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**Section: 7.15      Mass Decontamination**

Effective Date:      10/01/2009

Revision Date:      09/21/2009

Approved by: M. Erickson 09/29/2009

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**SCOPE**

This guideline applies to all South Metro Fire Department personnel responsible for emergency response.

**PURPOSE**

These guidelines were developed for to provide information and suggested procedures for mass casualty decontamination following a hazardous materials (HAZMAT)/WMD incident.

There is no perfect solution to mass casualty decontamination and no single process or method can account for all variables (e.g., hazard, time, number of victims, environmental conditions, resources). These guidelines are intended to identify a simple, consistent mass decontamination process that can be applied with reasonable effectiveness to any HAZMAT/WMD incident. In other words, *to use the fastest approach that will cause the least harm and do the most good for the majority of the people.*

**PROCEDURE****1. Overview**

This section discusses the basic foundation and a recommended procedure for mass casualty decontamination. Mass decontamination is a multi-stage, resource intensive process. The approach presented in these guidelines represents a standard method of HAZMAT/WMD mass casualty decontamination. The concepts in this section can be implemented quickly by a wide range of first responder organizations and represent the least resource intensive, and most practical and efficient method of mass decontamination.

**Principles of Mass Decontamination**

- Removing clothes is the single most critical step and may remove 80-90% of physical contamination
- Do not delay removal of clothes or application of high-volume, low-pressure water shower to set up tents, additional equipment or to create a soap-water solution
- Conduct decontamination triage prior to administering a high-volume, low-pressure water shower
- Wash time should be between 30 seconds and three minutes, depending on the situation
- When the contamination involves chemical vapors, biological or radiological material, using gentle friction, such as rubbing with hands, cloth or sponges is recommended to aid in removal of contamination
- Rubbing should start with the head and proceed down the body to the feet
- Victim observation area(s) should be utilized to monitor victims for signs of delayed symptoms or evidence of residual contamination
- Perform secondary decontamination as necessary

**1.1 Definition of Decontamination**

Decontamination refers to means that reduce the hazard of a contaminant. There are two basic methods of decontamination, physical removal and neutralization. Physical removal involves mechanical action with techniques such as gentle friction with a soft cloth or sponge, blotting, and washing. Neutralization involves methods and/or materials to counteract the harmful effects of the contaminant.

The focus of mass casualty decontamination is only on physical removal of the contaminant. The addition of neutralizing agents is likely to cause delay in the execution of mass decontamination, as well as create potential additional hazards and safety issues when decontaminating large numbers of personnel not familiar with the decontamination process. Equipment such as decontamination tents and the use of additives such as soap are best implemented at the secondary decontamination site. If physical assets are limited, one possible method of secondary decontamination is re-running victims through the initial decontamination site, but at a slower and more deliberate pace that emphasizes thorough cleaning and

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removal of all residual agent. Liquid soap, if available, should be distributed for victims' use during this secondary decontamination.

### 1.2 *Purposes of Decontamination*

The three most important reasons for decontaminating exposed victims are:

- Removing the agent from the victim's skin and clothing, thus reducing further agent exposure and physical effects.
- Protecting emergency responders, medical personnel and others from secondary transfer exposures.
- Preventing victims from spreading contamination over additional areas.

## 2. **Mass Casualty Decontamination Operation**

These guidelines identify five basic steps for the process of mass decontamination:

1. Initial Size-up
2. Victim Control and Decontamination Triage
3. Decontamination Setup
4. Mass Decontamination Execution
5. Post Decontamination

These five steps are described briefly below. Section 7 of this volume contains individual checklists for each step. These checklists are designed to be removed and used as quick reference guides during an actual response and mass casualty decontamination.

Decontamination must be conducted as soon as possible to be effective in saving lives, limiting injuries and reducing the spread of contamination. Responders should use resources that are immediately available and start decontamination as soon as possible.

### 2.1 *Step 1: Initial Size-up*

This step is performed in accordance with standard guidelines for first responders when arriving at an incident scene. When HAZMAT/WMD exposure is suspected, first responders perform a safety assessment and attempt to identify signs/symptoms of exposure to determine whether mass decontamination is necessary. It is important during this step to weigh the risk vs. benefit to responders and remember that responder safety is paramount.

### 2.2 *Step 2: Victim Control and Decontamination Triage*

This step involves gaining initial control of the victims and directing them to area(s) of safe refuge so responders can provide guidance and instruction. Decontamination triage involves separating victims into prioritized groups for decontamination. Rapidly identifying victims who may not require decontamination can significantly reduce the time and resources needed to perform decontamination. The Victim Control/Decontamination Triage checklist included in Section 7 provides recommended priorities for victim decontamination.

### 2.3 *Step 3: Decontamination Setup*

This step includes establishing incident scene zones and setting up the actual decontamination site and operation. Section 4 includes instructions and graphics describing set up of a simple Ladder Pipe Decontamination System (LDS).

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**2.4      *Step 4: Mass Decontamination Conduct***

Step 4 addresses procedures for performing decontamination on a large number of victims, including victim instructions for properly removing clothing and proceeding through a decontamination shower corridor. Conduct also covers identification of victims who have been decontaminated and directing them to an area(s) of safe refuge for observation where they can be monitored for delayed symptoms or the need for secondary decontamination. Secondary decontamination with an emulsifier such as soap may be necessary if an oily liquid hazard (e.g., sulfur mustard) is involved and initial decontamination is performed with water only. Though the use of a soap-water solution is best for physical removal of all hazards, it will likely be required for oily liquid agents in order to provide the most effective physical removal of the agent from the victims' skin.

**2.5      *Step 5: Post Decontamination***

Step 5 describes actions to be taken following completion of initial mass decontamination, including observing victims for delayed symptoms and evidence of residual contamination; performing secondary decontamination as necessary; arranging for clothing/cover for decontaminated victims; recovering personal items (if possible); and transporting victims to medical facilities for follow-on care.

**3.0      **Basic All-Hazards Mass Decontamination Approach******3.1      *Clothing Removal***

Having a victim remove their clothes will greatly reduce risk in all cases. Victims should be encouraged to immediately remove as much clothing as possible – the more clothing removed the better. At a minimum, victims should remove outer garments down to their underwear.

Whenever possible, victims should unbutton or cut clothes to remove them rather than lift them over their head. This will reduce the chance of exposing the head, face and eyes to contamination. If clothes must be lifted over the head, instruct victims to do so carefully by placing their hands and arms on the inside of the garment and using their hands to pull the clothing away from the face and head as much as possible when removing it.

**3.2      *Water Shower***

The most expedient approach following removal of clothing is to use readily available equipment to provide an emergency high-volume, low-pressure (approximately 60 pounds per square inch (psi)) water shower for up to three minutes. While longer and more thorough washing increases the effectiveness of decontamination, depending on the number of victims and resources available, three minutes may not be practical. First responders should adjust the shower time to as little as 30 seconds to enable victims to receive an initial decontamination water shower as rapidly as possible.

While victims are waiting to be decontaminated, keep adequate spacing between individuals to avoid secondary contamination and exposure to off-gassing.

When moving through the decontamination shower, victims should tilt their heads back, raise their arms and spread their legs to expose the armpit and groin areas and prevent runoff from the head/hair getting into the eyes, nose or mouth. Victims should occasionally turn 90 degrees to expose their entire bodies to the water cross stream.

When the contamination does not involve oily, liquid chemical agent, using gentle friction, such as rubbing with hands, a soft cloth, or sponges is recommended to aid in removal of the contamination. This process must start with the head and proceed down the body to the feet.

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**4.0      High-Volume, Low-Pressure Decontamination**

The Ladder Pipe Decontamination System (LDS) provides a large capacity, high-volume, low-pressure water shower. Ladder pipes, deck guns, and fog nozzles are positioned strategically to create a mass decontamination corridor.

Two engines can create a corridor with water spray from both sides using hose lines and deck guns, while the ladder pipe provides high-volume, low-pressure water flow from above. Multiple LDSs use more than one ladder pipe to increase the length of the decontamination corridor to accommodate large groups of victims. Multiple corridors can be established to provide decontamination for different groups, such as ambulatory and non-ambulatory victims or even to provide decontamination at hospitals.

The South Metro Fire Department utilizes specially designed shower apparatus on each of its primary engines and can be setup much the same way as described above. These shower units have three stations per truck and when working together can decontaminate approximately 20 to 300 people per hour depending on shower time per person.

Responders should establish a mass decontamination system utilizing available resources that enables them to rapidly establish a high-volume, low-pressure water shower decontamination operation.

**5.0      Cold Weather Guidelines**

Even in cold weather conditions, it is still most practical to conduct your decontamination effort outdoors. The healthy human body can withstand very low temperatures for a brief amount of time. The recommended basic methods of decontamination, immediate clothing removal and a high-volume, low-pressure shower, remain the same for temperatures as low as 36°F. Once victims are decontaminated, they should be provided with clothing/cover and moved to a heated facility. For temperatures 35°F and below, removal of clothing and a “dry” decontamination method for removal of liquid contamination may be used outdoors, such as blotting with paper towel, followed by high-volume, low-pressure water shower at a heated facility.

Consider the response of the State Decon Trailers for cold weather decon. These trailers can be obtained by contacting the State Duty Officer. The two closest trailers are located at Eagan and MAC fire departments.

**General Rules for Cold Weather Decontamination**

1. Conduct some form of decontamination regardless of temperature conditions.
2. Remove clothing outdoors
3. If victims are outdoors in very low temperatures (**<36°F**), use a dry method of decontamination (e.g., removal of clothing, blotting) instead of water for liquid contamination.
4. After dry decontamination, victims should be moved inside or to a heated area for water/soapy water high-volume, low-pressure water shower and to mitigate the effects of cold weather.
5. Observe for signs of hypothermia, delayed symptoms and completeness of decontamination.
6. Follow all other General Rules for Mass Casualty Decontamination

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**6.0      Summary**

The key to successful mass decontamination is to use the fastest approach that will cause the least harm and do the most good for the majority of the victims. There is no perfect solution that can account for every variable and ensure rapid, completely effective decontamination of large numbers of victims for all hazards.

First responders will have to determine the need for mass decontamination; the extent and practicality of performing decontamination triage; the scope of resources needed versus resources available; the need for application of soap; and whether soap can be rapidly applied during initial decontamination or will have to be delayed until secondary decontamination can be performed.

**7.0      Quick Reference Guides for Mass Decontamination**

The following pages are designed to be stand alone, quick reference checklists and supporting graphics that concisely capture information to aid first responders in a mass decontamination situation for a HAZMAT/WMD incident. This section is meant to be printed double-sided so that the supporting graphics are on the reverse side of the checklist.

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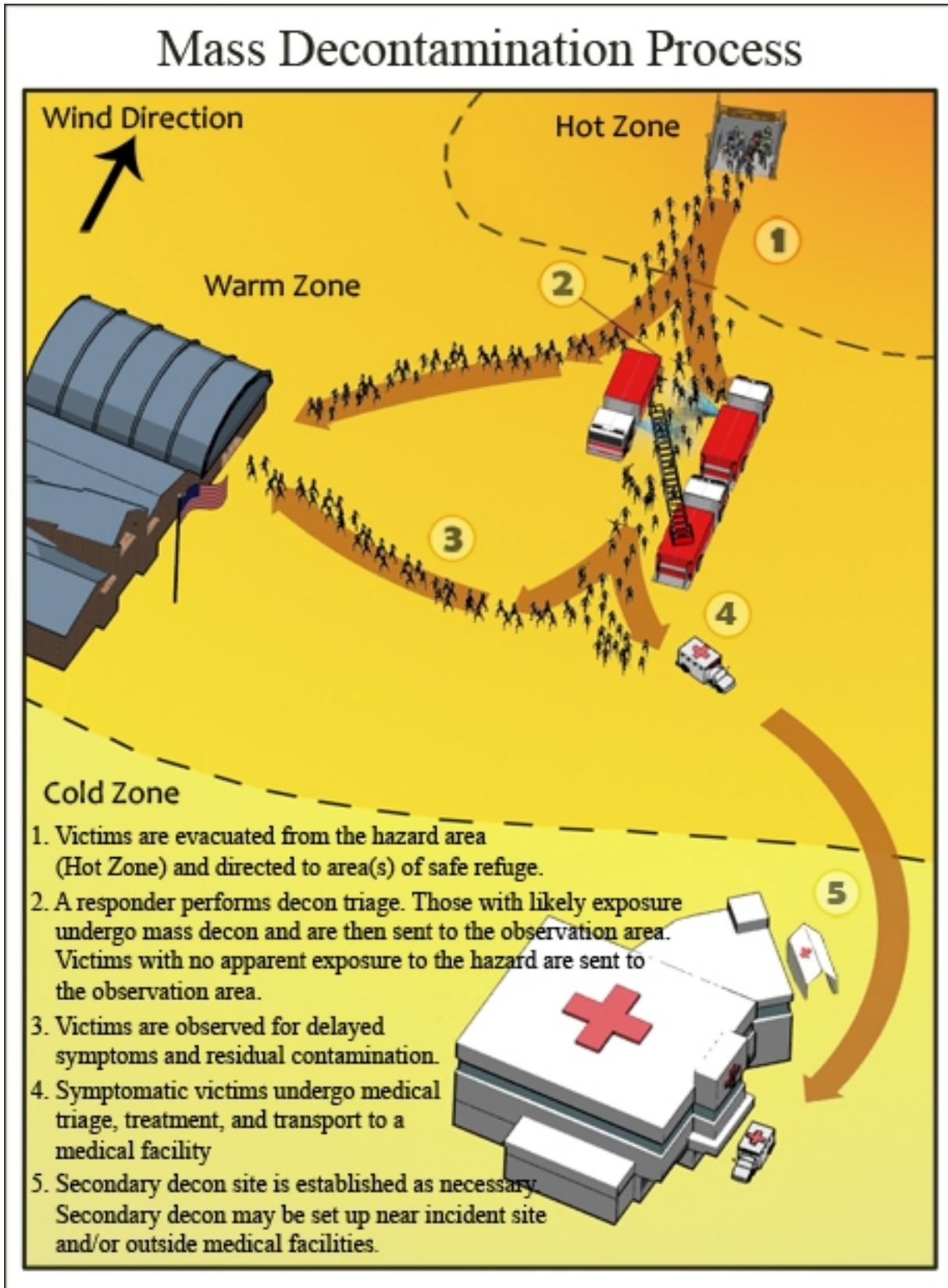
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**Guidelines for HAZMAT/WMD Mass Casualty Decontamination**

**INCIDENT COMMANDER'S OVERVIEW CHECKLIST**

- Establish a visible command post.
- Conduct scene safety assessment, to include secondary devices.
- Protect yourself.
- Approximate casualties.
- Determine type/state (liquid, solid or gas) of the hazard.
- Assess risks and determine need for decontamination.
- Conduct Decontamination Triage to prioritize victims.
- Communicate decontamination process to the victims (e.g., remove garments down to underwear immediately).
- Notify medical facilities.
- Establish perimeter/zones.
- Set up decontamination site.
- Execute decontamination.
- Observe victims for delayed symptoms.
- Perform Secondary decontamination (as necessary).
- Transport casualties to medical facility (as necessary).

**When responders are unable to determine if actual chemical agent exposure has occurred, and in those situations where actual exposure appears unlikely, decontamination should be deferred PENDING OBSERVATION AND/OR SCENE INVESTIGATION. If symptoms develop, individuals should be treated followed by prompt field decontamination by the most expeditious means available.**



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**Guidelines for HAZMAT/WMD Mass Casualty Decontamination**

**INITIAL SIZE-UP CHECKLIST**

- Communicate the incident to first responders.
- Conduct scene safety assessment.
- Do not rush into the incident scene – protect yourself.
- Local law enforcement should check for possible secondary devices near decontamination site.
- Look for signs and symptoms of exposure and utilize detectors, if available.
- Estimate how many suspected victims are involved.
- Determine whether mass decontamination is required.
- Determine what resources are needed and readily available for mass decontamination.
- Determine the impact of weather conditions on decontamination operations (temperature, wind speed, wind direction).
- Decontamination should be set up upwind from the incident. If the temperature is below 65°F, consider cold weather decontamination.
- Alert hospitals to prepare for victims exposed to contamination.

**Guidelines for HAZMAT/WMD Mass Casualty Decontamination**

**VICTIM CONTROL/DECONTAMINATION TRIAGE CHECKLIST**

- Ensure all responders are properly protected.**
- Gain control of the victims as rapidly as possible (public address systems, instructional signs) and direct victims to area(s) of safe refuge to begin decontamination or for observation.
- In multi-lingual communities, use multi-lingual or illustrated signs to provide instructions to victims.
- Perform decontamination triage by separating and prioritizing victims into categories in preparation for mass decontamination (see Decontamination Triage Tree on reverse).
  - ❖ Non-ambulatory
  - ❖ Ambulatory and symptomatic
  - ❖ Ambulatory, non-symptomatic, exposed to contaminant
  - ❖ Ambulatory, non-symptomatic, no obvious exposure to contaminant

**Note: it is possible that the severity of conventional injuries may require that certain victims receive an elevated priority, regardless of whether they are showing obvious signs/symptoms of exposure.**

- ENCOURAGE VICTIMS TO REMOVE AS MUCH CLOTHING AS POSSIBLE, BUT AT LEAST REMOVE OUTER GARMENTS DOWN TO UNDERWEAR.** Cutting and/or unbuttoning is preferred to pulling clothing over the head.
- If clothes must be lifted over the head, instruct victims to do so carefully by placing hands and arms inside the garment and using the hands to pull the head opening away from the face and head as much as possible.

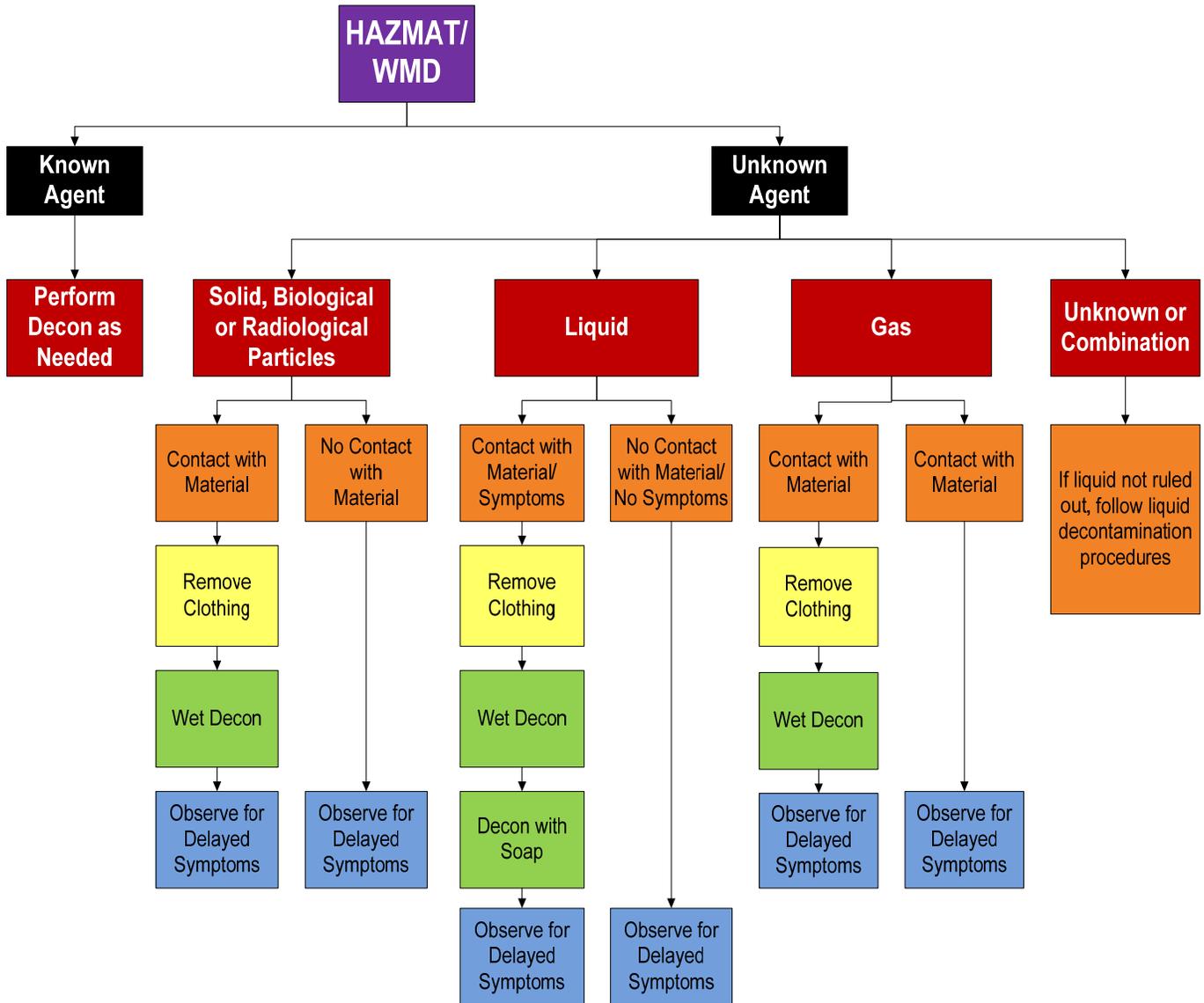


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**Guidelines for HAZMAT/WMD Mass Casualty Decontamination**

**DECONTAMINATION SETUP CHECKLIST**

- Ensure all responders are properly protected.***
- Local law enforcement should check for possible secondary devices near the selected decontamination site(s).
- Establish Hot/Warm/Cold zones. Set up barriers or police tape to delineate zones. Post signs directing victims on where to go and what to do.
- If not already accomplished**, instruct victims to remove as much clothing as possible. Cutting and unbuttoning is preferred to pulling clothing over the head. Collect clothing in the Warm zone.
- Set up decontamination site upwind of the hot zone. Ideally, it should be uphill from the hot zone, easily accessible for responders, and have good drainage.
- Suggested setup: Ladder Pipe Decontamination System (or other expedient system) to dispense high-volume, low-pressure water (~60 psi) with wide fog pattern.

***Note: Decontamination of exposed and/or symptomatic victims should not wait for set up of decontamination tents or additives such as soap,***

- Establish victim observation area(s) and secondary decontamination area(s) as necessary.

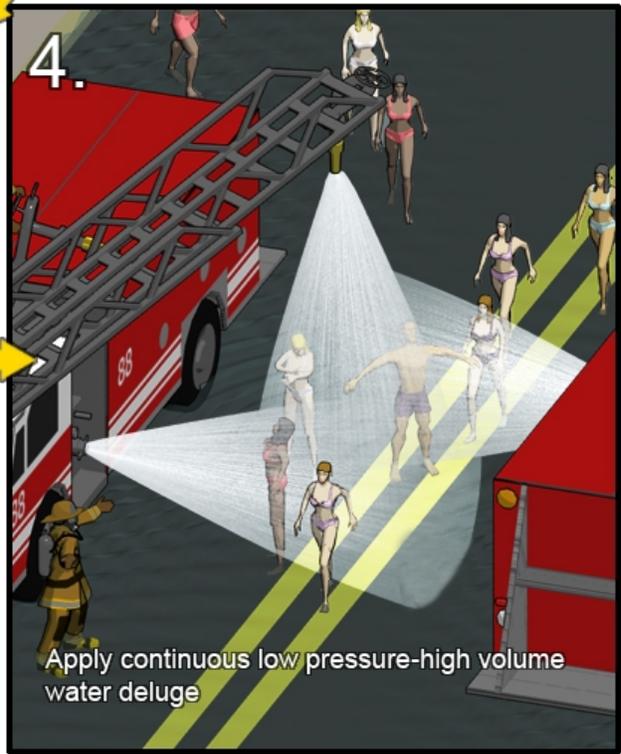
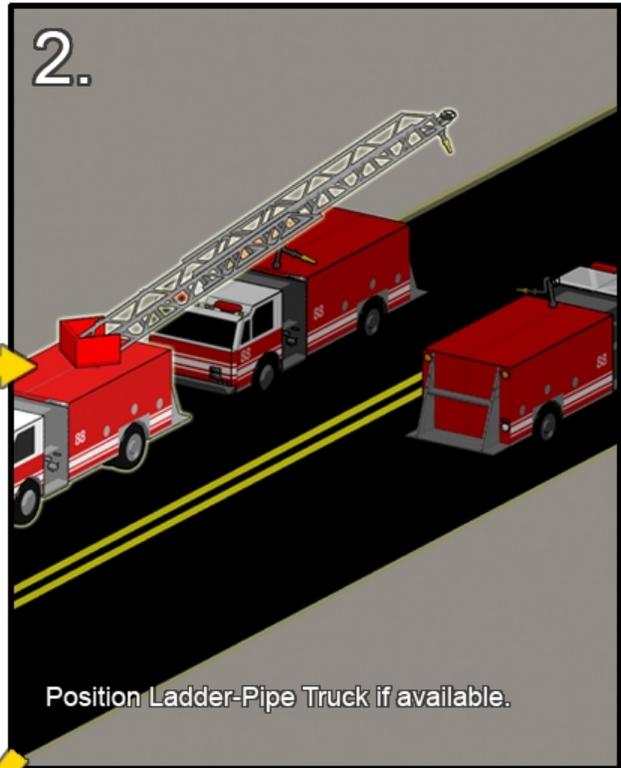
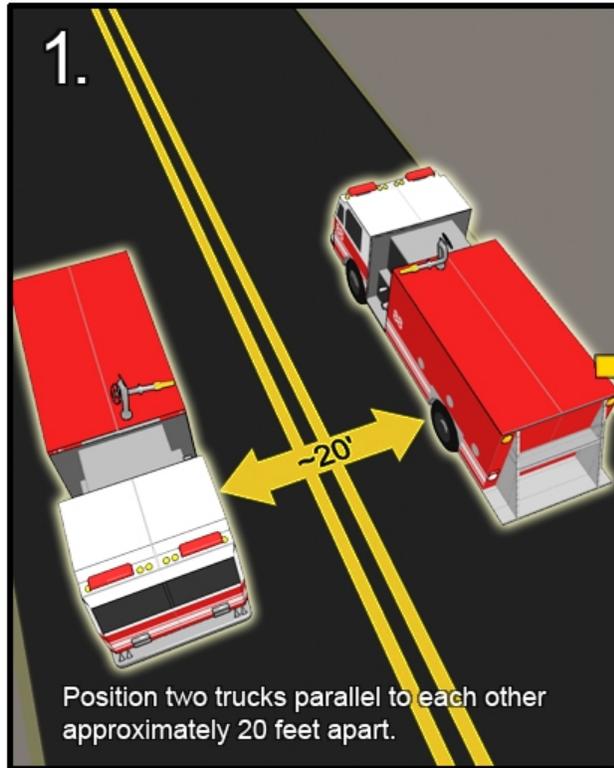
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### Ladder Pipe Decontamination System Method



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**Guidelines for HAZMAT/WMD Mass Casualty Decontamination**

**MASS DECONTAMINATION EXECUTION CHECKLIST**

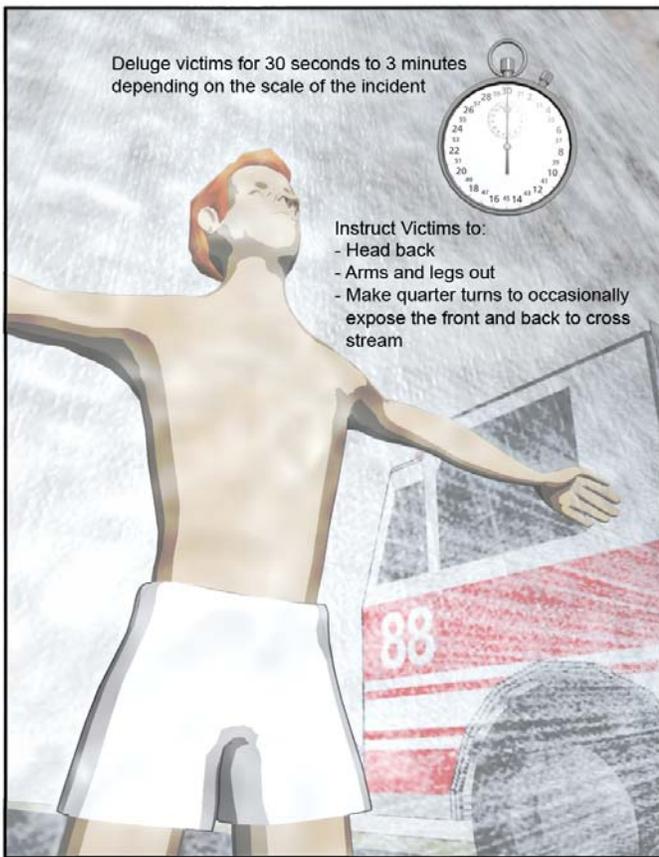
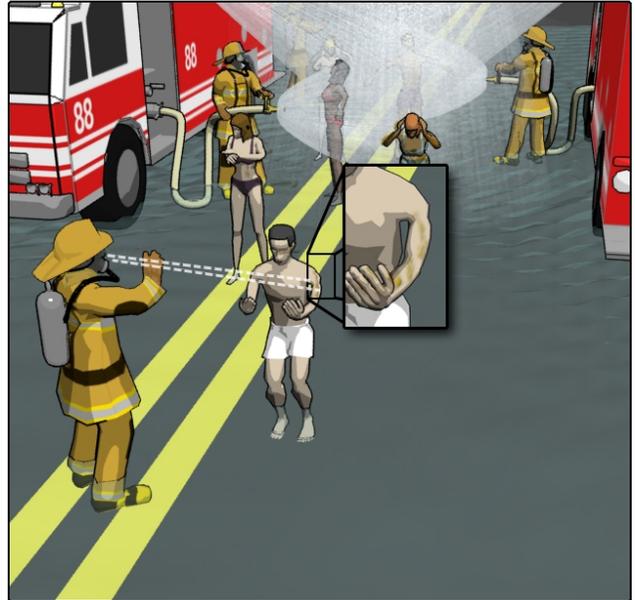
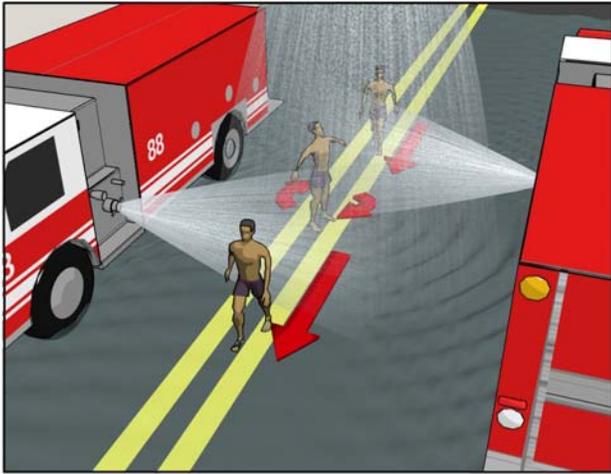
- Instruct victims to move to specific areas depending on medical and decontamination triage status.
- If not already accomplished**, instruct victims to remove as much clothing as possible.
- Establish a method for collecting and tracking personal items (e.g., bag labeled with victim name/number).
- Based on decontamination triage prioritization, instruct victims to move through the decontamination corridor. Wash time should be between 30 seconds and three minutes. Do not delay the high-volume, low pressure water shower to create a soap-water solution
- Instruct victims to:
  - ❖ Tilt head back.
  - ❖ Raise and spread arms and spread legs to expose armpits and groin.
  - ❖ Walk through shower system slowly, and periodically turn 90 degrees.
  - ❖ When the contamination involves chemical vapor, biological or radiological materials, victims should apply gentle friction by using their hands, a cloth, or a sponge to aid in removal of contamination.
  - ❖ Rubbing should start with the head and proceed down the body to the feet.
  - ❖ When the contamination is a liquid chemical agent, DO NOT apply friction without the aid of soap as this may spread the hazard over the body and increase medical risk.
- After passing through decontamination corridor, provide victims with clothing/cover.
- Use some means to identify victims that have been decontaminated.
- Direct symptomatic patients to additional treatment or secondary decontamination area(s) as appropriate.
- Direct non-symptomatic victims to observation area(s).

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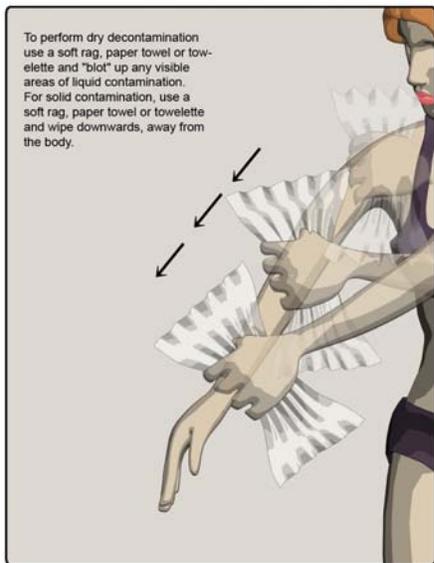
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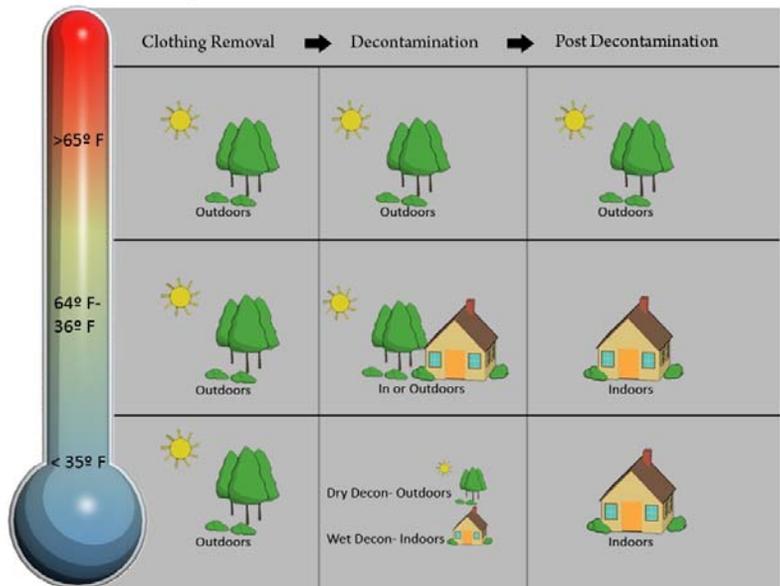
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**COLD WEATHER DECONTAMINATION (<65°F) CHECKLIST**

- Conduct some form of decontamination regardless of temperature conditions.
- Remove clothing outdoors
- If victims are outdoors in very low temperatures (<36°F), use a dry method of decontamination (e.g., removal of clothing, blotting) instead of water for liquid contamination.
- After dry decontamination, victims should be moved inside or to a heated area for water/soapy water high-volume, low-pressure water shower and to mitigate the effects of cold weather.
- Physically identify decontaminated victims (e.g., tag around neck).
- Observe for signs of hypothermia, delayed symptoms and completeness of decontamination.
- Follow all other General Rules for Mass Casualty Decontamination



**Temperature Decontamination Guide**



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**POST DECONTAMINATION CHECKLIST**

- Observe victims for delayed symptoms and completeness of decontamination.
- Perform secondary decontamination as necessary.
- Transport symptomatic victims to medical facilities for assistance.
- Arrange for clothing/cover and possible recovery of personal effects.
- Collect contaminated personal items for possible decontamination.
- Provide follow-up information to the victims (e.g., symptoms to watch for).
- Provide instructions to victims prior to release (e.g., care, follow-up).
- Decontaminate all responders, equipment, and incident site.
- Conduct medical check on all responders.
- Complete victim and first responder documentation and accountability.