

## ASSUMPTIONS

This Transportation Emergency Preparedness Program (TEPP) Model Procedure provides guidance for performing decontamination of emergency responders exiting the “hot zone” at either a transportation incident involving only radioactive materials or a transportation incident involving multiple hazardous materials, including radioactive material.

The following assumptions are to be considered when reviewing this Model Procedure:

- n This procedure is not all-inclusive but was developed to meet the minimum guidance for decontaminating responders at a radioactive hazardous material incident.
- n This procedure is designed for use by trained and qualified emergency responders. Additional procedural requirements may be implemented according to appropriate state, tribal, or local requirements.
- n This procedure assumes that all responders and equipment leaving the hot zone are potentially contaminated. A personnel and equipment decontamination system/method must be implemented to control the spread of radioactive material contamination.
- n All emergency response personnel have been trained in the use of an Incident Management System such as the Incident Command System.
- n A Radiation Authority from local, state, federal, or tribal agencies will respond and assist in the disposition of an incident involving radioactive materials.
- n Procedural options are modeled for a fire service response. However, the procedural steps can be modified to accommodate other emergency response organizations. Selection of the appropriate procedural option and applying the procedural steps based on the level of protective clothing the responder is wearing will assist in decontaminating the responders.
- n This procedure assumes that waste minimization practices are an important consideration during incident management.

### 1.0 PURPOSE

The purpose of this procedure is to provide guidance for performing decontamination of individuals who have entered a “hot zone” during hazardous material incidents involving radioactive materials.

### 2.0 SCOPE

This procedure applies to emergency responders who have responsibility for performing emergency response activities which require entry into a hot zone that is potentially contaminated with radioactive or other hazardous materials.

## 3.0 RESPONSIBILITIES

- 3.1 Decontamination Worker—carry out the appropriate decontamination process to remove hazardous materials with which the entry team has come in contact.
- 3.2 Responder—follow appropriate decontamination steps and comply with requests made by decon personnel.
- 3.3 Incident Commander—ensure that no personnel or equipment are allowed to leave the hot zone without proper decontamination.

## 4.0 RECORDS

- 4.1 Decontamination Method Decision Tree and Option Flow Charts (Attachments 1 through 4)
- 4.2 24-hour Assistance Telephone Numbers (Attachment 5)
- 4.3 Personnel Dosimetry Report (Attachment 6)
- 4.4 Personnel Contamination Location Report (Attachment 7)

## 5.0 FREQUENCY

Use this procedure as needed.

## 6.0 ADDITIONAL REFERENCES

- 6.1 Hazardous Materials - Managing the Incident, Second Edition; Noll, Hildebrand & Yvorra; 1984
- 6.2 Haz-Mat Response Team (Leak & Spill Guide); Hildebrand; 1984.
- 6.3 OSHA 29 CFR 1910.120 - Hazardous Waste Operations & Emergency Response, interim final rule
- 6.4 EPA Standard Operating Safety Guides, Publication 9285.1 01, June 1992

## 7.0 EQUIPMENT

- 7.1 The following equipment may be necessary based on the type and method of decontamination required.
  - 7.1.1 Banner tape to indicate incident boundary and control zones.
  - 7.1.2 Mops and brushes.
  - 7.1.3 Large trash cans.
  - 7.1.4 Water supply.
  - 7.1.5 Different size plastic bags.
  - 7.1.6 Tarp (plastic type).
  - 7.1.7 Masking tape.
  - 7.1.8 Detergent soap (mild soap for personnel).
  - 7.1.9 Towels.

- 7.1.10 Safety cones.
- 7.1.11 Buckets.
- 7.1.12 Containment system (pools, etc.) for decontamination water run-off.
- 7.1.13 Radiological survey instrument.

## 8.0 LOCATION

Use this procedure as needed based upon incident location. Positioning of the decontamination system/station should be upwind and upslope from the incident scene.

## 9.0 SAFETY

- 9.1 Keep respiratory protection in place until primary decontamination is complete or advised otherwise by the radiation authority.
- 9.2 Contain all run-off created by decontamination procedures.
- 9.3 Package all contaminated materials (tools, coveralls, etc.) removed from hot zone for disposal or decontamination at a later date.
- 9.4 Report all injuries or unusual incidents to the Safety Officer or Incident Commander.
- 9.5 Verify that Emergency Medical Service (EMS) personnel are on the scene for emergencies requiring medical assistance.

## 10.0 TERMS/DEFINITIONS

**Cold Zone** - Also referred to as the support zone, the cold zone is a contamination-free zone established around the warm zone where emergency operations can be directed and supported. The cold zone is normally established in an area where radiation levels are at natural background levels.

**Contamination** - As referred to in this document, contamination is undesired radioactive material that is deposited on the surface of or inside structures, areas, objects, or people

**Contamination Control Zone** - An isolation zone that is typically set up around a hazardous incident site to control the spread of hazardous substances. See hot zone, warm zone, cold zone.

**Decontamination** - The reduction or removal of contaminating radioactive material from a structure, area, object, or person. Decontamination may be accomplished by: use of a tape press or wiping the surface (dry decon); washing or flushing the surface with water or other solution (wet decon), or allowing the material involved to decrease in activity through natural radioactive decay.

**Hot Zone** - Also referred to as the exclusion zone in some jurisdictions. The hot zone is usually set up in the immediate area surrounding the spilled material or incident scene. Access to the hot zone should be controlled for accountability purposes as well as contamination control purposes.

**Incident Commander (IC)** - The person responsible for all decisions relating to the management of the incident.

**Radiation Authority** - A federal, state, or tribal agency designated official. Responsibilities include evaluating radiological hazard conditions during normal operations and emergencies.

**Radioactivity** - The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays, from the nucleus of an unstable isotope. Also, the rate at which radioactive material emits radiation.

**Radioisotope (radionuclide)** - An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. Approximately 5,000 natural and artificial radioisotopes have been identified.

**Radiological Survey** – Usually performed by the Radiation Authority, a radiological survey is performed using a radiation detection instrument especially adapted for inspecting an area or individual to establish the existence and amount of radioactive material present.

**Step-off Pad** - Transition area between contaminated and non-contaminated areas that may be used to allow exit of personnel and removal of equipment.

**Warm Zone** - Also referred to as the contamination reduction zone, the warm zone is usually established around the hot zone to provide a buffer between the hot and cold zones. Decontamination often takes place in the warm zone.

## 11.0 PROCEDURE

### Option 1 - Multiple HazMat/No Survey Instrument Available

WET DECONTAMINATION METHOD, RESPONDERS SHOULD CONSULT WITH THE INCIDENT COMMANDER TO DETERMINE THE APPROPRIATE WASH SOLUTION

1. Establish the decontamination system considering contaminants present. If the contaminant is radioactive material with additional hazardous material present, the procedural steps listed below are recommended for the decontamination process. Necessary barricades or identifying features of the decontamination system should be obvious to responders. Barricade tape or traffic cones could be used to identify the decontamination system. To contain water run-off from the decontamination process, use available containment systems or create a containment system. If a containment system is not available, responders should use, fire hose and salvage covers (tarps) to construct a containment system. If no materials are available for the construction of a containment system, then responders should select a low-lying area (such as a drainage ditch) to contain decontamination water run-off.

*Note: Different types and levels of personal protective clothing are worn by response organizations. When conducting decontamination, you must adjust the decontamination process to satisfy the type and level of personal protective clothing being worn by responders. Some examples of personal protective clothing worn by law enforcement, emergency medical service, and fire service responders are shown here.*

2. Instruct responders to place equipment or tools in the designated drop area. The drop area should provide some type of containment for equipment that may be contaminated. Examples of an appropriate drop area include a plastic cover placed on the ground that equipment/tools can be placed on or a lined can that equipment/tools can be placed in.

*Note: Equipment and tools placed in the drop area will need to be surveyed and decontaminated as needed by the local, state, or tribal Radiation Authority before they can be released as "clean."*

3. Have responder approach the hot zone line (identified by a step-off pad). Typical absorbent pads are acceptable to use as step-off pads. Responder should step onto the pad and wipe feet. Responder should then step into the warm zone.

*Note: When using the wet wash decontamination method, implement waste minimization practices and contain wash and rinse water run-off. Decontamination workers should replace damaged step-off pads as necessary. Replacement pads should be placed on top of existing pads.*

4. Decontamination workers will instruct the responder to step into first wash area. Decontamination workers will scrub and rinse responder's outer protective clothing using the appropriate wash solution.

5. Decontamination workers will instruct the responder to step into the second wash area. Decontamination workers will again scrub and rinse responder's outer protective clothing.

6. With the assistance of the decontamination workers, the responder will remove their SCBA harness/backplate; do not turn off the SCBA air supply.

*Note: Decontamination workers should ensure that the responder does not disconnect the regulator air supply or remove the SCBA face piece. Positive pressure within the face piece should be maintained.*

7. With the assistance of decontamination workers, the responder will remove fire fighting gloves. The decontamination worker will place the fire fighting gloves in the designated collection device (plastic bag, lined can, or ground covered area).

*Note: If the fire fighting coat is equipped with wristlets, the decontamination worker will assist the responder in releasing the wristlets.*

8. With the assistance of the decontamination workers, the responder will replace the fire fighting gloves with latex gloves.

9. With the assistance of the decontamination workers, the responder will remove the fire fighting helmet and hood. The decontamination worker will place the helmet and hood in the designated collection device.

*Note: If the responder's helmet is not equipped with a chinstrap that can be separated from the helmet, the helmet should be slid down the SCBA face piece supply hose and held by the decontamination worker. The fire fighting hood should be handled in the same manner. A second option to sliding the helmet and hood down the air supply line is to cut the helmet strap and hood to facilitate removal.*

10. With the assistance of the decontamination workers, the responder will remove their fire fighting coat. The decontamination worker will place the fire fighting coat in the designated collection device.

11. With the assistance of the decontamination workers, The responder will step to next position in the decontamination process and remove their fire fighting pants and boots. The decontamination worker will place the fire fighting pants and boots in the designated collection device.

*Note: If available, some type of temporary footwear should be provided (shoe covers, sandals, etc.).*

12. The responder will remove their SCBA face piece and hand it to the decontamination worker. The decontamination worker will turn off the responder's SCBA and place the SCBA in the designated collection device.

*Note: The decontamination worker may also be required to handle the fire fighting helmet and hood.*

13. The responder should step to next position in the decontamination process and remove latex gloves. Place gloves in disposal container and report to designated staging area for contamination survey/monitoring by local, state, or tribal Radiation Authority.

14. Decontamination workers will complete the decontamination process by conducting a self-decontamination using the aforementioned decontamination steps.

*Note: Decontamination workers will assist each other in removing protective clothing and placing removed clothing into the designated collection device.*

15. Decontamination workers should brief the Incident Commander on the number, type, and location of items (protective clothing, equipment, tools, etc.) needing decontamination. The Incident Commander will coordinate the final contamination survey of responders who entered the hot zone and decontamination of any contaminated items with the local, state, or tribal Radiation Authority.

*Note: Equipment and tools placed in the drop area will need to be surveyed and decontaminated as needed by the local, state, or tribal Radiation Authority before they can be released as "clean."*

## Option 2 - Radioactive Material Only/No Survey Instrument Available

### DRY DECONTAMINATION METHOD

1. Establish the decontamination system considering contaminants present. If the contaminant is only radioactive material, the procedural steps listed below are recommended for the decontamination process. Necessary barricades or identifying features of the decontamination system should be obvious to responders. Barricade tape or traffic cones could be used to identify the decontamination system.

*Note: Different types and levels of personal protective clothing are worn by response organizations. When conducting decontamination, you must adjust the decontamination process to satisfy the type and level of personal protective clothing being worn by responders. Some examples of personal protective clothing worn by law enforcement, emergency medical service, and fire service responders are shown here.*

2. Instruct responders to place equipment or tools in the designated drop area. The drop area should provide some type of containment for equipment that may be contaminated. Examples of an appropriate drop area include a plastic cover placed on the ground that equipment/tools can be placed on or a lined can that equipment/tools can be placed in.

*Note: Equipment and tools placed in the drop area will need to be surveyed and decontaminated as needed by the local, state, or tribal Radiation Authority before they can be released as "clean."*

3. Have responder approach the hot zone line (identified by a step-off pad). Typical absorbent pads are acceptable to use as step-off pads. Responder should step onto the pad and wipe feet. Responder should then step into the warm zone.

*Note: Decontamination workers should replace damaged step-off pads as necessary. Replacement pads should be placed on top of existing pads.*

4. The responder should step into the warm zone. With the assistance of the decontamination workers, the responder will remove the SCBA harness/backplate; do not turn off the SCBA air supply.

*Note: Decontamination workers should ensure that the responder does not disconnect the regulator air supply or remove the SCBA face piece. Positive pressure within the face piece should be maintained.*

5. With the assistance of decontamination workers, the responder will remove fire fighting gloves. The decontamination worker will place the fire fighting gloves in the designated collection device (plastic bag, lined can, or ground covered area).

*Note: If the fire fighting coat is equipped with wristlets, the decontamination worker will assist the responder in releasing the wristlets.*

6. With the assistance of the decontamination workers, the responder will replace the fire fighting gloves with latex gloves.

7. With the assistance of the decontamination workers, the responder will remove the fire fighting helmet and hood. The decontamination worker will place the helmet and hood in the designated collection device.

*Note: If the responder's helmet is not equipped with a chinstrap that can be separated from the helmet, the helmet should be slid down the SCBA face piece supply hose and held by the decontamination worker. The fire fighting hood should be handled in the same manner. A second option to sliding the helmet and hood down the air supply line is to cut the helmet strap and hood to facilitate removal.*

8. With the assistance of the decontamination workers, the responder will remove their fire fighting coat. The decontamination worker will place the fire fighting coat in the designated collection device.



9. With the assistance of the decontamination workers, The responder will step to next position in the decontamination process and remove their fire fighting pants and boots. The decontamination worker will place the fire fighting pants and boots in the designated collection device.

*Note: If available, some type of temporary footwear should be provided (shoe covers, sandals, etc.).*

10. The responder will remove their SCBA face piece and hand it to the decontamination worker. The decontamination worker will turn off the responder's SCBA and place the SCBA in the designated collection device.

*Note: The decontamination worker may also be required to handle the fire fighting helmet and hood.*

11. Responder should step to next position in the decontamination process and remove latex gloves. Place gloves in disposal device and report to designated staging area for contamination survey/monitoring by local, state, or tribal Radiation Authority.

12. Decontamination workers will complete the decontamination process by conducting a self-decontamination using the aforementioned steps.

*Note: Decontamination workers will assist one another in removing protective clothing and placing removed clothing into the designated collection device.*

13. Decontamination workers should brief the Incident Commander on the number, type, and location of items (protective clothing, equipment, tools, etc.) needing decontamination. The Incident Commander will coordinate the final contamination survey of responders who entered the hot zone and decontamination of contaminated items with the local, state, or tribal Radiation Authority.

*Note: The Radiation Authority will determine background radiation levels and identify radiation levels that can be considered clean for personnel and equipment.*

### Option 3 - Radioactive Material Only/Survey Instrument Available

#### DRY DECONTAMINATION METHOD

1. Establish the decontamination system considering contaminants present. If the contaminant is only radioactive material, the procedural steps listed below are recommended for the decontamination process. Necessary barricades or identifying features of the decontamination system should be obvious to responders. Barricade tape or traffic cones could be used to identify the decontamination system.

*Note: Different types and levels of personal protective clothing are worn by response organizations. When conducting decontamination, you must adjust the decontamination process to satisfy the type and level of personal protective clothing being worn by responders. Some examples of personal protective clothing worn by law enforcement, emergency medical service, and fire service responders are shown here.*

2. Instruct responders to place equipment or tools in the designated drop area. The drop area should provide some type of containment for equipment that may be contaminated. Examples of an appropriate drop area include a plastic cover placed on the ground that equipment/tools can be placed on or a lined can that equipment/tools can be placed in.

*Note: Equipment and tools placed in the drop area will need to be surveyed and decontaminated as needed by the local, state, or tribal Radiation Authority before they can be released as "clean."*

3. Have responder approach the hot zone line (identified by a step-off pad). Typical absorbent pads are acceptable to use as step-off pads. Responder should step onto the pad and wipe feet. Responder should then step into the warm zone.

*Note: Decontamination workers should replace damaged step-off pads as necessary. Replacement pads should be placed on top of existing pads.*

4. The responder should step into the warm zone. Decontamination workers will be prepared to conduct full body radiological survey to monitor for radioactive material contamination using appropriate contamination detection equipment.
5. If the responder plans on returning to the hot zone or is in need of an air supply change, the decontamination workers will assist in conducting a hot bottle change.

*Note: The decontamination workers will assist the responder in changing the air supply. The hot bottle change process varies for the different types of Self-Contained Breathing Apparatus. Review your organization's procedures for details on the proper procedure for conducting a hot bottle change for the type of SCBA used within your organization.*

6. Decontamination workers will conduct a full body survey of the responder. If the decontamination workers do not detect contamination levels above permissible local, state, or tribal guidelines, continue with step 16 of this procedure. If detectable levels of contamination are detected, continue with step 7 of this procedure.

*Note: The full body survey process, using a typical contamination detection instrument should take approximately three (3) minutes per responder.*

7. As decontamination workers survey responder for contamination, Attachment 7 can be used to denote locations of contamination on responder's protective clothing. Upon completion of the whole body survey, the decontamination worker will assist the responder in removing the contaminated clothing.

*Note: Decontamination of protective clothing should be conducted by or in the presence of the local, state, or tribal Radiation Authority.*

8. The responder should step into the warm zone. With the assistance of the decontamination workers, the responder will remove the SCBA harness/backplate; do not turn off the SCBA air supply.

*Note: Decontamination workers should ensure that the responder does not disconnect the regulator air supply or remove the SCBA face piece. Positive pressure within the face piece should be maintained.*

9. With the assistance of decontamination workers, the responder will remove fire fighting gloves. The decontamination worker will place the fire fighting gloves in the designated collection device (plastic bag, lined can, or ground covered area).

*Note: If the fire fighting coat is equipped with wristlets, the decontamination worker will assist the responder in releasing the wristlets.*

10. With the assistance of the decontamination workers, the responder will replace the fire fighting gloves with latex gloves.

11. With the assistance of the decontamination workers, the responder will remove the fire fighting helmet and hood. The decontamination worker will place the helmet and hood in the designated collection device.

*Note: If the responder's helmet is not equipped with a chinstrap that can be separated from the helmet, the helmet should be slid down the SCBA face piece supply hose and held by the decontamination worker. The fire fighting hood should be handled in the same manner. A second option to sliding the helmet and hood down the air supply line is to cut the helmet strap and hood to facilitate removal.*

12. With the assistance of the decontamination workers, the responder will remove their fire fighting coat. The decontamination worker will place the fire fighting coat in the designated collection device.

13. With the assistance of the decontamination workers, The responder will step to next position in the decontamination process and remove their fire fighting pants and boots. The decontamination worker will place the fire fighting pants and boots in the designated collection device.

*Note: If available, some type of temporary footwear should be provided (shoe covers, sandals, etc.).*

14. The responder will remove their SCBA face piece and hand it to the decontamination worker. The decontamination worker will turn off the responder's SCBA and place the SCBA in the designated collection device.

*Note: The decontamination worker may also be required to handle the fire fighting helmet and hood.*

15. The responder should step to next position in the decontamination process and remove latex gloves. Place gloves in disposal container and report to designated staging area for contamination survey/monitoring by local, state, or tribal Radiation Authority.

16. If the responder was not contaminated, the next step in the decontamination process is to remove remaining protective clothing and report to designated staging area a for contamination survey by the local, state, or tribal Radiation Authority.

17. The decontamination workers will complete the decontamination process by conducting a full body radiological survey of one another. If contamination is located, the workers should follow the steps outlined in this procedure for removal of protective clothing. If no contamination is detected, they should remove their protective clothing in a normal fashion and report to the designated

staging area for a contamination survey by the local, state, or tribal Radiation Authority.

18. Decontamination workers should brief the Incident Commander on the number, type, and location of items (protective clothing, equipment, tools, etc.) needing decontamination. The Incident Commander will coordinate the final contamination survey of responders that entered the hot zone and decontamination of any contaminated items with the local, state, or tribal Radiation Authority.

*Note: The Radiation Authority will determine background radiation levels and identify radiation levels that can be considered clean for personnel and equipment.*

ATTACHMENT 1: DECONTAMINATION OPTION DECISION TREE

ATTACHMENT 2: DECONTAMINATION METHOD OPTION 1 FLOW CHART

ATTACHMENT 3: DECONTAMINATION METHOD OPTION 2 FLOW CHART

ATTACHMENT 4: DECONTAMINATION OPTION 3 OPTION FLOW CHART

ATTACHMENT 5: 24-HOUR ASSISTANCE TELEPHONE NUMBERS

ATTACHMENT 6: PERSONNEL DOSIMETRY REPORT

ATTACHMENT 7: PERSONNEL CONTAMINATION LOCATION REPORT