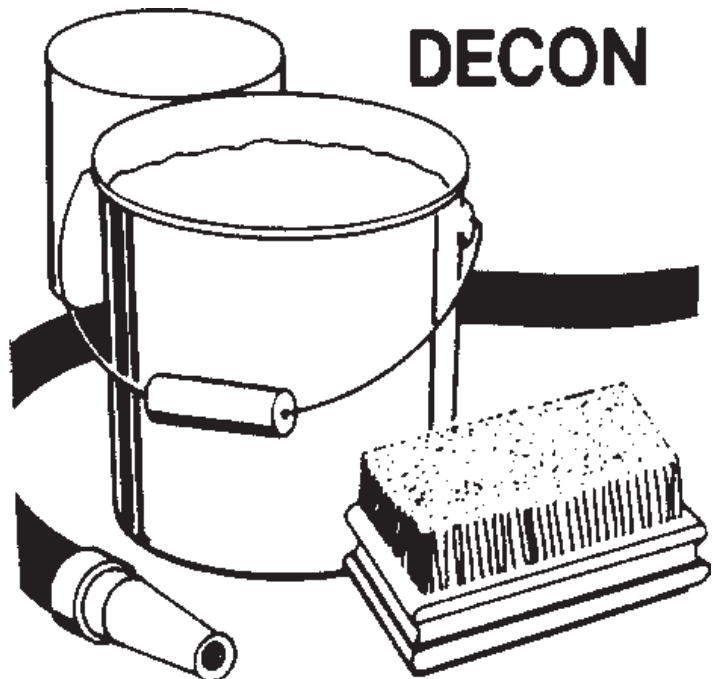


# Section 16

# Decontamination

## Purpose

**To learn how to operate a wet or dry decon line as an Operations-level responder and how to protect yourself in the decon process.**



# Section 16

What you will find  
in this section...



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# Task 1

- **Use fact sheets and your own experience to answer the questions below.**

**Y**our group has been called to decontaminate your company's Haz Mat Team which is responding to a spill at your plant. Please use the fact sheets in this section and your own experience to answer the questions below. Here is what you know about the spill:

*One hundred gallons of diesel fuel have spilled at the loading dock from a truck with a damaged fuel tank. The Haz Mat Team will put a patch on the leaking tank, block the nearby storm drains, and clean up the spill. They will be dressed in level B protection.*

*The Haz Mat Team members have been trained as Technicians. Your group, the Decon team, are all Operations-level responders.*

1. Would you do wet or dry decon for the Haz Mat Team members? Why?

# Task 1

continued

- **Use fact sheets and your own experience to answer the questions below.**

2. Make a list of supplies for your decon:

# Task 1

continued

- Use fact sheets and your own experience to answer the questions below.

3. On a wet decon line, in what order would you wash suits, boots, and gloves? Number the order on the picture below.



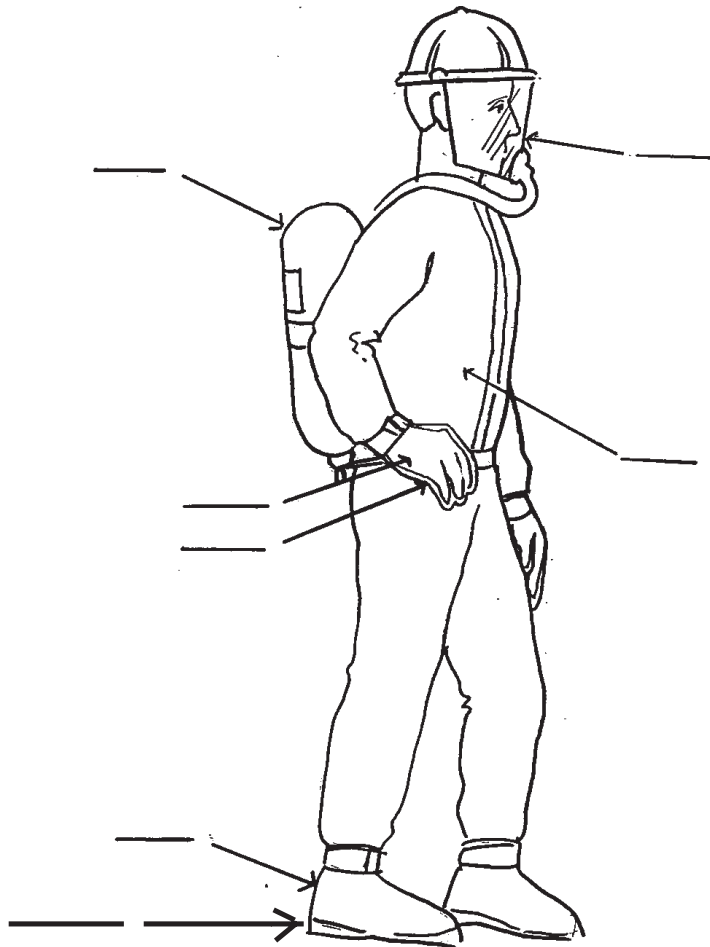
4. What is the **minimum level of protective clothing** you should wear to decontaminate the worker in this picture? Why?

# Task 1

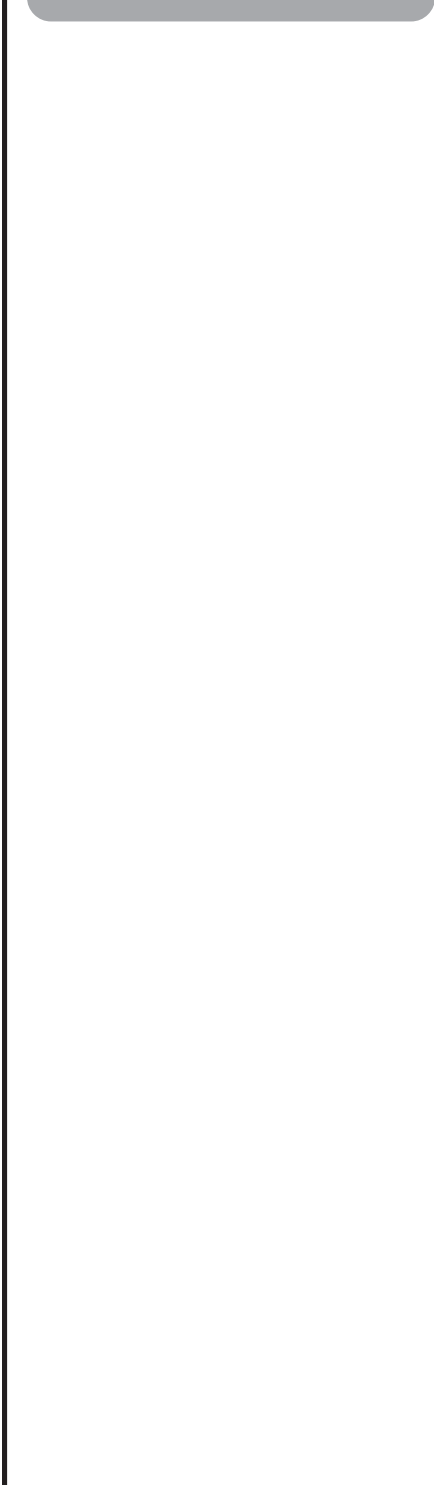
continued

- Use fact sheets and your own experience to answer the questions below.

5. On a wet decon line, in what order would you remove clothes and equipment for a person dressed in level B? Number the order on the picture below.



6. In an emergency, for example if an entry team member started to feel sick or passed out, how would you change the decon process?



**Fact Sheet #1****Wet vs. Dry**

**E**mergency response is messy work. The Haz Mat team may get chemicals on their suits, boots, gloves, even their SCBAs. So everyone needs to get cleaned up before they leave the spill. Cleaning chemicals off of protective equipment is called decontamination (decon for short).

**Your  
Job**

As an operations-level responder, you could be assigned to work on the decon line. The Incident Commander would tell you what kind of decon line to set up, but you would need to know how to do the decon process.

**Two Kinds of Decon Line****Wet Decon**

At most spills, workers who enter the Hot Zone are washed off and scrubbed with a decon solution. Their suits and gloves are taken off inside out. Gloves are usually thrown out. Disposable suits are thrown away. Reusable suits are hung up to dry and be inspected. Any items that are thrown away have to be treated as hazardous waste because they probably still have some chemicals on them.

**Dry Decon – Quick and Easy, but Less Effective  
– for Level C only**

Some emergency responders wear two layers of disposable suits that can just be thrown out. They can take off their suits inside out and throw them out in hazardous waste bags. Dry decon is only good for decontaminating people who are responding to spills that aren't very dangerous. A good rule of thumb is that you only do dry decon for people responding in level C.



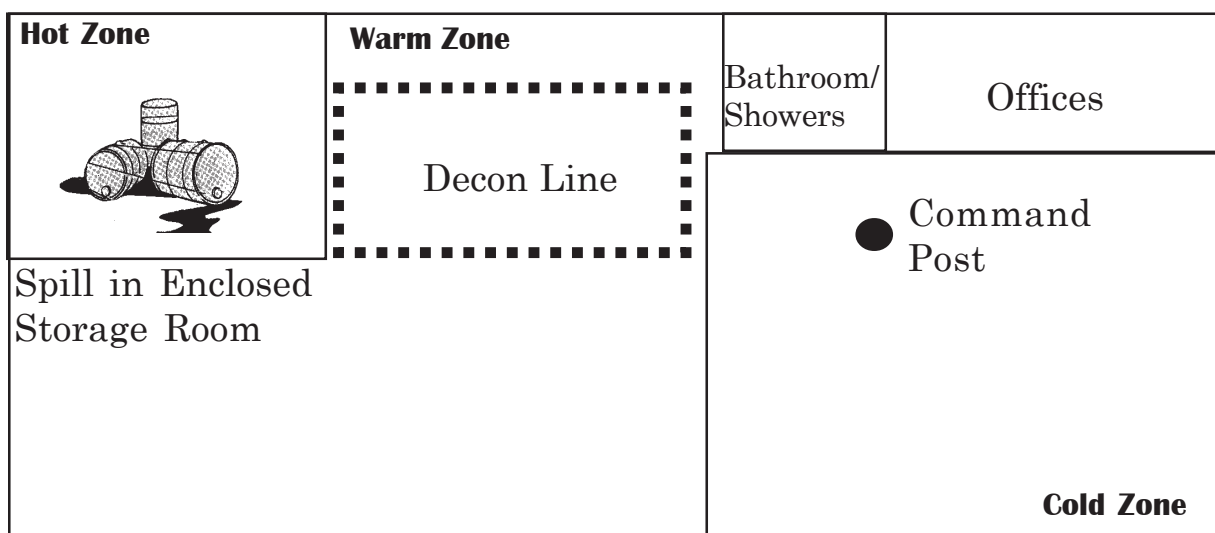
**Fact Sheet #2**

# Where's the Decon Line?

**A**fter evacuation of the area around the spill and size up, the Incident Commander sets up the three work zones. These zones are based on the size-up, results of any air monitoring, and the lay-out of the area. The three zones are:

- **Hot Zone** (sometimes called the exclusion zone)  
The area affected by the haz mat spill. The hot zone should extend far enough to keep people just outside the zone from being exposed to hazardous materials or dangerous surprises (fire, explosion, change in wind).
- ⇒ **Warm Zone** (or decontamination zone)  
The area where the decon line is set up. It starts out clean, but will become contaminated as the entry team leaves the hot zone.
- **Cold Zone** (sometimes called the clean zone or support zone)  
The area where the command post, extra supplies, and other support functions are set up. This is where the Incident Commander stays.

## Example of Zones When Spill is Inside Plant



## **Fact Sheet #2, continued**

Work zones help keep people out of harm's way. Work zones also help to keep the released materials in a confined area. Since emergency responders can only leave the hot zone by passing through the decon line, they cannot track the hazardous materials outside of these zones.

Keep entrances into the hot zone separate from exits out of it. The exit is the decon line.

**Where to set up the decon line** – Here are some of the things to think about when picking the location for the decon line:

### **DO**

- 👍 Look for an area that has easy access, but also easy to control access. Put the decon line on **flat ground**, so water doesn't run off the plastic.
- 👍 Put it **upwind** from the spill release.
- 👍 Look for asphalt or hard ground underneath, in case water leaks through the plastic. Dirt will soak up the dirty decon water. Then you would have to remove the dirt.
- 👍 Look for **water (a hose or pump) nearby**, so water doesn't have to be carried.

### **DON'T**

- 👎 Don't put the line near generators or near fork lift traffic that give off dangerous gases such as carbon monoxide.
- 👎 Don't put it downhill from the spill, where run-off from the spill or heavy gases can collect.

## **Fact Sheet #3**

# **An Ounce of Prevention**

**I**t is much easier to keep chemicals off of workers and equipment than it is to clean chemicals off.

### **Here are five tips for preventing contamination in the first place.**

1. Stay away from the spilled chemicals. Your job as an Operations-level first responder should keep you clear of them.
2. When you can, wear SCBAs inside the suit because SCBAs are very hard to clean. You can only do this with a suit that has a pouch in the back.
3. Wear a disposable suit over a reusable one. This will keep the thicker, reusable suit cleaner (and it will last longer).
4. **Use lots of duct tape on zippers, gloves, and boots. Be sure to put a tab on every piece of duct tape so it is easy to take off.**
5. Watch out for nails, sharp edges, or anything that can rip suits. Part of your buddy's job is to keep an eye out for tears in your suit. It is hard for you to see them.

*Source: "Decontamination," Chapter 7 in "Hazardous Materials Response Handbook," 2nd ed., National Fire Protection Association, Quincy, MA, 1993.*

**Fact Sheet #4**

# All Dressed Up

**T**he workers who run the decon line need protection from chemicals too. Chemicals will splash off the suits when they are hosed off. There will be water all over the plastic on the ground. Workers on the decon line need almost the same protection as cleanup workers.

**If workers in the hot zone wear**

**Decon workers need to wear no less than**

Level A

Operations Responders do not decon at this level, contamination is too high.

Level B

Level C

Level C

Level C

The rule of thumb is that decon workers wear no less than one level below the ppe that the entry team is wearing. The decon workers closest to the Hot Zone may even be in the same level of protection as the entry team. It depends on how contaminated the entry team will get.

*Operations-level responders do NOT have enough training to decon workers in level A personal protective equipment (ppe). This should be done only by trained Haz Mat Technicians with the proper equipment.*

**Fact Sheet #5**

# Invisible Damage

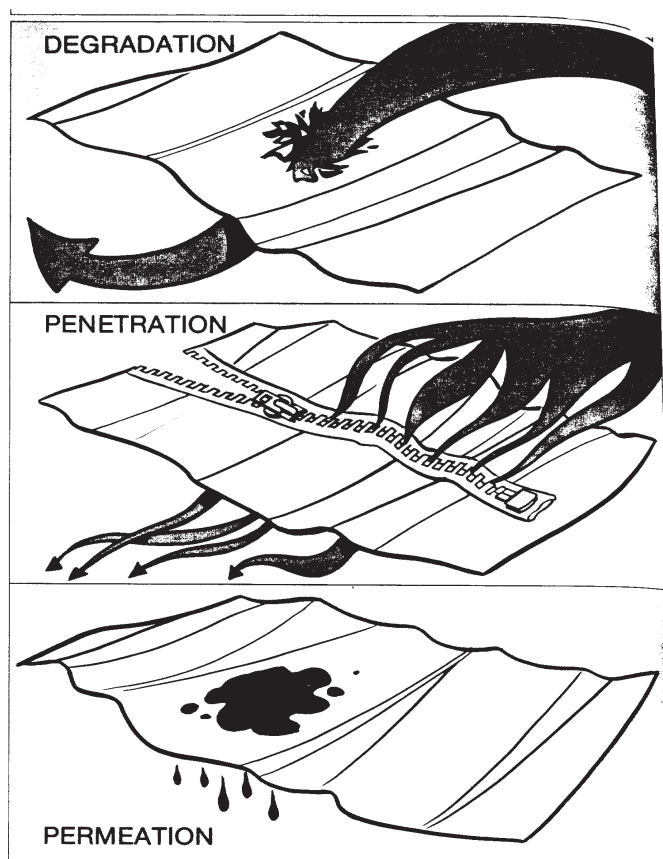
**N**o one really knows how to get a suit totally clean. Some chemicals always stay on the fabric (or soak in). Eventually, even the most expensive suit has to be thrown out because chemicals have soaked in or damaged the fabric.

Throwaway suits don't need to be cleaned. You just use them and throw them out. But remember that these suits don't protect you as well as heavier suits. Also, the suits are hazardous waste which costs a lot to dispose of.

**Remember that chemicals can damage suits in three ways.**

## Chemicals can:

- Eat through the fabric and make a hole in the suit, or
- Leak in at a zipper or seam and get on your clothes or skin, or
- Soak right through the fabric and get on your clothes or skin.



**Source:** Schwope, A.D. et al, "Guidelines for the Selection of Chemical Protective Clothing," American Conference of Governmental Industrial Hygienists, Inc., Cincinnati, OH, 1983.

**Fact Sheet #6**

# Water, Water Everywhere

**W**et decon is messy. Water from the sprayers gets on the plastic sheeting. Water drips off of suits and boots. Wet, soapy scrub brushes pile up. All of the water on a decon line has chemicals in it. Decon water is hazardous waste, just like spilled chemicals.

## **Here are some ways to keep water under control on the decon line:**

- ◆ Always use metal or plastic tubs or pools to wash or rinse workers.
- ◆ Pump out the pools before they are 1/2 full.
- ◆ Roll up some extra plastic sheeting around the edge of the decon area. Or roll the edge around a 2" x 4" board. Then the plastic will be like a big bowl.
- ◆ Try to use one wide sheet of plastic instead of taping two together. Tape won't hold up.
- ◆ Clean up water as you go along. Don't let it collect into big puddles.
- ◆ Try to keep scrub brushes in the tubs, not on the plastic sheeting.
- ◆ Put a tub under the chair where boots are taken off . This is where the most water drips.

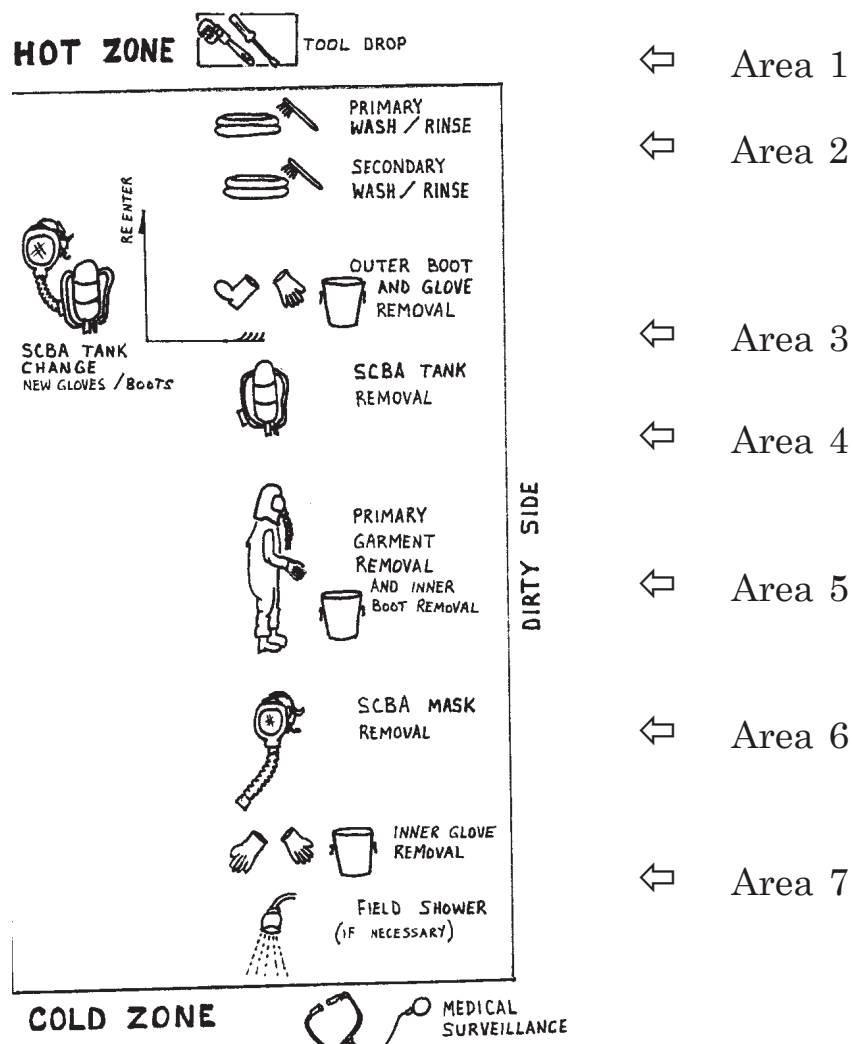
Water from the decon line needs the same special transportation, treatment, and care as other hazardous waste. It has to be collected (usually in a drum) and sent for treatment or to a landfill.

## Fact Sheet # 7

# ABCs of Decon

The general idea of decon is to wash and remove the items that are most contaminated first. Then, move to a cleaner area to wash and take off less contaminated items.

### Set-up for wet decon to clean workers in level B ppe.



A written description of what happens at each station follows on the next page.

*Drawing: M. Neal, 1992*

## ***Fact Sheet #7, continued***

### **Here are the steps for Wet Decon of a person dressed in Level B.**

- Area 1.** Drop tools on a plastic sheet. They will be washed off by the decon team.
- Area 2.** Step into pool. Spray with decon solution (probably soap and water). Scrub with long-handled brushes. Some decon lines do this twice (they set up two pools). Wash suit first from top to bottom, one quarter at a time. Then wash gloves and, last, boots.
- Area 3.** Sit down on a stool (it's hard to balance on one foot). Take off boot covers and outer gloves and throw out. Throw out the duct tape, too.
- Area 4.** Disconnect from air, then remove SCBA backpack. Put it in a container for cleaning. Leave facepiece on.
- Area 5.** Sit down. Take off boots, middle gloves (if wearing any). Put them in a container to be cleaned.
- Take off suit inside out. Avoid touching outside of suit as much as possible. If disposable, throw suit away. If reusable, put suit in a container to be cleaned.
- Area 6.** Take off facepiece. Put in container for cleaning.
- Area 7.** Take off inner gloves inside out. Put them in a bag to be thrown out.
- Area 8.** Take a shower. Scrub your mouth and nose and under your fingernails. Be sure to shampoo your hair and clean your mustache, if you have one.

**Note:** *Decon for Level C is the same except skip Area 4.*



## **Fact Sheet #7, continued**

### **Here are the steps for Dry Decon, Level C only.**

**Area 1.** Drop tools on a plastic sheet. They will be washed off by the decon team.

**Area 2.** Wipe off outer suit with paper towels.

**Area 3.** Sit down on a stool (it's hard to balance on one foot). Take off boot covers and outer gloves and put them in a bag or garbage can to be thrown out. Throw out the duct tape too.

**Area 4.** Sit down. **Take off boots.** Put them in a container to be cleaned. Throw out the duct tape.

If worker has **middle gloves**, pull them off by the cuff so they turn inside out. Leave on inner gloves. Put the middle gloves in a container to be cleaned. Throw out the duct tape.

As you take off **outer suit**, roll it up inside out. Put the suit in a garbage bag to be thrown out.

**Area 5.** Take off **inner suit**, rolling it inside out. Put the suit in a garbage bag/can to be thrown out.

**Area 6.** Take off respirator. Put it on the table for cleaning.

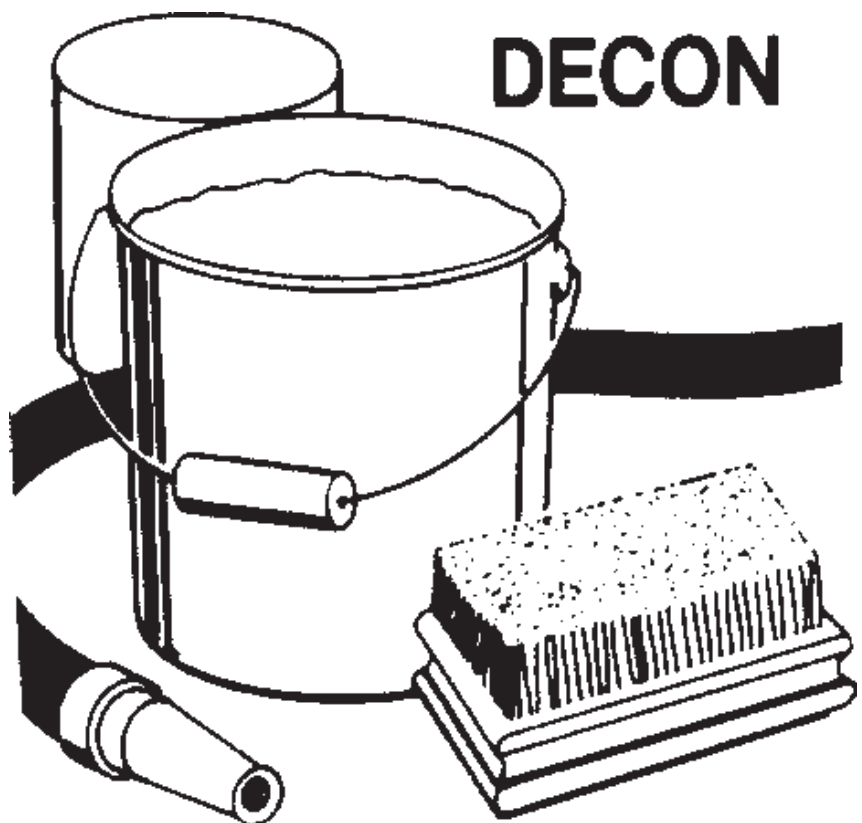
**Area 7.** Take off inner gloves inside out. Put them in a bag to be thrown out.

**Area 8.** Take a shower, if needed.

## ***Fact Sheet #7, continued***

### **Decon for Decon Workers, Too**

Decon workers also have to go through the decon line when they leave. Start with the decon workers closest to the Hot Zone because they are the most contaminated. They begin the decon process in a less contaminated area one station down the line from where they were working. Decon workers help to decon each other.



**Fact Sheet #8**

# If Something Goes Wrong – Emergency Decon

**D**econ takes time. This is why the decon line must be set up and the decon team ready before anyone goes into the hot zone to control the spill. If workers are rushed through the decon line, they can spread chemicals. The safety officer at a spill has to make sure that workers are not rushed through the decon line to save time.

But, there may be situations when you don't have time to put a person through the whole decon process. What do you do if someone on the entry team passes out or has some other medical emergency?

**If a team member has a medical problem:**

The most important thing is to get medical help for the worker. Your goal is to clean off the suit enough so that no one in the emergency room will be poisoned, and the worker won't get exposed to a lot more chemicals when the respirator is removed.

- Quickly spray off the suit and outer garments. Move the worker to a cleaner area.
- Disconnect the SCBA hose and remove the mask.
- You may need to cut the suit open to get it off as quickly as possible, especially if the worker is suffering from heat stroke.

**If a worker needs *immediate attention* and is contaminated:**

- You may only get a chance to wrap him or her in plastic. The plastic cover prevents the ambulance and the emergency room from getting badly contaminated.

## ***Fact Sheet #8, continued***

- Make sure the EMT's and/or doctors know what chemicals the worker has been exposed to. A copy of the MSDS for the chemical should go with the worker to the hospital.

### **If the SCBA runs out of air:**

*The people with the least amount of air left in their tanks should go through decon first. This should help to avoid running out of air.*

- Don't rip the facepiece off as soon as the alarm sounds, and don't leave the decon line!
- Quickly spray and brush off the outer garments (suit, gloves, and boots), move down the line to a cleaner area, then disconnect the SCBA hose.
- Keep the mask on and breathe through the hose as you finish all the steps.

**Fact Sheet #9**

# Getting Ready for Decon

**G**ood decon takes lots of planning. All the supplies need to be ready before a spill. The decon line needs to be set up, and the decon workers have to be ready before anyone goes into the hot zone.

## Equipment

For *Dry Decon*, you will need:

- ♦ Plastic sheeting to cover the ground
- ♦ Boards (or something) to hold down the sides of the ground cover
- ♦ Non-slip tape or stickers for the plastic
- ♦ Bright marking tape or traffic cones to mark the decon area
- ♦ Lots of hazardous waste disposal bags
- ♦ Bags (a different color!) or tubs to hold equipment that will be cleaned off site or saved for reuse
- ♦ Drums or garbage cans to hold the bags, and to hold up marking tape
- ♦ Disposable paper towels or rags to wipe suits
- ♦ Stools (not wood because it absorbs chemicals), so workers can pull off boots without falling
- ♦ Tables to hold respirators for cleaning, and for cleaning tools and equipment
- ♦ Lights and power if any work is done at night

For *Wet Decon*, you will need all of the above *and*:

- ♦ A field shower or spray bottles (Hudson sprayers)
- ♦ A source of water
- ♦ Hoses
- ♦ Soap (Tide or another soap with trisodium phosphate or TSP)
- ♦ Scrub brushes with long handles
- ♦ Tubs or kiddie pools to catch water
- ♦ Pumps or wet vacuums to pick up water

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## **Fact Sheet #9, continued**

- ♦ A place to store waste water
- ♦ A 2-foot wide squeegee to move water

### **Decon area setup**

The decon line needs to be marked off so that no one wanders in by accident, and it's easy for the entry team to see. You can use bright tape tied to drums at waist height or traffic cones to make the decon line more visible.

*Source: "Guidelines for Decontamination of Fire Fighters...", Supplement 8 in "Hazardous Materials Response Handbook," 2nd edition, National Fire Protection Association, Quincy, MA, 1993.*

# Task 2

- **Try out the step-by-step decon process.**

**N**ow you will see how a decon line is set up and what happens at each step of the process. The instructors will set up the line.

Take the drawing from Fact Sheet #7 with you to the decon line. Divide yourselves among the different areas. An instructor and one or two of you will step through the decon line while the people at that area show the rest of the group what to do. You will get feedback from the instructor as you go.

You will get a chance to decontaminate people dressed out in ppe later in the course.





# Summary

continued

## Decontamination

- ★ Operations-level responders can be assigned to work on the decon line at an emergency. This is the only place you would have to wear full protective equipment (respirators and suits). If the emergency is bad enough for the entry team to use Level A, then the decon team members should be Haz Mat Technicians, not you!
- ★ Decontamination (decon) keeps spilled chemicals from getting tracked outside the spill area. Everyone who goes into the hot zone must go through the decon line when they leave the spill.
- ★ The decon line is built upwind of the release in the area outside the hot zone. This area is called the warm zone. It starts out clean but will become contaminated as the entry team passes through the decon line.
- ★ The decon line has to be set up, and the decon workers ready to go *before* anyone goes into the hot zone. The entry team might need decon right away.
- ★ Dry decon wearing two suits is quick and easy, but not good for higher levels of contamination. You can only use dry decon for workers dressed in level C. Wet decon is more effective, but takes more time, planning, and equipment. Wet methods are used to decon level B, and sometimes level C.
- ★ Decon workers need personal protective equipment, too. A rule of thumb: if workers in the hot zone wear level B, decon workers wear C (at a minimum). Some decon workers closest to the hot zone may need level B if the entry team gets very contaminated.

# Summary

continued

## Decontamination

- \* Taking off your suit can expose you to a lot of chemicals. Take your suit and gloves off inside out. Then remove the facepiece and inner gloves last, to protect the most sensitive areas.
- \* Decon workers decontaminate each other. The decon workers closest to the hot zone get decontaminated first.
- \* In an emergency, the most important decon step is to quickly clean off the suit and outer garments. If needed, get medical help immediately.
- \* Good decon takes lots of planning. The decon team needs brushes, hoses, soap, plastic sheeting, ppe and other supplies ready *before* a spill. **The decon team needs practice to be able to work quickly and safely.**