guard the entrance.



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6.8 Respirator Removal

Respirator Considerations

Wait until personnel are in a clean area to direct removal of respirators.

Medical emergencies take precedence over radiological ones. Therefore, if a person is having difficulty breathing, immediate removal of the respirator is permitted.

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6.9 Supplemental Actions

CAM Alarm Supplemental Actions

1. Obtain the names and Z numbers of all personnel in the area at the time of the alarm.
2. Notify the HPFC, Team Leader, and management as appropriate, and request assistance as needed.
3. Perform a whole body frisk, including respirator (if applicable), for all personnel involved.
 - If contamination is found, then go to section 4.10, *Personnel Contamination*.
 - If contamination is not found, then continue to step 4.
4. Doff PPE and respirator (if applicable).
5. Segregate PPE and respirators (if applicable) for each individual.

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6.10 Supplemental Actions Cont.

CAM Alarm Supplemental Actions

6. Perform a whole body frisk of personnel without PPE and respirator.

- If contamination is found without PPE and respirator, then go to section 4.10.
- If no contamination is found, then personnel may be released from the area. If a PCM is available, then personnel shall clear the PCM before being released.

7. Segregate personnel who have been monitored from those who have not been monitored.

8. Ensure nasal swipes are performed in accordance with section 4.11, *Nasal Swipes*.



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6.11 Follow-up Actions

CAM Alarm Follow-Up Actions

1. If there is known or suspected exposure to air concentrations ≥ 40 DAC-hr, then contact the Radiation Protection Services (RP-SVS) Internal Dosimetry team to determine if a special bioassay is necessary.
2. Contact HPFC for re-entry in accordance with Section 4.12, *Re-Entry*, and change air monitoring filters.
3. Send filters to HPAL with emergency priority for analysis.
4. Initiate a Radiation Protection Initial Notification (RPIN).



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6.12 CAM Alarm Knowledge Check

(Multiple Choice, 10 points, unlimited attempts permitted)

What is the difference between actions for a CAM alarm with respiratory protection and a CAM alarm with insufficient respiratory protection?

- Workers have five minutes to clean up their work area if they have no protection
- The CAM alarm can be ignored if everyone has sufficient respiratory protection
- When there is sufficient protection, work can be placed in a safe condition prior to evacuation
- There is no difference

Correct	Choice
	Workers have five minutes to clean up their work area if they have no protection
	The CAM alarm can be ignored if everyone has sufficient respiratory protection
X	When there is sufficient protection, work can be placed in a safe condition prior to evacuation
	There is no difference

Correct (Slide Layer)

What is the difference between actions for a CAM alarm with respiratory protection and a CAM alarm with insufficient respiratory protection?

- Workers
- The CAM
- When the alarm sounds, workers should put on respiratory protection prior to exiting the area.
- There is no difference between the two types of alarms.

 **Correct**

That's right! You selected the correct response.

Continue

Try Again (Slide Layer)

What is the difference between actions for a CAM alarm with respiratory protection and a CAM alarm with insufficient respiratory protection?

- Workers
- The CAM
- When the alarm sounds, workers should put on respiratory protection prior to exiting the area.
- There is no difference between the two types of alarms.

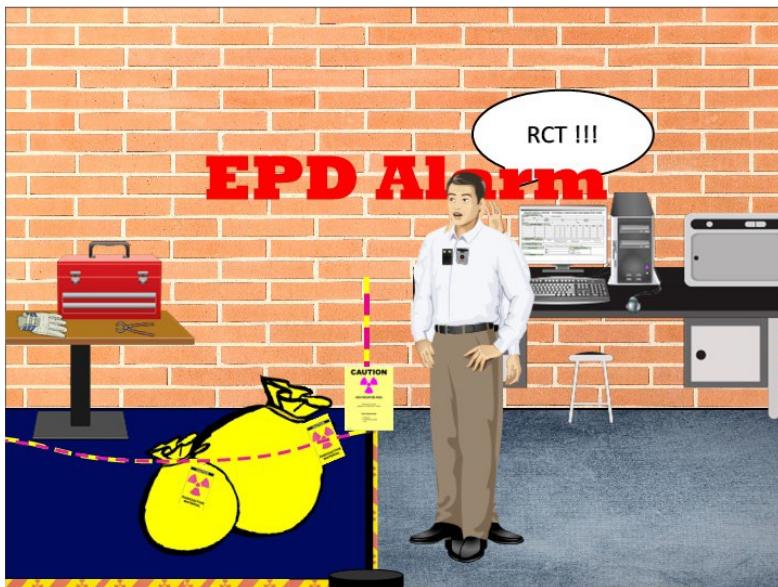
 **Incorrect**

That is incorrect. Please try again.

Try Again

7. EPD Alarm

7.1 EPD Alarm



7.2 Dose Alarm Initial Response

EPD Dose Alarm Initial Actions

RP-PROG-TP-201, 4.8.1 Dose Alarm

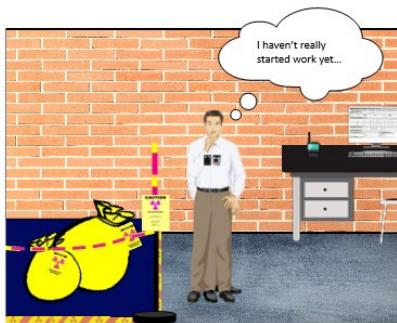
1. Stop work.
2. Place work in a safe condition AND exit the area.
3. While Exiting the area, notify personnel of the dose alarm.
4. Record reading from the EPD and personal information associated with the alarming EPD.
5. Notify HPFC, Team Leader, and management as appropriate, AND request assistance as needed.
6. Return EPD to reset alarm.
7. Perform re-entry in accordance with Section 4.12, *Re-Entry*.



7.3 Stop Work and Exit

- 1. Stop work**
- 2. Place work in a safe condition and exit the area**

Work in a quick manner to secure the work area, preventing the spread of contamination and minimizing the possibility of hazards.



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7.4 While Exiting, Notify Others

- 3. While exiting, notify personnel of dose alarm**

Hmm... My dose is unusually high...

If others are unaware of the abnormally high dose rates, they may be close to alarming their EPDs as well. Other workers in the area should check their EPDs for high readings.

Evacuate to an area of low radiation levels verified by survey at the earliest opportunity.

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7.5 Remaining Initial Response Actions

Remaining Initial Response Actions

4. Record EPD reading and the worker's personal information (name and Z number).
5. Notify the HPFC, Team Leader, and management. Request assistance as needed.
6. Return the EPD to reset the alarm.
7. Perform re-entry IAW Section 4.12



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7.6 Dose Rate Initial Actions

EPD Dose Rate Alarm Initial Actions

RP-PROG-TP-201, 4.8.2 EPD Dose Rate Alarm

1. Immediately proceed to an area of lower dose rate.
2. While moving to a low background area, notify personnel of the dose rate alarm.
3. Check the dose measurement on the EPD. IF a dose limit has been exceeded, THEN GO TO Section 4.8.1, *Dose Alarm*.
4. IF the EPD dose rate alarm subsides, THEN evaluate the need to proceed with the task using known data.
5. IF guidance is needed on how to proceed with the task, THEN notify HPFC and/or Team Leader as applicable.

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7.7 Leave to Area of Lower Dose

1. Immediately proceed to an area of lower dose rate.



If high dose is not seen on the EPD but it is still alarming, the dose rate is high instead of total dose. Moving to an area of lower dose rate will silence the alarm.



7.8 Notify Others While Exiting

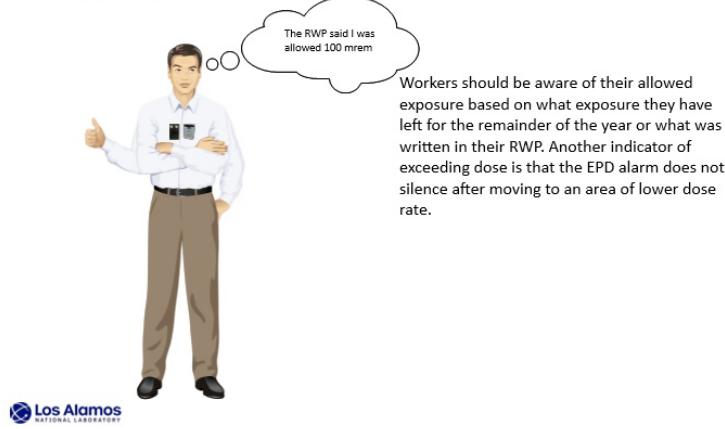
2. While moving to a low background area, notify personnel of the dose rate alarm.

If others are unaware of the abnormally high dose rates, they may be close to alarming their EPDs as well. Other workers in the area should check their EPDs for high readings.



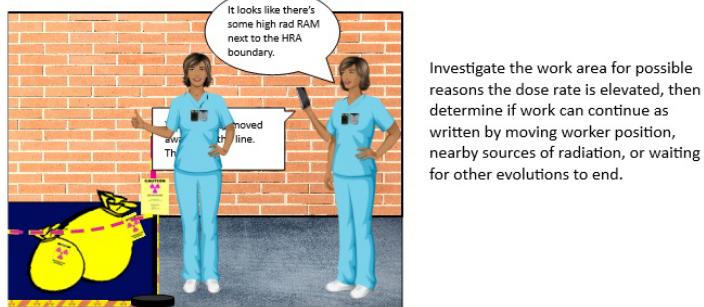
7.9 Check EPD

3. Check the dose measurement on the EPD. If a dose limit has been exceeded, then take action for EPD dose alarm.



7.10 Seek Guidance

4. If the EPD alarm subsides, evaluate the need to proceed with known data.
5. If guidance is needed on proceeding, then notify the HPFC or Team Leader as needed.



7.11 EPD Alarm Knowledge Check

(Multiple Choice, 10 points, unlimited attempts permitted)

What are the two limits you and workers should be concerned about exceeding when an EPD alarms?

- RWP and annual exposure limits
- RWP and instrument exposure limits
- Annual and general public exposure limits
- General public and instrument exposure limits

Correct	Choice
X	RWP and annual exposure limits
	RWP and instrument exposure limits
	Annual and general public exposure limits
	General public and instrument exposure limits

Correct (Slide Layer)

What are the two limits you and workers should be concerned about exceeding when an EPD alarms?

- RWP and annual exposure limits
- RWP an
- Annual
- General



Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

What are the two limits you and workers should be concerned about exceeding when an EPD alarms?

- RWP and annual exposure limits
- RWP an
- Annual
- General



Incorrect

That is incorrect. Please try again.

[Try Again](#)

8. Personnel Decontamination

8.1 Personnel Decontamination



8.2 Hot Particles

Hot Particles

P121 definition of a hot particle: A small, loose, highly radioactive particle with an activity of nominally 15,000 dpm or greater (α or β/γ) and/or capable of producing an equivalent skin dose of >100 mrem/hr.

If a hot particle is identified:

- Remove it by tape lift method
- Conduct an isotopic analysis on the particle

An illustration showing two people in a decontamination room. One person is standing at a counter with a washing machine, and the other is standing next to them. A speech bubble from the second person says, "Tape press is done. Let's frisk your hand again." The Los Alamos National Laboratory logo is in the bottom left corner of the slide.

8.3 Clothing Contamination

Clothing Contamination



- Use tape press to remove contamination or cover it with tape
- Contaminated clothing is removed
- Isolate contaminated materials for further evaluation
- Perform a whole body frisk

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8.4 Respirator Contamination

Respirator Contamination



- Contamination on respirator filters is removed by wiping
- Tape lift or the covering with tape method is used for contamination in all other places
- Remove the respirator
- Isolate the respirator for further evaluation
- Perform a whole body frisk and obtain nasal smears

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8.5 Body Contamination

Body Contamination



- Prevent contamination from entering any wound or orifice
- Wash areas with mild soap and lukewarm water (cool water for tritium)
- Tape press may be used for skin
- Do not use abrasive material
- Survey affected areas again
- Repeat decon efforts until:
 - contamination is removed
 - decon is no longer effective
 - reddening or irritation of skin is observed



8.6 Body Contamination Cont.

Body Contamination



- Save contaminated materials for further evaluation
- Perform nasal smears if:
 - Non-PPE contamination occurred on the chest, shoulders, neck, or head
 - Respirators are contaminated or compromised
- Process decontaminated personnel through a PCM
- Contact OCCMED if in doubt on how to proceed at any time



8.7 Follow-up Actions

Follow-Up Actions



- Is special bioassay needed?
 - Tritium liquid spilled on skin or clothing
 - If skin contamination is:
 - $\geq 1,000$ dpm plutonium or americium
 - $\geq 10,000$ dpm uranium
 - contaminated by any other radionuclide
- What about a confirmatory count?
 - Hair/scalp, face, skin and/or whole body contamination includes α or hard to detect β/γ radionuclides AND
 - Contamination occurred in a CA, HCA, ARA, from breech of an engineered barrier, or involved a contaminated object



8.8 Follow-up Actions Cont.

Follow-Up Actions



- Complete RP-PROG-FORM-036 *Contaminated Person Survey* for any non-PPE contamination
 - Attach any related HPAL results
- Notify HPFC, Team Leader, and management as appropriate. Request assistance as needed.
- Initiate RPIN for:
 - any non-PPE contamination
 - unplanned PPE contamination
 - $>1,000$ dpm/100 cm 2 α
 - $>5,000$ dpm/100cm 2 β
 - >0.25 mR/hr



8.9 Personnel Decontamination Knowledge Check 1

(Multiple Choice, 10 points, unlimited attempts permitted)

When should decontamination efforts on a person's body be stopped?

- Decontamination efforts are no longer effective
- Reddening or irritation of the skin is observed
- All answers are correct
- Contamination is removed

Correct	Choice
	Decontamination efforts are no longer effective
	Reddening or irritation of the skin is observed
X	All answers are correct
	Contamination is removed

Correct (Slide Layer)

When should decontamination efforts on a person's body be stopped?

- Decontamination efforts are no longer effective
- Reddeni
- All answe
- Contami

 Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

When should decontamination efforts on a person's body be stopped?

- Decontamination efforts are no longer effective
- Reddeni
- All answe
- Contami

 Incorrect

That is incorrect. Please try again.

[Try Again](#)

8.10 Personnel Decontamination Knowledge Check 2

(Multiple Choice, 10 points, unlimited attempts permitted)

What are the acceptable methods of body decontamination that an RCT may use?

- A. Tape press on the skin
- B. Abrasive soaps
- C. Soap and lukewarm water (cool for tritium)
- D. Wrapping the affected area in poly and sweating the contamination out
- E. Both A and C
- F. All of the above

Correct	Choice
	A. Tape press on the skin
	B. Abrasive soaps
	C. Soap and lukewarm water (cool for tritium)
	D. Wrapping the affected area in poly and sweating the contamination out
X	E. Both A and C
	F. All of the above

Correct (Slide Layer)

What are the acceptable methods of body decontamination that an RCT may use?

- A. Tape press on the skin
- B. Abras
- C. Soap
- D. Wrap
- E. Both
- F. All of



Correct

That's right! You selected the correct response.

[Continue](#)

Try Again (Slide Layer)

What are the acceptable methods of body decontamination that an RCT may use?

- A. Tape press on the skin
- B. Abras
- C. Soap
- D. Wrap
- E. Both
- F. All of



Incorrect

That is incorrect. Please try again.

[Try Again](#)