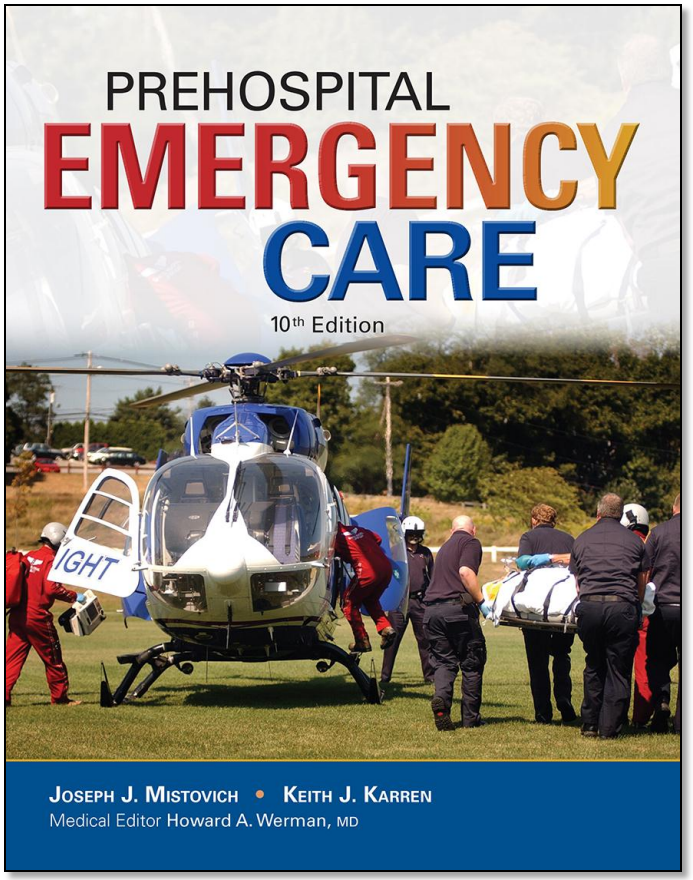
PREHOSPITAL EMERGENCY CARE

TENTH EDITION



CHAPTER 44

Hazardous Materials

Learning Readiness

- EMS Education Standards, text p. 1196

Learning Readiness Objectives

- Please refer to page 1196 of your text to view the objectives for this chapter.

Learning Readiness Key Terms

- Please refer to page 1196 of your text to view the key terms for this chapter.

Setting the Stage

- Overview of Lesson Topics
  - Identifying Hazardous Materials
  - Guidelines for Hazardous Materials Rescue

Case Study Introduction

EMTs Nikki Davis and Randy Brown arrive at the scene of a reported vehicle collision in which a car pulling an enclosed rental trailer overturned. Both the car and the trailer are on their sides.

Case Study Introduction

A police officer on the scene reports that a liquid substance with a strong chemical smell is leaking from the trailer, and he believes it may be related to methamphetamine manufacturing. The driver has fled the scene, but an injured passenger remains in the vehicle.

Case Study

- What initial actions should Nikki and Randy take?
- What information should they report to dispatch regarding the scene?
- What additional resources will be needed to manage this scene?

Introduction

- More than 4 billion tons of hazardous materials are shipped through the U.S. every year.
- Examples include explosives, gases, flammables, corrosives, and radioactive material.
- EMTs must be able to recognize indications of hazardous materials emergencies.

Hazardous materials spills and other accidents are common problems. (© Mark C. Ide)

Identifying Hazardous Materials

- A hazardous material poses a threat or unreasonable risk to life, health, or property if not properly controlled.
- The principle dangers are toxicity, flammability, and reactivity.

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TABLE 44-2 TRACEM: Types of Damage from Hazardous Materials

T	**T**hermal: Heat sources, burning, radiant heat
R	**R**adiological: Nuclear fuels and by-products, nuclear bombs
A	**A**sphyxiation: Lack of O_2 due to chemical vapors, heavy gases
C	**C**hemical: Toxic or corrosive chemicals
E	**E**tiological: Biological hazards
M	**M**echanical: Trauma from bullets, shrapnel, and so on

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Identifying Hazardous Materials

- The U.S. Department of Transportation (DOT) requires vehicles containing hazardous materials to be marked with labels or placards.

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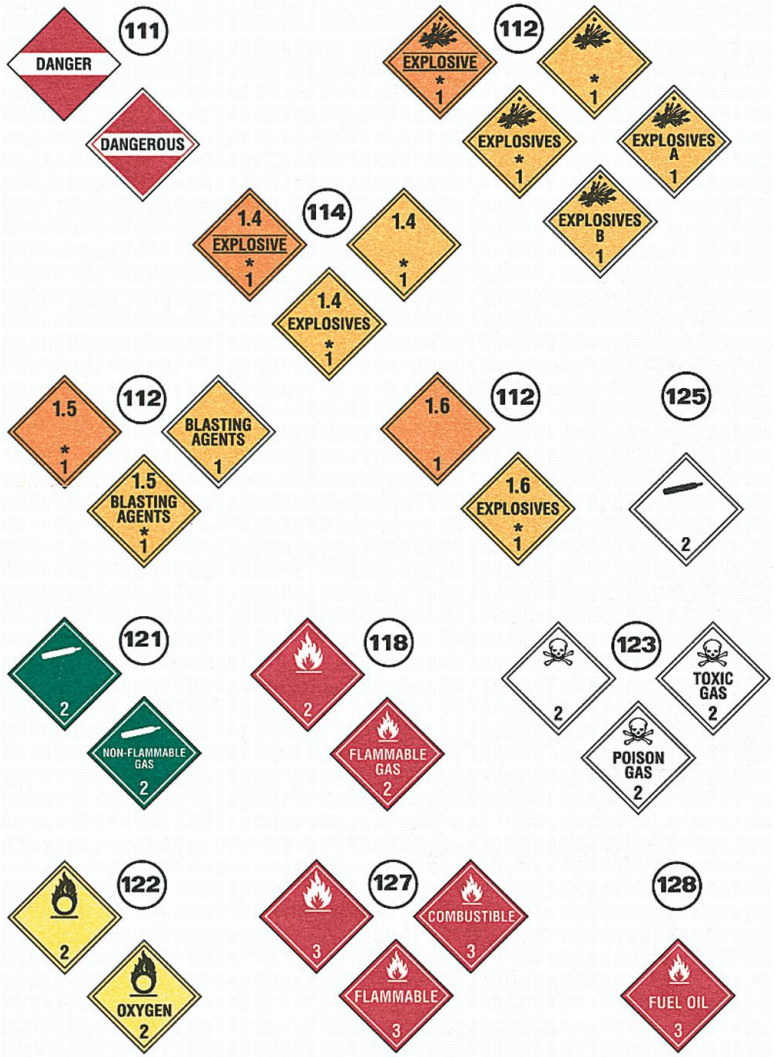
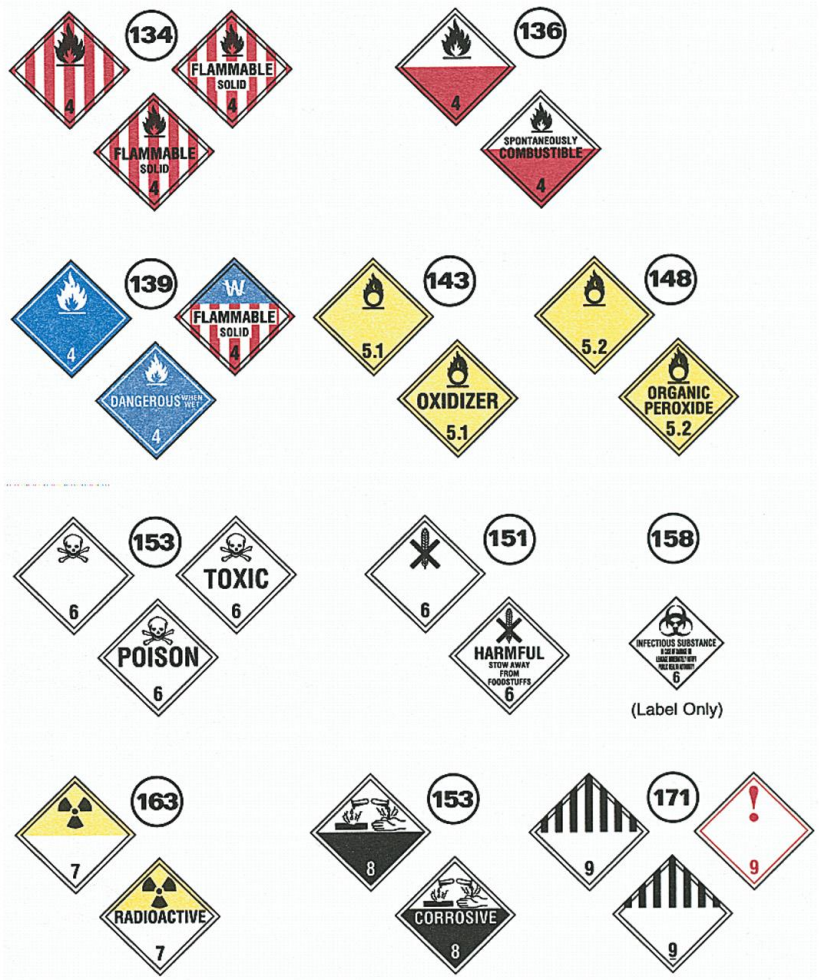
The U.S. Department of Transportation requires packages, storage containers, and vehicles containing hazardous materials to be marked with specific hazard labels.





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Any tank, vehicle, train, or ship that carries hazardous materials must have a placard that identifies the substance.

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Identifying Hazardous Materials

- NFPA 704 system
  - The National Fire Protection Association (NFPA) placard system is used to mark fixed storage containers

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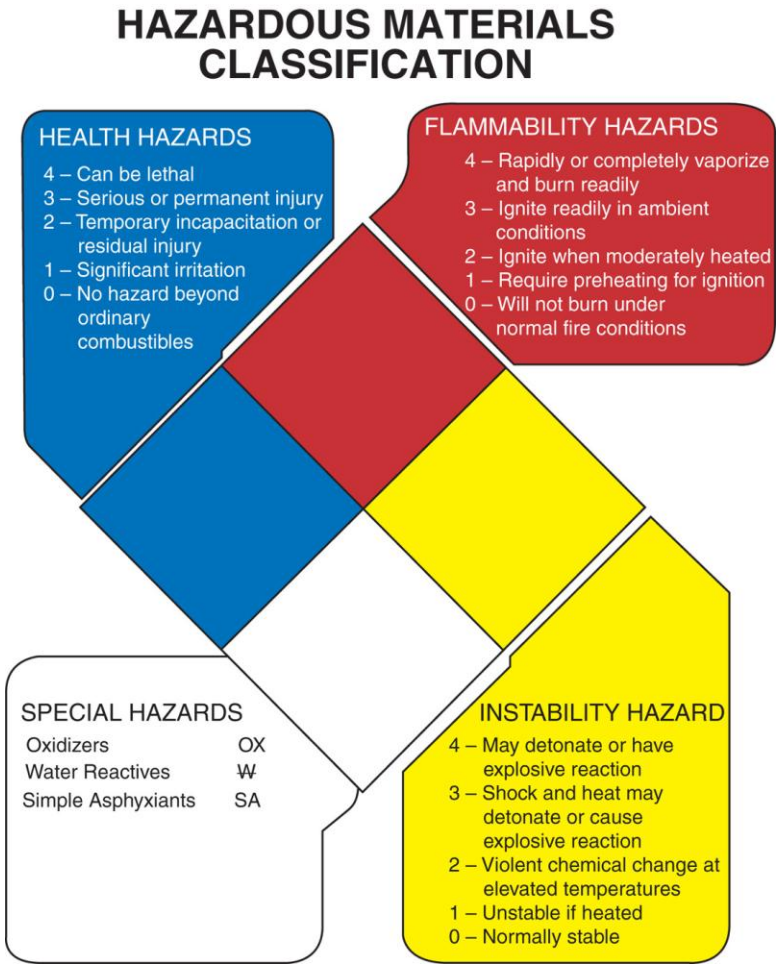
NFPA 704 hazardous materials classification.
(Reprinted with permission from NFPA 704-2012, System for the Identification of the Hazards of Materials for Emergency Response, Copyright © 2011, National Fire Protection Association. This reprinted material is not the complete and official position of the NFPA on the referenced subject, which is represented solely by the standard in its entirety. The classification of any particular material within this system is the sole responsibility of the user and not the NFPA. The NFPA bears no responsibility for any determinations of any values for any particular material classified or represented using this system.)



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NFPA 704 labeling on a tank.

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Identifying Hazardous Materials

- Shipping papers and material safety data sheets (MSDSs) also help identify hazardous materials.

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Identifying Hazardous Materials

- Using your senses
  - Visual clues include:
    - Smoking or self-igniting materials
    - Extraordinary fire conditions
    - Boiling or spattering of materials that have not been heated
    - Wavy or unusually colored vapors over a container of liquid material

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Identifying Hazardous Materials

- Using your senses
  - Visual clues include:
    - Characteristically colored vapor clouds
    - Frost near a container leak
    - Unusual condition of containers

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Look for clues to potential hazardous materials, such as signs.

a

continued on next slide

Look for clues to potential hazardous materials, such as storage tanks.

b

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Identifying Hazardous Materials

- Resources
  - American Chemistry Council
  - Poison control centers
  - USDOT *Emergency Response Guidebook*
  - CHEMTREC
  - Chemtel, Inc.

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Identifying Hazardous Materials

- When contacting a resource, provide the following:
  - Your name, callback number, and fax number
  - Nature and location of product
  - UN identification number or name of product(s)

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Identifying Hazardous Materials

- When contacting a resource, provide the following:
  - Name of carrier, shipper, manufacturer, consignee, and point of origin
  - Type of container and size
  - Quantity of material

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Identifying Hazardous Materials

- When contacting a resource, provide the following:
  - Local weather conditions
  - Number of injuries and/or exposures
  - Emergency services that are present or are responding

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Identifying Hazardous Materials

- Required training
  - The Occupational Safety and Health Administration (OSHA) has regulations that identify four levels of training.

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Identifying Hazardous Materials

- First Responder Awareness
  - For those who are likely to witness or discover a hazardous materials emergency
  - Trained to recognize a problem, call for proper resources, and prevent others from entering the scene
  - This is the level most often required for EMTs.

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Identifying Hazardous Materials

- First Responder Operations
  - For those who initially respond to hazardous materials emergencies
  - Trained to use specialized personal protective equipment and help stop the emergency from spreading

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Identifying Hazardous Materials

- Hazardous Materials Technician
  - Extensive training for rescuers who plug, patch, or stop the release of a hazardous material

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Identifying Hazardous Materials

- Hazardous Materials Specialist
  - Advanced knowledge and skills
  - Provides command and support activities at the site of a hazardous materials emergency

Click on the type of hazard represented by the blue area of an NFPA 704 placard.

A. A specific hazard, such as radiation or oxidation

B. Fire hazard

C. Health hazard

D. Reactivity hazard

Guidelines for Hazardous Materials Rescues

- Never attempt a hazardous materials rescue unless you have the specialized training and equipment.
  - Request help
  - Locate yourself and bystanders uphill, upwind, upstream, and away from the danger.

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Guidelines for Hazardous Materials Rescues

- General rules
  - Avoid contact with any unidentified material, regardless of the level of protection offered by your clothing and equipment.
    - Protect the safety of all rescuers and patients.
    - Provide patient care.
    - Decontaminate clothing, equipment, and the vehicle.

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Guidelines for Hazardous Materials Rescues

- General rules
  - Avoid risking your life or your health if the only threat is to the environment.
  - First responder awareness responsibilities are to recognize, avoid, isolate, and notify.

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TABLE 44-3 RAIN: Awareness-Level Responsibilities at a Hazardous Materials Incident

R	***R**ecognize* that a hazardous materials incident has occurred.
A	***A**void* contact with the hazardous substance.
I	***I**solate* the area.
N	***N**otify* the appropriate authorities or response agencies.

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Guidelines for Hazardous Materials Rescues

- Only those at the operations level or higher should enter the scene, and only with appropriate protection.

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Guidelines for Hazardous Materials Rescues

- Preincident planning is essential and should include:
  - One command officer
  - Clear chain of command
  - Established communication system
  - Predesignated receiving facilities

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Guidelines for Hazardous Materials Rescues

- Implementing the plan
  - Establish the command system and command post
  - Get information as follows:
    - Nature of the problem
    - Identification of the hazardous material or materials involved
    - The type and condition of containers
    - Existing weather conditions

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Guidelines for Hazardous Materials Rescues

- Implementing the plan
  - Get information as follows:
    - Whether there is presence of fire
    - Time that has elapsed since the emergency occurred
    - What has already been done by people at the scene

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Guidelines for Hazardous Materials Rescues

- Implementing the plan
  - Get information as follows:
    - The number of patients
    - The danger of victimizing more people
    - Establishing safety zones

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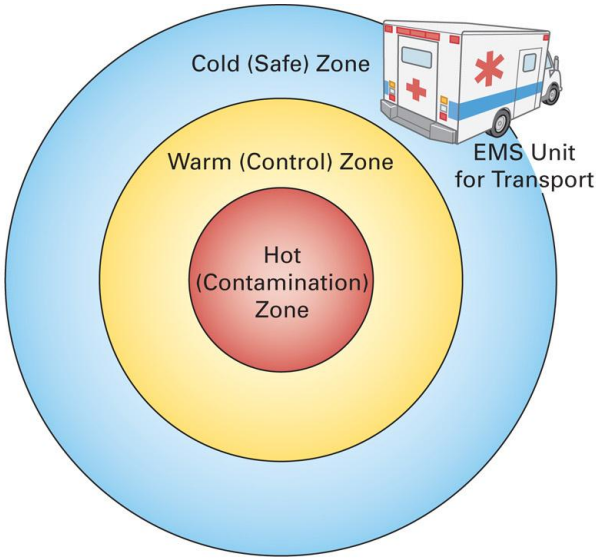
Establishing safety control zones at the site of a hazardous materials emergency.



Hot (Contamination) Zone

Contamination is actually present.
Personnel must wear appropriate protective gear.
Number of rescuers limited to those absolutely necessary.
Bystanders never allowed.

Warm (Control) Zone

Area surrounding the contamination zone.
Vital to preventing spread of contamination.
Personnel must wear appropriate protective gear.
Lifesaving emergency care is performed.

Cold (Safe) Zone

Normal triage, stabilization, and treatment performed.
Rescuers must shed contaminated gear before entering the cold zone.

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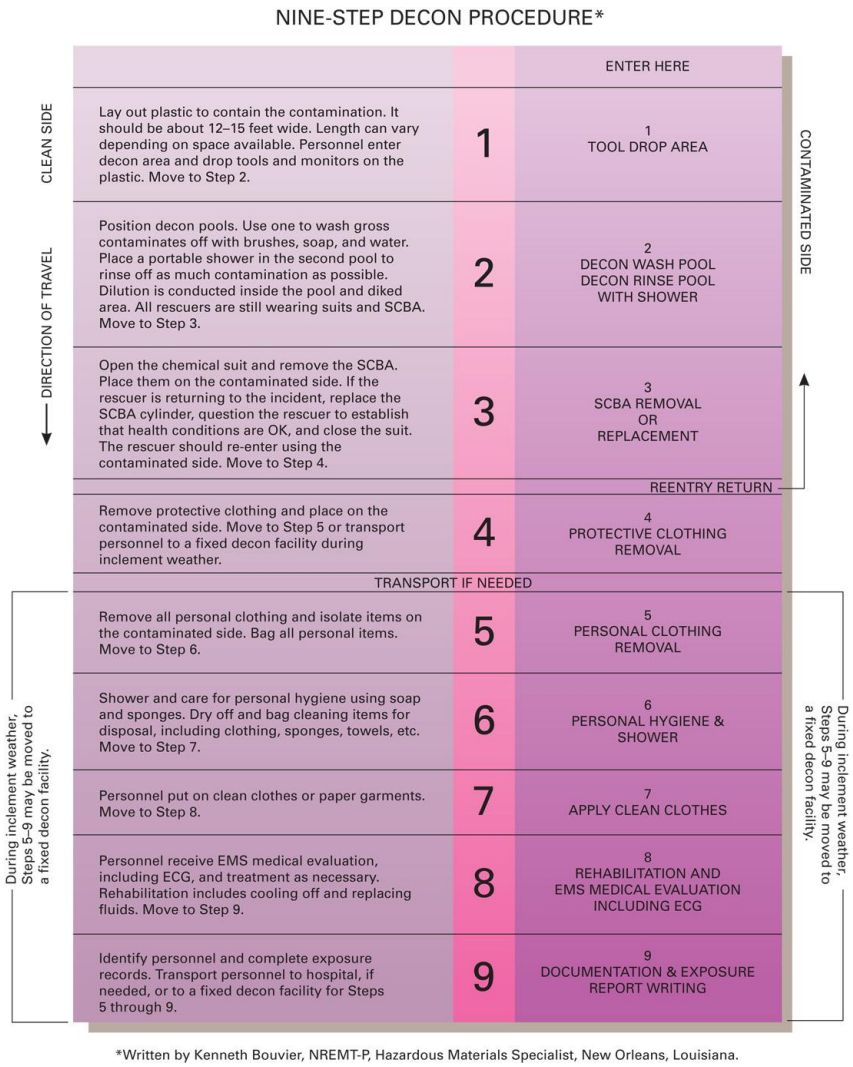
Nine-step decontamination procedure.



*Written by Kenneth Bouvier, NREMT-P, Hazardous Materials Specialist, New Orleans, Louisiana.

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Guidelines for Hazardous Materials Rescues

- Emergency procedures
  - Anyone in the warm and hot zones must have proper protective equipment.
  - Gross decontamination is performed at the entry to the warm zone.
  - Primary assessment is performed in the warm zone.

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Guidelines for Hazardous Materials Rescues

- Emergency procedures
  - Once life threats are addressed, complete decontamination is performed.
  - The patient is assessed and major injuries are treated in the warm zone.
  - All protective equipment is removed before entering the cold zone.

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Guidelines for Hazardous Materials Rescues

- Emergency procedures
  - In the cold zone, take vital signs and prepare the patient for transport.
  - Protect the ambulance and equipment from contamination.
  - Complete decontamination is required prior to air medical transport.

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Guidelines for Hazardous Materials Rescues

- Emergency procedures
  - Any rescuers who are exposed must be decontaminated with soap and copious amounts of water.
  - Report exposures and obtain a medical examination.
  - Equipment and vehicles also must be decontaminated.

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Testing hazard levels at a spill.

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Rescuer in decontamination process.

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Guidelines for Hazardous Materials Rescues

- Radiation emergencies
  - Exposure
    - The patient is in the presence of radioactive material without any of it touching his clothing or body.
    - The exposure may be harmful to the patient.
    - The patient does not become radioactive.

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Guidelines for Hazardous Materials Rescues

- Radiation emergencies
  - Contamination
    - The patient has direct contact with the source of radioactivity.
    - The radioactive material is present on the patient's clothes or skin.
    - The patient is a risk to emergency personnel.

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Guidelines for Hazardous Materials Rescues

- Guidelines for radiation emergencies
  - Protect yourself and others from contamination.
  - Do not attempt to decontaminate a radiation patient.

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Guidelines for Hazardous Materials Rescues

- If possible, wait for a radiation safety officer (RSO).
- If an RSO cannot come to the site:
  - Place the patient in a body bag up to the neck.
  - Cover the hair with a cap or towel.
  - Wipe the face with disposable wipes and place them in a plastic bag for disposal at the hospital.

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Guidelines for Hazardous Materials Rescues

- Time, distance, and shielding are critical in reducing exposure in radiation emergencies.
- Priorities
  - Safety of rescuers and patients
  - Patient care
  - Decontamination

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Guidelines for Hazardous Materials Rescues

- Problems caused by radiation
  - Radiation sickness
    - Caused by exposure to large amounts of radiation
    - Onset begins in hours to weeks
    - Signs and symptoms include nausea, vomiting, hemorrhage, loss of appetite, fever, sores, immune system suppression.

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Guidelines for Hazardous Materials Rescues

- Problems caused by radiation
  - Radiation injury
    - Local injury caused by exposure to less-penetrating particles
    - Signs and symptoms include hair loss, burns, and generalized skin lesions.

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Guidelines for Hazardous Materials Rescues

- Problems caused by radiation
  - Radiation poisoning
    - The patient is exposed to large amounts of radiation internally
    - Problems include cancer and amnesia.

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Guidelines for Hazardous Materials Rescues

- Factors that determine radiation exposure
  - Amount and type of shielding used
  - Strength of radiation source
  - Distance from radiation source
  - Type of radiation
  - Length of exposure
  - Amount of body exposed

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Guidelines for Hazardous Materials Rescues

- Terrorist attacks involving weapons of mass destruction (WMD)
  - May use nuclear devices, biological agents, or chemicals

Case Study Conclusion

Nikki and Randy ensure they are parked uphill, upwind of the trailer as they await the hazardous materials team. Law enforcement closes off all traffic in the area of the collision.

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Case Study Conclusion

Properly outfitted hazardous materials personnel determine that the patient has not had direct contact with the leaking material, but was exposed to fumes. They decontaminate the patient and deliver him to Nikki and Randy, who are waiting in the cold zone.

Hazardous materials personnel contain the leak and prepare to clean up the site.

Lesson Summary

- Emergency care involves medical, legal, and ethical issues.
- Scope of practice identifies what care can legally be performed.
- Standard of care identifies the accepted level of care.

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Lesson Summary

- EMTs have a duty to act.
- Medical direction is required for medical oversight of an EMS system.
- Consent applies in all patient care situations.
- A competent adult can refuse care.