

Explosives and Hazardous Materials Emergencies

BLET: 26

TITLE: EXPLOSIVES AND HAZARDOUS MATERIALS EMERGENCIES

Lesson Purpose: To prepare the student to recognize and assist in potentially dangerous situations.

Training Objectives: At the end of this block of instruction, the student will be able to achieve the following objectives in accordance with information presented during the instructional period:

1. Explain the procedures used by law enforcement officers in responding to reports of bomb threats and suspicious objects.
2. During a practical exercise, demonstrate the ability to search buildings and property to locate explosive devices and materials.
3. Recognize explosive and incendiary devices.
4. Describe the procedures used in examining and/or detecting suspicious or potentially dangerous objects (i.e., suspicious packages, downed high-tension wires, unusual odors).
5. Describe the procedures to be followed when responding to an incident involving an explosion.
6. Demonstrate the ability to use a fire extinguisher and extinguish fires by completing a practical exercise.
7. Recognize and explain placards and sign shapes that indicate hazardous materials on vehicles.
8. Describe the procedures used to operate a patrol vehicle while escorting hazardous materials.
9. Recognize, identify, and classify hazardous materials.
10. Observe, approach, and evaluate a hazardous materials incident.
11. Describe the role of the awareness level first responder on the scene of a hazardous materials incident.

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12. Demonstrate the ability to respond to environmental crime and make an appropriate referral.

Hours: Twelve (12)

Instructional Method: Conference/Practical Exercise

Materials Required: Lesson Outline
Pen/Pencil/Paper
2000 Emergency Response Guidebook. Neenah, WI:
J.J. Keller & Assoc., Inc.

Training Aids: VCR

Monitor
Overhead Projector
Screen
Slide Projector
Slides: Improvised Explosive Devices
Videos:
1. Fire Extinguishers-The First Responder, MTI (1984)
2. Dick and Harry: Rest in Pieces, Niagara Regional Police Video Unit (1996)
3. First Response to Explosives, Bureau of ATF and IACP (1992)
4. Suspicious Packages, AIMS Multimedia (1992)

References: Bomb Threats and Physical Security Planning. Washington, DC: Department of the Treasury, ATF P 7550.2, 7/87.

Bomb Summary - 1993. Washington, DC: U.S. Department of Justice, 1994.

2000 Emergency Response Guidebook. Neenah, WI: J.J. Keller & Assoc., Inc., 2000.

Explosives Incident Report - 1993. Washington, DC: Department of the Treasury, ATF P 3320.4, 7/94.

Hazardous Materials Training for First Responders. Washington, DC: International Association of Fire Fighters, 1990.

Transportation of Hazardous Materials; Driving and Parking Rules. 49 C.F.R. Part 397, 1996.

Explosives and Hazardous Materials Emergencies

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INSTRUCTOR NOTES

1. Arrangements need to be made to have a building for students to practice the bomb search procedures covered in class.
2. A dry chemical extinguisher should be furnished for each student so all class members get an opportunity to extinguish a fire. The fire should be set to check the student's response to different hazards. The instructor should ensure that all safety precautions have been taken before setting the various types of fires involved in the exercise. In this exercise the instructor will ignite fires using the various types of combustibles outlined in the lesson plan.
3. The instructor will be required to use 2000 Emergency Response Guidebook and familiarize the student with how it is used. This book can be purchased by each student along with other course materials. An in-class quiz should be given on the use of the guidebook (see instructor's handout, "Hazmat Materials Identification Exercise").
4. The practical exercises are important in this block for both bomb searches and fires. Though each exercise is suggested to coincide in the lesson plan with the instructor's lecture, practicality may dictate the exercises to be conducted at the conclusion of the class.
5. The videos should be shown near the end of the portion of the lecture dealing with bomb search procedures. The instructor should review each prior to showing to ensure that there are no inconsistencies with policies in the instructor's geographical area.
6. The section **Hazardous Material Responses** is provided to address the federal mandate prescribed in North Carolina Administrative Code 7C.0101(a)(26), requiring instruction for **first responders** at the **awareness level**. Instructors should have attended one of any number of courses offered in this area.

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I. Introduction

A. Opening Statement

NOTE: Reveal opening slide AExplosives and Hazardous Materials Emergencies.@

Law enforcement officers must respond to many potentially dangerous situations without knowing the exact nature of the problem or what to expect. The officer, acting on the assumption that he/she is expected to take some action, may take some action or fail to take some action that is ill advised or even dangerous to himself/herself and/or the general public. In many instances, the appropriate action of the officer is his/her presence at the scene and the reporting of the incident.

By utilizing the guidelines presented in this block of instruction, the officer will understand his/her obligations and limitations in responding to potentially hazardous situations and be able to possibly reduce the hazard and minimize the risk to the public.

B. Training Objectives

NOTE: Click on right arrow to reveal ATraining Objectives.@ Continue to click on right arrow to review each.

C. Reasons

Consistent with the law enforcement officer's mission of protecting life and property, his/her responsibility is magnified when responding to situations involving explosives or hazardous materials. With this in mind the officer should be aware of these hazards and know what action should and should not be undertaken.

II. Body

A. Responding to Bomb Threats and Suspicious Objects

NOTE: Click on right arrow to reveal AResponding to Bomb Threats and Suspicious Objects.@

1. The officer should proceed to the location as rapidly as is prudent, in accordance with departmental policy and state law.
2. All communications regarding bomb threats, bombs, or suspected bombs should be done by landline telephone whenever possible. There should be no radio transmissions in the area. This includes, but is not limited to,

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portable radios, mobile radio telephones, radar, and MDT or television transmissions.

3. Upon arrival, contact the **person in charge**. Do not be delayed discussing the nature of your business with receptionists, secretaries, etc. Politely and courteously insist on talking to the person in charge immediately.
4. Upon contact with person in charge, determine their opinion regarding the seriousness of the bomb threat. Also determine whether or not a search has been initiated and, if so, who is conducting the search. **Remember, you are there in an advisory capacity and all decisions regarding the safety of the property and employees must be made by the person in charge.**
 - a. If circumstances warrant, you should advise the person in charge to consider the necessity of evacuation.
 - b. If the person in charge decides to evacuate and seeks your advice, you should advise them to remove all unauthorized and unnecessary personnel a minimum of 300 feet from the building.
 - c. If a suspicious package is found, the evacuation zone should be increased, depending upon the size of the package, the availability of cover and physical protection, location, and other nearby hazards such as fuel and chemical storage. Traffic should be diverted around the evacuation zone.
5. If a search has been started but not yet completed, advise the person in charge that you will stand by until a search has been completed and provide advice, as needed, regarding the ongoing search.
6. If a search has been started prior to your arrival, suggest that this be done immediately. Again, advise the person in charge that conducting the search of the premises is his/her responsibility and that the officer will not actively participate in the search operation unless required to by the circumstances. If required, the officers will advise the person in charge and search personnel as to appropriate search procedures. (See Section B of this outline)
 - a. Alert the supervisory and custodial personnel to assist in directing the search.
 - b. Deploy the searchers in a manner to cover the exterior and interior of the premises as soon as possible.
 - c. A central location or command post should be established. This is where the person in charge, the custodial personnel, appropriate supervisory personnel (if necessary), and the responding officer

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should be located. The command post or central location should have a telephone. The search teams should be aware of this location and the telephone number.

- d. If the threat indicated the location of the bomb, that location should be investigated first by the designated searcher.
- e. If no location was indicated, it is suggested that the general areas to be searched proceed with the following priorities:

NOTE: Click on right arrow to reveal ABuilding Searches.®

- (1) The building exterior
- (2) Public access areas, i.e., lobbies, restrooms, etc.
- (3) Stairwells
- (4) Engineering spaces, including janitor's closets and lockers
- (5) Areas normally occupied on a continuing basis by employees are the least likely and should be the areas searched

- 7. If a search has been completed when you arrive--with negative results--seek out the person who received the threat and conduct a complete investigation. Try to determine:
 - a. The exact time of the call
 - b. The exact words of the caller
 - c. The caller's voice characteristics
 - d. Was the voice familiar?
 - e. Were there any background noises?
 - f. The name of the person receiving the call
 - g. The receiver's telephone number
 - h. Date of the call
- 8. It is best if those familiar with the premises conduct the search.

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9. If a suspicious package or an item that is out of the ordinary is located, expert assistance should be obtained by notifying and dispatching the **ABomb Squad** to the scene. Agencies that may be called for such assistance are:
 - a. Local Bomb Technicians, if available.
 - b. State Bureau of Investigation (SBI)
 - c. Explosives Ordnance Detachment (military)

NOTE: Click on right arrow to reveal ASBI and Army Disposal Units. Distribute handout and give telephone numbers for Division of Emergency Management in classes in counties represented in the class.

B. Search Procedures

While it may not be appropriate for an officer to take an active part in most bomb threat searches, **every officer should be aware of methods of conducting an effective search operation.**

1. Building search

NOTE: Click on right arrow to reveal below text.

- a. Search operations should start at the exterior and work toward the interior.
- b. Once on the inside, searching operations start from the lowest level and work up.
- c. The interior search should begin with those areas most accessible to the public and areas containing service equipment (i.e., air conditioners, etc).

NOTE: Click on right arrow to reveal below text.

- d. Consideration should be given to marking those areas already searched to avoid duplication.
- e. When searching use caution. Any property moved should be done with extreme caution.

NOTE: Click on right arrow to reveal below text.

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- f. Whenever your suspicions regarding a package are aroused, do not hesitate to obtain the assistance of the bomb squad personnel.
- g. Once an item is found, continue searching for additional items until the entire building has been thoroughly searched.

NOTE: Click on right arrow to reveal below text.

- h. If a reported time of detonation is given, all unauthorized personnel (with exception of bomb squad personnel) will evacuate the area a minimum of 15 minutes prior to the reported time.
- i. Any officer assisting in or conducting a search in which no item was found **should not declare the area safe. He should only state that nothing was found.**

NOTE: Click on right arrow to reveal below text.

- j. **Finally, if an item (suspect package) is found, remember, don't touch it. Notify the bomb squad personnel.**

NOTE: Click on right arrow to reveal ADon't Touch Anything Suspicious.@

2. Vehicle search

- a. If a search of a motor vehicle for a bomb or explosive is necessary, the officer or untrained persons should not attempt this operation.
- b. Leave the vehicle alone and request that bomb squad personnel make the search.
- c. Establish a perimeter surrounding the vehicle.

3. Examining suspicious and potentially dangerous objects

NOTE: Click on right arrow to reveal ALetter and Package Bomb Indicators.@

- a. The officer should always be aware of the hazards involved when examining a suspicious package.
- b. Don't move it or touch it.
- c. Don't turn lights on or off in the area.

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- d. Note the particulars about the item, i.e., size, shape, color, unusual writing or numbers, and exactly where it is sitting.

NOTE: At this time a practical exercise is conducted allowing the students to demonstrate response and search procedures for bomb threat in a building.

C. Recognition of Explosive Devices

1. Definitions

Explosion - The sudden and rapid escape of gases from a confined space, accompanied by high temperatures, violent shock, and loud noise.

a. Types of explosions

(1) Mechanical explosions

Examples: pressure cooker, steam boiler

(2) Chemical explosion - The extremely rapid conversion of a solid or liquid explosive compound into gases having a much greater volume than substances from which they are generated.

THIS IS THE MOST LIKELY TYPE OF EXPLOSION TO BE ENCOUNTERED BY LAW ENFORCEMENT PERSONNEL.

(3) Atomic explosion - Induced by either fission, the splitting of the nucleus of atoms, or fusion, the joining together under great force the nuclei atoms. Nuclear fission or fusion occurs only in extremely dense or heavy elements which are atomically unstable or radioactive. When fission or fusion occurs, a tremendous release of energy, heat, gas, and shock takes place.

b. The nature of chemical explosions

- (1) An explosion is merely a rapid form of combustion. Ordinary combustion is simply a slow form of explosion. **The speed of the burning action constitutes the difference between combustion, explosion and detonation.**

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- (2) Low explosives (explosives mixtures which are blended **Amechanically**) - Their detonation velocity rate is below 3,280 feet per second. (Black powder rate is 1,312 f.p.s.)

EXAMPLES: Black powder, smokeless powder, etc.

- (3) High explosive - explosive compound that is chemically bonded at a molecular level as opposed to mechanically blended. A bonding occurs between the substances when they are chemically combined.

EXAMPLE: Nitroglycerin - the glycerin is poured slowly into nitric acid forming a new compound whose elements are the **closest possible union**.

High explosives burn or detonate at a rate of above 3,280 f.p.s. (Dynamite-about 9,000 f.p.s.; RDX - 27,500 f.p.s.)

2. Destructive devices

a. Explosive devices

- (1) Instructions on how to manufacture explosive devices are readily available on the Internet and books in print.
- (2) Commercial explosives are also readily available. There are stringent federal controls at the dealer and manufacturer levels with regard to storage.
- (3) Some of the most common high explosives are commercial dynamite and trinitrotoluene (TNT). These explosives have a variety of legitimate uses. Problems arise with poor storage by legitimate purchasers. There are a significant number of thefts each year.
- (4) Initiating devices - electric and nonelectric
- (5) Pipe bombs - 70% of all bombs in the U.S. are black powder pipe bombs.
 - (a) Materials are easily available. Black powder and a variety of ignition devices are available.
 - (b) Easy to transport and conceal.
- (6) Other types of containers with a variety of ignition devices can be used with low or high explosives.

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- (7) Booby traps - Explosive devices designed to be detonated by unsuspecting victims.
- b. Incendiary devices - fire bombs
 - (1) May be difficult to spot. They can be ordinary materials found in every household and have very legitimate uses.
 - (2) Incendiary devices can be made from the simplest combustibles.
 - (a) Tissue paper and match
 - (b) Road flare and rocket model fuse
 - (c) Sugar and potassium chlorate in a cigarette pack
 - (d) Match heads with sulfuric acid
 - (e) Candle in oil
 - (f) Bottle of gasoline and firecracker
 - (3) Incendiary devices made with a gel or Anapalm.[®]
 - (a) Can use simple soap flakes mixed with gasoline.
 - (b) Must attach some ignition device.
 - (c) Gel or Anapalm[®] will stick to any surface and burn with an intense flame for a long period of time.

NOTE: Show NCJA video, Dick and Harry: Rest in Pieces (6.5 minutes) and Suspicious Packages (8 minutes).

D. Responding to Downed Wires and Other Hazards

NOTE: Click on right arrow to reveal Downed Wires and Other Hazards.

Again, the officer should proceed to the location as rapidly as prudent, in accordance with departmental policy and state law.

- a. Ascertain the location of the hazard prior to arrival.
- b. Park your vehicle a safe distance from the hazard while you investigate.

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- c. After determining that a hazard exists, notify the proper authority (power company, gas company, etc.) and stand by until the hazard can be neutralized.

NOTE: Click on right arrow to reveal below text.

- d. You may need to block the area off until it can be made safe.
- e. Finally, do not touch or allow untrained persons to touch downed lines.

NOTE: Refer students to procedures outlined in the Emergency Response Handbook.

E. Unusual Odors

Be alert for any unusual odors in the area--that is, unfamiliar odors that do not seem appropriate for the environment. A safe rule of thumb to follow is that if you can smell it, you are too close.

F. First Responder - Post-Blast Incident

NOTE: Click on right arrow to reveal Initial Responses.®

1. Primary duties are to establish order, protect life, and preserve the evidence.
2. Assess the situation.
 - a. Provide first aid to the injured and/or make sure they get the aid needed.
 - b. Get additional help if needed.
3. Crowd control - the situation can be dangerous to the curious.
 - a. There is the possibility of secondary and/or unexploded devices.
 - b. Crowds can trample or carry away pieces of evidence.
4. Secure a wide area around the explosion site.
 - a. Sometimes evidence is blown hundreds of yards away.
 - b. Extend the perimeter well beyond the immediate area.
5. Take charge and keep all nonessential personnel away from the scene.

Control the scene until the investigating team arrives.

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NOTE: Click on right arrow to reveal below text.

6. Check for secondary devices
 - a. Just because there has been a detonation, it does not mean there cannot be additional devices.
 - b. Check nearby vehicles and property as well as the remaining parts of the original search area.
 - c. **If you discover another suspicious looking object, do not attempt to pick up the object. Clear the area and notify the appropriate personnel.**

7. Try to disturb the scene as little as possible.

Whether dousing the fire or tending the victim, vital evidence may be underfoot.

8. Secondary duties
 - a. In identifying witnesses, include:
 - (1) A list of who saw what around the time of the bombing. Include their phone number and address.
 - (2) A description of suspicious individuals or vehicles in the area before or after the explosion.
 - b. Note the license plates of vehicles passing through or lingering in the area after the explosion. (Suspects often like to return to see the results of their work.)
 - c. Witnesses should be questioned about the nature of the blast itself (presence and color of smoke, etc.).

NOTE: Show video First Response to Explosives (21 minutes).

- G. Using Fire Extinguishers

The use of portable fire extinguishing equipment must be left to the judgment of a trained operator. The extinguisher should be relied upon only to the extent of their intended use, and when the limit has been reached, larger fire extinguishing devices and equipment should be provided to extinguish the fire.

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Unless absolutely necessary, law enforcement personnel should not try to fight the fire if it is already spreading beyond its original area, or if the officer is not sure how to put out the fire. Call the fire department first.

NOTE: Show fire extinguishers.

NOTE: Click on right arrow to reveal APressurized Dry Chemical Extinguisher.@

1. Determining the potential of a fire extinguisher
 - a. Every fire extinguisher has a label which explains its capabilities. The label should be read before using the extinguishers.
 - b. The numbers and letters on the extinguishers denote what kind of fire it is effective on, and how effective it should be.

NOTE: Example 2 A 10 B C.

2. Fire classes defined

NOTE: Click on right arrow to reveal AFire Symbols.@

NOTE: Click on right arrow to reveal AFire Classes.@

- a. Class A: ordinary combustible materials
 - b. Class B: flammable liquids
 - c. Energized electrical equipment
 - d. Class D: combustible metals
3. The officer should be familiar with the fire extinguisher(s) carried in his/her vehicle. Do not attempt to activate the extinguisher until close enough to the fire to be within the reach of the stream of that particular extinguishing agent. The following general instructions apply to most portable fire extinguishers.
 - a. Pull the pin at the top of the extinguisher which keeps the handle from being pressed. Break the plastic or thin wire inspection band.
 - b. Point the nozzle or outlet toward the fire. If the hose assembly is clipped to the extinguisher body, release it and point.
 - c. Press the handle above the carrying handle to discharge the agent inside. The handle can be released to stop the discharge at any time.

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- d. Sweep the nozzle back and forth before the flames to spread out the extinguishing agent. Apply it toward the base of the flames. After the fire is out, probe for remaining reflash of flammable liquids. Make sure the fire is out.

NOTE: Show video Fire Extinguishers: The First Responder (12 minutes).

NOTE: Demonstrate how to use fire extinguishers then allow students to use the extinguishers on a fire.

4. Responding to fires and other public safety and/or health hazards
 - a. Your designated duties when responding to fires will be determined by whether or not your agency requires you to help fight the fire. If you will be actively engaged in fighting the fire, you should respond directly to the scene. If you are not required to fight fire, you should respond to the location designated by your department (i.e., for directing traffic).
 - b. When responding to other public safety and/or health hazards:
 - (1) Park your vehicle upwind of the incident, if possible.
 - (2) Move and keep people away from the incident scene.
 - (3) Do not walk into or touch any spilled materials.
 - (4) Avoid inhalation of all gases, fumes, and smoke even if no hazardous material is involved.
 - (5) Do not assume that gases or vapors are harmless because of a lack of odor.
 - (6) If more than one person is involved in an emergency response action, it is important that an on-scene leader be designated and that you know who is in charge of handling the incident.
 - (7) Contact the appropriate agency for handling the hazard.
5. The officer should be able to recognize the hazardous materials warning placards which appear on vehicles transporting such materials.

NOTE: Again, provide the students with the names of emergency coordinators in the area.

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NOTE: Refer to DOT handbook.

H. Hazardous Materials Responses

1. History

History of hazardous materials response in the United States and North Carolina:

a. United States - hazardous materials generated

- (1) Currently there are over 30,000 different hazardous materials in the United States, with new chemicals being produced every year.
- (2) According to EPA, 408 of these chemicals are extremely toxic.
- (3) Fifty million tons of hazardous waste are generated annually.
- (4) One and a half billion tons of hazardous materials are transported throughout the nation annually.

b. North Carolina - hazardous materials generated

- (1) It is estimated that two million tons of hazardous materials enter N.C. annually.
- (2) North Carolina ranks seventh in the United States in total tonnage, around 22 million tons.

NOTE: Click on right arrow to reveal AN.C. Major Hazardous Waste Facilities.@

c. Hazardous materials response incidents - International/United States

NOTE: Click on right arrow to reveal below text.

- (1) Texas City, Texas - October 30, 1987

Fifty thousand pounds of hydrofluoric acid escaped from a ruptured tank. The cloud of toxic gas rolled at least 1.5 miles north west of the plant, causing the evacuation of some 4,000 residents. More than 1,000 people received hospital treatment.

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- (2) Study of acid fumes to gauge long term effects.
Waverly, Tennessee - 1978

A devastating railway incident occurs when a single tank car carrying 27,871 gallons of liquefied petroleum gas ruptures. An immense explosion follows, killing five immediately, eleven more as a result of injuries. Scores were severely burned.

- (3) Bhopal, India

d. Hazardous materials response incidents - North Carolina

- (1) Marshville
- (2) Rockingham
- (3) Other locales

2. Escorting explosives and hazardous materials

NOTE: Click on right arrow to reveal [Escorting Explosives and Hazardous Materials](#).

a. Compliance with laws and regulations

- (1) Every state must be in compliance with the federal standards for transporting explosives and hazardous materials.
- (2) In addition, every vehicle transporting explosives and hazardous materials must be in compliance with the laws, ordinances, and regulations of the jurisdiction(s) through which it is being operated unless the laws, ordinances, and regulations impose standards which are less stringent than U.S. Department of Transportation regulations. Each carrier is required to furnish each driver with a copy of the U.S. Department of Transportation Regulations.
- (3) The vehicle must be attended at all times except with regard to where certain conditions exist as described in the U.S. Department of Transportation Regulations.
- (4) The vehicle must observe the parking restrictions set forth in the U.S. Department of Transportation Regulations.

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- b. Routing - Non-Radioactive Hazardous Materials (NHRM)
 - (1) The carrier must comply with NHRM routing designations of the state. **Check with North Carolina Department of Motor Vehicles.**
 - (2) The vehicles must be placarded or marked in accordance with U.S. Department of Transportation Regulations.
 - (3) Vehicles carrying explosives or hazardous materials which **are not** subject to a NHRM routing designation should operate the vehicle over routes which do not go through or near:
 - (a) Heavily populated areas
 - (b) Places where crowds are assembled
 - (c) Tunnels
 - (d) Narrow streets or alleys
 - (4) Except where the motor carrier determines:
 - (a) There is no practicable alternative.
 - (b) A reasonable deviation is necessary to reach terminal points of loading and unloading facilities, facilities for food, fuel, repairs, rest, or a safe haven.
 - (c) A reasonable deviation is required by emergency conditions.
 - (5) **Operating convenience is not a basis for determining whether it is practicable to operate a motor vehicle in accordance with the U.S. Department of Transportation Regulations.**
- c. The escorting of all explosive and hazardous materials should be coordinated with the North Carolina Highway Patrol and the North Carolina Department of Motor Vehicles Law Enforcement Division.
- d. The types of explosives or hazardous materials should be considered when determining whether or not to use blue light and/or other emergency warning equipment (example:

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nitroglycerine). It may be better not to use such equipment in order to avoid attracting attention to the shipment.

- e. Officials may wish to consider keeping the knowledge of such shipments and the routing of such shipments on a **need to know** basis to avoid unnecessary alarm in the community.

3. Recognition, identification, and classification

- a. Definition of **hazardous materials**: Any substance or material in any form or quantity which poses an unreasonable risk to safety and health and property.

NOTE: Click on right arrow to reveal AHAZ MAT Definitions.

NOTE: Present the student with the concept that many different chemicals or substances can be hazardous or cause a hazardous materials incident.

- b. Risk assessment

First Responders must develop the habit of looking for clues signaling the presence of hazardous materials, then using resources to further identify the specific hazard involved. There are some basic clues that can assist in detecting hazardous materials.

(1) Occupancy/Location

The occupancy and location of the site can provide valuable clues. If the processes, materials used, and products manufactured at a particular site are known, First Responders can take more accurate precautions.

(2) Your senses

- (a) Smell - If you can smell it, you are too close

Olfactory Fatigue - The nose becomes saturated with a product and you think the product is gone; however, it still may be present and you are not able to smell it due to olfactory fatigue.

- (b) Skin, nose, eye irritation

- (c) Sight - vapor clouds, color of smoke

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- (3) Container shapes

NOTE: Click on right arrow to reveal Containers Shapes.

- (a) Cargo trucks

- (b) Tank trucks

Gasoline petroleum tanks
Corrosive liquid carriers
Propane tankers
Cryogenic carriers
Dry bulk

- (c) Railcars tanks

Pressurized
Non-pressurized
Bulk carriers

- (d) Other containers

Drums
Cylinders
Tote tanks
Glass containers
Small packages

- (4) Markings and color (may indicate chemical class, example: green - nonflammable gas; not always consistent)

- (5) Placards, labels, and markings

NOTE: Click on right arrow to reveal Placards and Labels.

Placards, labels, and markings provide information on the type and hazards of products being transported or stored. There are a number of placarding systems required or strongly recommended for hazardous materials. Those most commonly encountered by law enforcement are:

- (a) DOT System

The U.S. Department of Transportation regulates not only the packaging and vehicles used in

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transporting hazardous materials, but also the types of labels and placards that must be attached to both containers and vehicles. Regulations are specific regarding what is classified as hazardous material and under what circumstances these materials should be placarded during transportation.

Familiarity with the DOT system is essential because the placards and labels provide the initial and most valuable clue as to the type of hazardous material within the containers. The presence of a placard indicates that a dangerous substance is present; the information on the placard indicates the type of hazard.

However, some classes of materials require that a placard be displayed no matter what quantity is carried. These classes are:

- Explosives A
- Explosives B
- Poison Gas
- Flammable Solids (water-reactive)
- Radioactive Materials

DOT labels are not always required, but when called for, they are generally affixed to two sides of the package. When only one label is required, it must be affixed on or near the closure of the package. If more than two different labels are required, they must be positioned next to one another. Labels must be affixed near the shipping name of the material. Labels are four inches on each side.

The DOT placarding system is not flawless. In addition to the fact that smaller quantities of some materials in non-bulk containers may not need to be placarded, there are other problems associated with the DOT system. For example:

- ' Placards and labels may not be accurate.

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- ' There may be confusion about placarding mixed loads.
- ' Secondary hazards may not be identified by placards.
- ' The degree or severity of the hazard is not conveyed.
- ' The DANGEROUS placard is vague and of little use.
- ' Shippers may not always comply.
- ' Enforcement of the regulations is difficult.

Consequently First Responders should not rely exclusively on placarding (or lack of placarding) as a source of information.

(b) UN Class and Identification Numbers

The United Nations has developed several recommendations for the international transport of hazardous materials. Among these are two systems that provide uniform classification and identification information about hazardous materials shipments.

1) UN Class Numbers

The first system, the use of UN Class Numbers, is not specifically required by U.S. DOT for domestic shipments. However, when UN Identification Numbers are displayed, UN Class Numbers must also be displayed. When used, the UN Class Number appears at the bottom of the shipment's label and/or placard. This is usually a one digit number, although some UN Class Numbers contain decimal points which represent divisions within the class. Each Class Number ranging from 1 to 9 represents a different type of material-- for example: "1" represents "Explosives"

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(explosives material placards more specifically identify categories of explosives [for more detailed information see the Guidebook]); A2" represents A Gases; and so on. While this particular system is helpful in countries that use placards and labels without words on them, this information simply mirrors the information that already appears on U.S. DOT labels and placards.

2) UN Identification Numbers

The other United Nations system for identifying hazardous materials shipments has been adopted by U.S. DOT. This system calls for the use of a UN Identification Number on most bulk shipments of hazardous materials. This four-digit number must be displayed in a white, rectangular box in the center of the appropriate placard, on an orange panel affixed near the placard, or (rarely) in a white, rectangular box on the container. These numbers can be cross-referenced with certain sources, such as 2000 Emergency Response Guidebook, to more accurately identify the contents of the container.

Note: In the U.S. and Canada, hazardous substances which have not yet been assigned a UN Identification Number are given NA (North American) Identification Numbers which serve the same purpose as the UN Identification Numbers.

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Although there are exceptions, placard information is generally presented as follows:

The following pages describe each of the DOT placards and their corresponding labels. Each pair of placards and labels represents a DOT hazard group, or class. Note that there can be differences between the placards and the number or design of the labels for a single hazard.

- (6) Shipping papers/facility documents

NOTE: Stress that shipping papers (or MSDS) are the most important papers in an emergency, because they are chemical specific and identify the owner, manufacturer, and shipper.

All vehicles hauling hazardous materials, as defined by DOT, must have shipping papers that are within easy reach of the vehicle operator. However, shipping papers may not be accessible to First Responders if the vehicle is burning or a hazardous material is involved.

The type of shipping papers varies depending on the mode of transportation.

- (a) Highway transportation

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In highway transportation the shipping paper is in the form of a bill of lading. The driver of the vehicle is responsible for the bill of lading, which must be carried in the cab of the vehicle within the driver's reach while still fastened in a seat belt.

(b) Rail transportation

In rail transportation, two types of shipping papers are used: the waybill and the wheel report. There is a waybill/wheel report for each railcar. There is also a consist, which lists all the railcars and may indicate which railcars are carrying hazardous materials. Rail shipping papers are the responsibility of the conductor or the train engineer.

(c) Air transportation

In air transportation, the shipping paper is the air bill. The air bill is the responsibility of the pilot and must be readily available during flight.

(d) Waterway transportation

The shipping paper used in waterway transportation is called the cargo manifest. The cargo manifest is the responsibility of the captain and must be accessible during shipping.

(e) Facility documents

Facility documents include Material Safety Data Sheets (MSDS) and related reports. MSDSs are usually supplied to the user by the manufacturer of the chemical and contain information on the physical and chemical properties of the material, the physical hazards associated with it, and instructions on how to respond to an incident involving the material.

(7) Driver information

c. Classes of chemical/physical properties

(1) Explosives

(a) DOT classification of explosives

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- 1) FORBIDDEN - All explosives that cannot be transported due to sensitivity and explosive nature.
 - 2) ACCEPTABLE
 - a) Class A explosives - Dynamite, TNT, Nitroglycerin, etc.
 - b) Class B explosives - Black powder, display fireworks, military ammunition, etc.
 - c) Class C explosives - Detonating fuses, small arms ammunition, etc.
 - d) Blasting Agents - Fertilizer, ANFO (Material designed for blasting but considered so insensitive that there is little chance of initiation.)
- (b) Control measures
- 1) Immediately evacuate to 2,100 feet.
 - 2) Secure all ignition sources.
 - 3) Protect from excessive heat, friction, or impact.
 - 4) No radio transmissions within 250 feet.
 - 5) Fire - If there is an exterior fire (not in the cargo).
 - a) Immediate concern - prevent fire from igniting exposed cargo.
 - b) Primary objective - extinguish and stabilize.
 - 6) Fire - Interior (in cargo)

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- a) Immediate concern - withdraw; protect life and property.
 - b) Primary objective - isolate area, deny entry, evacuate.
- (2) Compressed gases
- (a) Three DOT classes
 - 1) Flammable gas - butane, propane, butadiene, etc.
 - 2) Non-flammable gas - chlorine
 - 3) Poison gas - mustard, sarin, etc.
 - (b) Control measures
 - 1) Large containers - isolate immediately. First Responder should never attempt to plug or patch a leak.
 - 2) Protect and evacuate
- (3) Flammable liquids/combustible liquids
- Control measures
- (a) Secure ignition sources
 - (b) Evacuate
 - (c) Dike - environmental damage is almost always a possibility
- (4) Flammable solids
- (a) Flammable metals - most end in **A-ium@**
 - 1) Alkali metals - aluminum, sodium, potassium, magnesium, calcium, titanium
 - 2) Nitrocellulose family
 - 3) Some can ignite when exposed to air; others are water reactive - can explode

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- (b) Control measures
 - 1) If no fire, control ignition source and wait for clean up.
 - 2) Large fire (much water needed) - use self-contained breathing apparatus (SCBA) on all flammable solid fires due to toxic products of combustion.
 - 3) Small fires - Class D dry powder extinguisher - special training.
- (5) Oxidizers, Peroxides
 - (a) Any substance that yields oxygen readily to stimulate the combustion of organic materials.
 - (b) Control measures
 - 1) Respect them - can react to friction or heat suddenly and violently.
 - 2) Don't allow sweeping or walking in product due to friction sensitivity.
- (6) Poisons/Infectious
 - (a) Any substance that causes harm to living organisms.
 - (b) DOT - four classes
 - 1) Class A - Compressed or liquefied gases. Some liquids (hydrocyanic acid) are extremely dangerous when mixed with air.
 - 2) Class B - Less dangerous than Class A (agricultural pesticides, fertilizers, exotic rocket fuel). Very frequent transportation accidents.
 - 3) Irritants - (tear gas)

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- 4) Etiological Agents - Microscopic organisms that cause human disease (Aids, viral hepatitis).
- (c) Control measures
 - 1) Approach upwind. (First Responder)
 - 2) Isolate the area. (First Responder)
 - 3) Full protective clothing.
 - 4) Remove ignition sources. (First Responder, if possible)
 - 5) If raining, cover with a tarp. (First Responder)
 - 6) Small fire - attempt to extinguish and contain runoff. (First Responder, if possible)
 - 7) Large fire - If First Responder should consider letting it burn.
- (7) Radioactives
 - (a) Any substance that spontaneously emits radiation.
 - (b) Control measures
 - 1) Remain upwind. (First Responder)
 - 2) Full protective clothing.
 - 3) Small fire - quickly extinguish - small amounts of water. (First Responder)
 - 4) Large fire - let it burn.
 - 5) Decontamination.
- (8) Corrosives
 - (a) Any liquid that causes visible destruction of human skin tissue, or a liquid that has a severe corrosion effect on steel.

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- (b) Control measures
 - 1) Remain upwind at all times - vapors can penetrate turnout gear. (First Responder)
 - 2) No fire - do not dilute; shut off flow, isolate and deny entry.
 - 3) Fire - smoke will contain corrosive gases. Avoid using water. May further reaction and spread the hazard.

d. Use of the Guidebook

NOTE: Have students examine their 2000 Emergency Response Guidebook. Point out the different section that can be identified by observing the different colors indicated on the edge of the book. This allows user to reference the book quicker during an emergency.

- (1) Shipping paper, bills of lading, manifest, etc.

NOTE: The example of shipping papers should be stressed as an excellent reference for cargo. Every effort should be made to obtain this from the proper authority or person in charge. While explaining this page in the book, a brief explanation should be made to the placarding method of identification.

- (2) CHEMTREC

NOTE: Explain to the student the importance of contacting CHEMTREC early into emergency response. In addition, encourage the responder to make every effort to contact the shipper and owner of the material. Once contact has been made, maintain contact throughout the operation.

- (3) Alphabetical index

NOTE: Explain to the student the proper procedure for using the alphabetical index and the relationship it has to the numerical index. The significance of using the base chemical for further identification should be stressed at this time. Explain the importance of the bold print and coloring code.

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- (4) Numerical index

NOTE: Explain to the student the proper procedure for using the numerical index and the relationship it has with the alphabetical index (which is cross indexed between UN and NA numbers). The significance of using the base chemical for further identification should be stressed at this time.

- (5) Response guides

NOTE: Explain the use of the emergency exposure guides as it relates to the potential hazards and emergency action. Use Guide 11 as a generic guide to walk them through an example of a spill.

- (6) Isolation and evacuation tables

NOTE: Explain to the student the difference between isolation and evacuation as it relates to the size of the spill and the need for downwind evacuation.

- (7) Placards

NOTE: Explain to the student the significance of placards in relation to the category of chemical being transported, the relationship to the classification system, the relationship to the exposure guides, and the use of colors, UN numbers and symbols, the most important being the response guide number.

- (8) Planning

NOTE: The student should have a working knowledge of how the guide book is used in the local emergency response plan, the role of the first responder, and action that can be initiated within the local plan.

- (9) Using the Guidebook

- (a) Step One

- 1) Identify the material by finding one of the following:

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- a) The 4-digit ID number on a placard or orange panel
 - b) The 4-digit ID number (after UN/NA) on a shipping document or package
 - c) The name of the material on a shipping document, placard, or package.
- 2) If an ID number or the name of the material cannot be found, skip to the note below.
- (b) Step Two
- 1) Look up the material's 3-digit guide number in either:
 - a) The ID Number Index - the yellow-bordered pages in the Guidebook
 - b) The Name of Material Index - the blue-bordered pages in the Guidebook
 - 2) If the guide number is supplemented with the letter AP, it indicates that the material may undergo violent polymerization if subjected to heat or contamination.
 - 3) If the index entry is highlighted, look for the ID number and name of the material in the table of initial isolation and protective action distances (the green-bordered pages). If necessary, begin protective actions immediately (see sections on Protective Actions).
 - 4) Use the following guide for all explosives:
 - i) Division 1.1 (Explosives A) - Guide 112

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- i Division 1.2 (Explosives A & B - Guide 112)
- i Division 1.3 (Explosives B) - Guide 112
- i Division 1.4 (Explosives C) - Guide 114
- i Division 1.5 (Blasting Agents) - Guide 112
- i Division 1.6 - Guide 112

(c) Step Three

Turn to the numbered guide (orange-bordered pages) and read carefully.

- (d) Note - If a reference guide cannot be found and this incident is believed to involve dangerous goods, turn to Guide 111 and use it until additional information becomes available.

NOTE: Class completes the AHazardous Materials Identification Exercise.@

e. Transportation hazards and response considerations

NOTE: Explain to the student that chemical spills involving transportation modes may present unique problems in that the spill will require immediate action, will be outside of the normal work space, be associated with the environment and the general population, and will lack major control devices needed to alleviate the situation.

(1) Highway

NOTE: Explain to the student that motor vehicle transportation presents the greatest possibility for chemical spills and make up the larger percentage of accident spills for emergency responders. Normally single commodity unless waste shipment.

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- (a) Wrecks - low to moderate spills
 - (b) Leaks and spills
 - (c) Fire
- (2) Railway

NOTE: Explain to the students that railway is unique in that the most of the railway accidents involve serious exposure risks since large quantities and types of chemicals are involved. In addition, many times railway accidents occur in remote places with little access to emergency equipment and personnel.

- (a) Train derailment
 - (b) Major product spill
- (3) Waterways

NOTE: Explain to the students that even though waterway spills are less in number, they present major problems to the environment and constitute a major containment and clean-up problem. Cite several major oil spills as examples.

- (a) Ship
 - (b) Barge
- (4) Airway

NOTE: Explain to the student the different types of chemicals unique to air traffic and particularly stress the need for caution concerning military aircraft.

- (a) Commercial (passenger and freight)
 - (b) Military
 - (c) Freight facilities
- (5) Pipeline

NOTE: Explain to the student that recent development of pipeline transportation of hazardous

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material has created new risks to the population due to spills and explosions.

- (a) Equipment failure
- (b) Human error
- (c) High volume release
- (d) Use of cut-off valves

4. Approach and safety/response

Size-up

a. Use all available information for early recognition of potential hazards.

- (1) Dispatcher information
- (2) Bystander information
- (3) Seven clues in risk assessment (See Guide Book)
- (4) Five steps to awareness

NOTE: Click on right arrow to reveal *Five Steps of Awareness.*

- (a) Detection
- (b) Recognition
- (c) Identify
- (d) Notification
- (e) Call for resources

b. Weather conditions

- (1) Temperature extremes, lightening, humidity, precipitation, and wind may all negatively affect the outcome of an incident.
- (2) In the event of a Haz Mat spill or release--particularly when a gas is involved--wind can become an important factor.

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The effect of wind can be both positive and negative with regard to the dispersion or dissipation of gas.

- (3) Precipitation can be a major problem in itself. Especially when it is in the form of heavy rain, snow, sleet, or freezing rain. These conditions increase the likelihood of transportation accidents involving hazardous materials, as well as emergency apparatus. Response times may be affected. Footing can be a serious hazard for responders and the public attempting to evacuate. All surfaces and equipment may be affected by the precipitation and visibility may be very limited. In addition, precipitation will further complicate situation involving water reactive materials.

Precipitation also affects run-off. Damming, diking, and run-off control is often adversely affected by snow, sleet, or rain.

c. Geography and topography

The location of incidents may also present major problems for officers. The presence of large bodies of water, hills, high buildings, close quarters, very porous or very compact soils, hot asphalt, or uneven terrain all increase the likelihood of injuries and increase the complexities of dealing with an incident.

d. Exposure - recognize the potential for exposure

- (1) Response personnel and victims
- (2) Surrounding population
- (3) Environmental exposures
- (4) Equipment

e. Early notification - law enforcement, utilities, fire, and rescue

5. Fixed facilities

a. Introduction to fixed facilities

NOTE: Click on right arrow to reveal AFixed Facility.®

- (1) Manufacturing/Processing response considerations

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- 4 Beware for the possible presence of acids, solvents, and caustics.
- (2) Distribution/Warehousing
 - 4 Pesticides and fertilizers are common in eastern North Carolina.
- (3) Retails sales
 - 4 Farm and garden stores - pesticides
 - 4 Hardware store - flammables, corrosives, pesticides
 - 4 Gas station - flammables, corrosives
- (4) Consumer services and office facility
 - 4 Farms - pesticides
 - 4 Homes - pesticides, flammables, corrosives
 - 4 High school - chemistry laboratory
 - 4 Local swimming pool - chlorine
- (5) Utilities/Waste treatment
- b. Types of incidents
 - (1) Fires
 - (2) Leaks and spills
 - (3) Gas releases - if gas stored
 - 4 Release may cause large evacuation
 - (4) Transportation
 - 4 To facilities
 - 4 Exiting facilities
- c. Response to fixed facilities
 - (1) Reporting procedures

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- (a) Right to know (North Carolina Department of Labor)
 - (b) MSDS - Must provide upon request
 - (c) Response planning
- (2) Placarding
- (a) NFPA System

The National Fire Protection Association (NFPA) has a marking system for **fixed** site installations that indicates the dangers associated with various hazardous materials. This marking system is **not** required in transportation.

This system, the NFPA 704 Marking System, uses a diamond divided into four specific areas. The areas indicate Health Hazard, Flammability, Reactivity, or Specific Hazard risks associated with each material.

The Health, Flammability, and Reactivity Hazards are ranked from **A0** to **A4** with 0 indicating no risk and 4 indicating the greatest risk. The Specific Hazard area usually contains a special

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symbol or letter indicating a specific danger. The table on the following page describes the 0-4 ratings.

The NFPA marker for sulfuric acid is shown to the left.

NFPA 704 MARKING SYSTEM

NUMBER	HEALTH HAZARD	FLAMMABILITY	REACTIVITY
4	Extremely toxic; even small amounts may be fatal. Structural fire fighting gear will not provide protection.	Very flammable gases or very volatile flammable liquids.	Capable of detonation or explosive reaction at normal temperatures and pressures.
3	Toxins or corrosives that are extremely hazardous to health but less so than number 4. Structural fire fighting gear may or may not be sufficient.	Capable of ignition under almost all normal conditions.	Capable of detonation or explosive reaction if there is a strong ignition source or high temperature.
2	Moderately toxic; hazardous to health but less so than number 3. SCBA and eye protection may be sufficient.	Capable of ignition with moderate heat.	Normally unstable and readily undergoes violent chemical change, but not capable of detonation. Also includes water-reactive materials.
1	Irritating or only slightly hazardous to health. SCBA may be required.	Requires heating before ignition will occur.	May become unstable under heat or pressure.
0	No unusual hazard.	Will not burn.	Normally stable even under fire conditions; not reactive.

(b) Other placarding/label considerations

In addition to the placards and labels described on the previous pages, First Responders should also be aware of the following hazards that may or may not require identification.

1) ORMs (Other Regulated Materials)

These materials do not fall within a specific hazard class but may nevertheless

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pose a risk to health and safety when transported. ORMs include carbon tetrachloride, ammonium fluoride, asbestos, and a number of other products. ORMs do not require placarding. However, DOT specifies shipping and packaging containers for these substances.

2) Cancer Causing Agents

The Occupational Safety and Health Administration (OSHA) requires that these substances be labeled as such.

3) Pesticides

The Environmental Protection Agency (EPA) requires that manufacturers= pesticide labels contain the signal words DANGER (most toxic) or CAUTION (least toxic).

6. Local plan

a. Roles and responsibilities

NOTE: Explain to the student the need for a local plan and how local plans have been developed over the past several years.

(1) Role of responding agencies

NOTE: The student should be made aware of the jurisdictional authority of all the possible responders mentioned in the local plan.

(a) Fire Department - the primary responder

(b) OSC (On-the-scene Commander) should be the fire chief due to training and resources

(2) Responsibilities/Authorities

(a) Federal agencies

(b) State agencies

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- (c) Local agencies
- (d) Owner/Operator

NOTE: The student should be taught the method of coordination, cooperation, and communication that is outlined in the local plan.

- b. Levels of classification of incidents/accidents

NOTE: Stress to the student the need to be aware of the local plans outlined for classification.

- 7. Environmental crime

NOTE: Click on right arrow to reveal [Environmental Crime](#).

When an officer responding to an explosive or hazardous material incident becomes aware of circumstances that indicate the possibility that an environmental crime has been committed, he/she should report it to the proper authority for further investigation.

- a. With regard to transportation violations, they should be reported to the nearest North Carolina Department of Motor Vehicles Law Enforcement Division office.
- b. Other environmental crimes such as toxic spills, waste spillages, etc., should be reported to the North Carolina Department of Environment, Health, and Natural Resources, Environmental Management Division - telephone number 919-733-7015.

III. Conclusion

- A. Summary

NOTE: Click on right arrow to reveal [Review Training Objectives](#). Click on red square, then on right arrow to review each.

The law enforcement officer may answer many of these hazardous materials calls and should keep in mind:

- 1. Take only the actions you know to be safe.
- 2. Keep unnecessary personnel out of the area.

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3. Contact the appropriate agency or person as soon as possible to assist in neutralizing the hazard.
- B. Questions from Class
- C. Closing Statement

NOTE: Click on far left arrow to return to opening slide.

NOTE: This block of instruction is not intended to make the student an expert in handling hazardous materials or devices or in fighting fires. It is, however, an outline of precautions one should be aware of and follow whenever possible.