Instructions

To complete this independent study program, view the entire program, advancing through each slide by pressing the “enter” key.

While viewing the slides, complete the accompanying Independent Study Test.

If needed, you can move backwards through slides by pressing the “backspace” key.

Start the program by pressing “enter”.

Hazardous Materials Update

Newburgh Fire Department

Introduction

Hazardous Material

- Hazardous Material: Any material that poses an unreasonable risk to the health and safety of persons and/or the environment if it is not properly controlled during handling, storage, manufacture, processing, packaging, use, disposal, or transportation.

HazMat Incident

- A hazardous materials incident is one that involves a substance that has been released or is on fire. Because of this, the material poses an unreasonable risk to people, the environment, and property.
  - Level I
  - Level II
  - Level III

HazMat First Responders

- First Responders must be able to implement actions that:

1. Protect People
2. Protect Environment
3. Protect Property

HazMat First Responders

- First Responders must have a basic knowledge of:
  - Pre-incident planning, recognition and incident control
  - Characteristics of Hazardous Materials
  - Methods of Transportation/Storage
  - Proper handling methods
  - Appropriate defensive actions
  - Local, State, Federal Regulations

HazMat Awareness

- First Responder Awareness Level:
  - Suspect or recognize the presence of hazardous materials
  - Protect themselves
  - Call for appropriate assistance
  - Secure the area

HazMat Operations

- First Responder Operations Level:
  - Responds as part of his/her normal duty in a defensive manner to releases, or potential releases, of hazardous materials.
  - Expected to protect themselves
  - Expected to protect individuals
  - Expected to protect the environment
  - Expected to protect property

OSHA Regulations

Hazardous materials operations are regulated by OSHA 1910.120.

- Requires employers whose personnel respond as First Responders to emergencies involving Hazardous Materials to be trained to the First Responder Operations Level at initial assignment of duties and each year thereafter.

Transportation and Storage

Means of Transportation

- Roadways
- Railways
- Waterways
- Airways
- Pipelines

Hazardous Materials

- Can be found in every community, work place and residence.

Common HazMat Locations

- Service Stations
- Hardware Stores
- Medical Offices
- School Laboratories
- Agricultural Co-Ops/Stores
- Farms
- Commercial/Industrial Facilities

Health Hazards

Health and Safety

- The health and safety of responders and civilians is the primary consideration.

Health Dangers

- Thermal, Mechanical, Poisons, Corrosives, Simple or Chemical Asphyxiants, Radioactives, Etiological & Others.

- Others include: Irritants, Sensitizers, Allergens, Convulsants, and Chronic health hazards.

Routes of Entry

- Inhalation
- Ingestion
- Absorption

Symptoms of Exposure

- Confusion, Anxiety, Dizziness, Blurred Vision, Skin Color Change, Cough, Chest Pain, Numbness of Extremities, Nausea, Vomiting, Abdominal Cramps, etc…

Properties of Hazardous Materials

States of Matter

- Gases
- Liquids
- Solids

Gases

- No independent size or volume
- Expand indefinitely once released
- More difficult to contain
- Ignite more readily

Liquids

- No independent shape, have specific volume
- Flow according to laws of gravity
- Assume the shape of container
- Can mix with other liquids

Solids

- Specific shape and volume
- Pose the least threat

Material Characteristics

- Flash Point: The minimum temperature at which a liquid fuel gives off sufficient vapors to form an ignitable mixture with air near its surface. (Will flash, but will not burn)

Material Characteristics

- Flammable (Explosive) Range: The percentage of the gas or vapor concentration in the air that will burn if ignited.

Below LEL = “Too Lean”

Above LEL = “Too Rich”

Material Characteristics

- Specific Gravity: The weight of a substance compared to the weight of an equivalent amount of water.

  Water = 1.0

  Below 1.0 – “Lighter than water” - will float on surface

  Above 1.0 – “Heavier than water” - will sink

Material Characteristics

- Vapor Density: The weight of a gas compared to the weight of air.

Air = 1.0

Above 1.0 – “Heavier than air” - will settle and accumulate

Below 1.0 – “Lighter than air” - will rise & disperse.

Material Characteristics

- Water Solubility: The ability of a liquid to mix with water.

  Water soluble (Polar Solvent)

  Non-Water Soluble (Hydrocarbons)

Material Characteristics

- Reactivity: The ability of a substance to undergo a chemical reaction with another substance.

- Hypergolic Materials: Substances that ignite when coming into contact with each other.

- Pyrophoric Materials: Materials that ignite and react on contact with air.

Material Characteristics

- Water Reactive Materials: Materials that react when coming in contact with water or humidity in the air.

Recognizing and Identifying Hazards

Hazard Identification

- Informal Methods of Identification
  - Verbal Reports
  - Visual /Physical Chemical Indications

Hazard Identification

- Formal Identification Methods

Department of Transportation Emergency Response Guide Book (ERG)

- The primary objective of the ERG is to direct first responders to a guide page for use in the first 15 minutes of the incident, or until qualified assistance arrives on scene.

ERG Information

- Guide 11 – Universal Guide, Unknown Material
  - Initial Action Guides
  - Placard Table
  - Material Name Index
  - U.N. ID No. Index
  - Initial Isolation and Protective Action Distances

ERG Guides

- Provides potential hazards and emergency actions.

  - Fire
  - Explosion
  - Spill or Leak
  - Health Hazards
  - First Aid

UN Identification Numbers

- United Nations Numbering System

  Four Digit Number

  Appears on Labels, Placards, Containers and Papers

- Apart from a full description of a material on a shipping document, the UN ID # may be the most valuable source of information for identifying a material and establishing initial protective actions.

CHEMTREC

- Emergency Chemical Information – 800-424-9300

- The First Responder will need to provide: Name and call back number; Location of incident; Material, shipper and manufacturer names; Type of vehicle/container; Rail car/truck number; Carrier's name; Consignee (destination); Local conditions; Actions already or currently being taken.

MSDS Sheets

- General Information, U.N. Hazard Class #
- Hazardous Ingredients
- Physical/Chemical Characteristics
- Fire and Explosion Hazard
- Reactivity Data
- Health Hazard Data
- Handling/Use Precautions
- Control Measures

NFPA 704 Symbols

- Fixed Facility Identification of Fire Hazards

- Red = Flammability, 0-4
- Blue = Health Hazard, 0-4
- Yellow = Reactivity Hazard, 0-4
- White = Special Hazards, Symbol

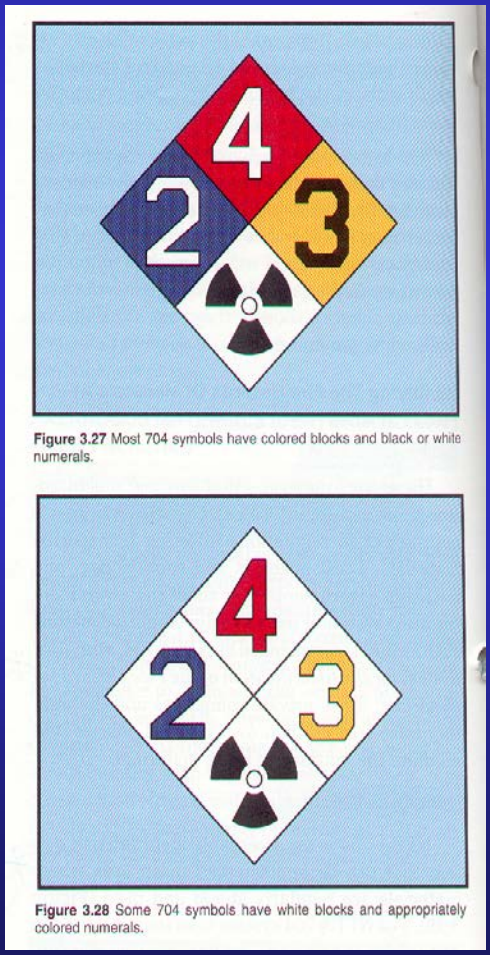


Figure 3.27 Most 704 symbols have colored blocks and black or white numerals.

Figure 3.28 Some 704 symbols have white blocks and appropriately colored numerals.

Hazard Documentation

•Shippers are required to carry shipping papers identifying the cargo on board and containing hazardous material information:

Roads	Bill of Lading - Cab/Driver
Trains	Waybill/consist - Engine/Engineer
Ships	Manifest – Pilot house/Captain
Aircraft	Air bill – Cockpit/Pilot

Hazard Communication

- DOT requires shippers to “communicate” hazards by:

Shipping Papers

Markings

Labels

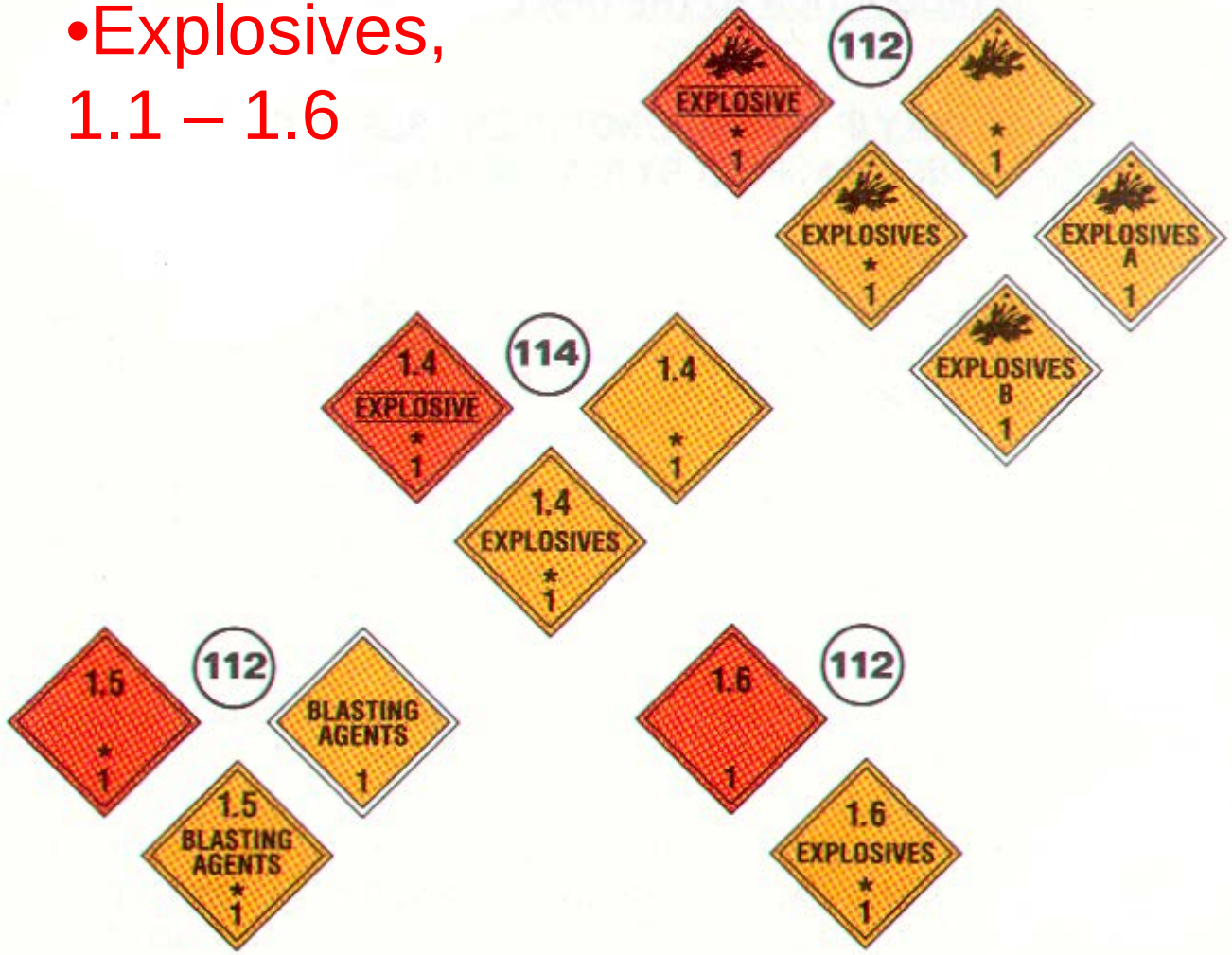
Placards

Placards

- DOT regulation for materials transported via roadways.

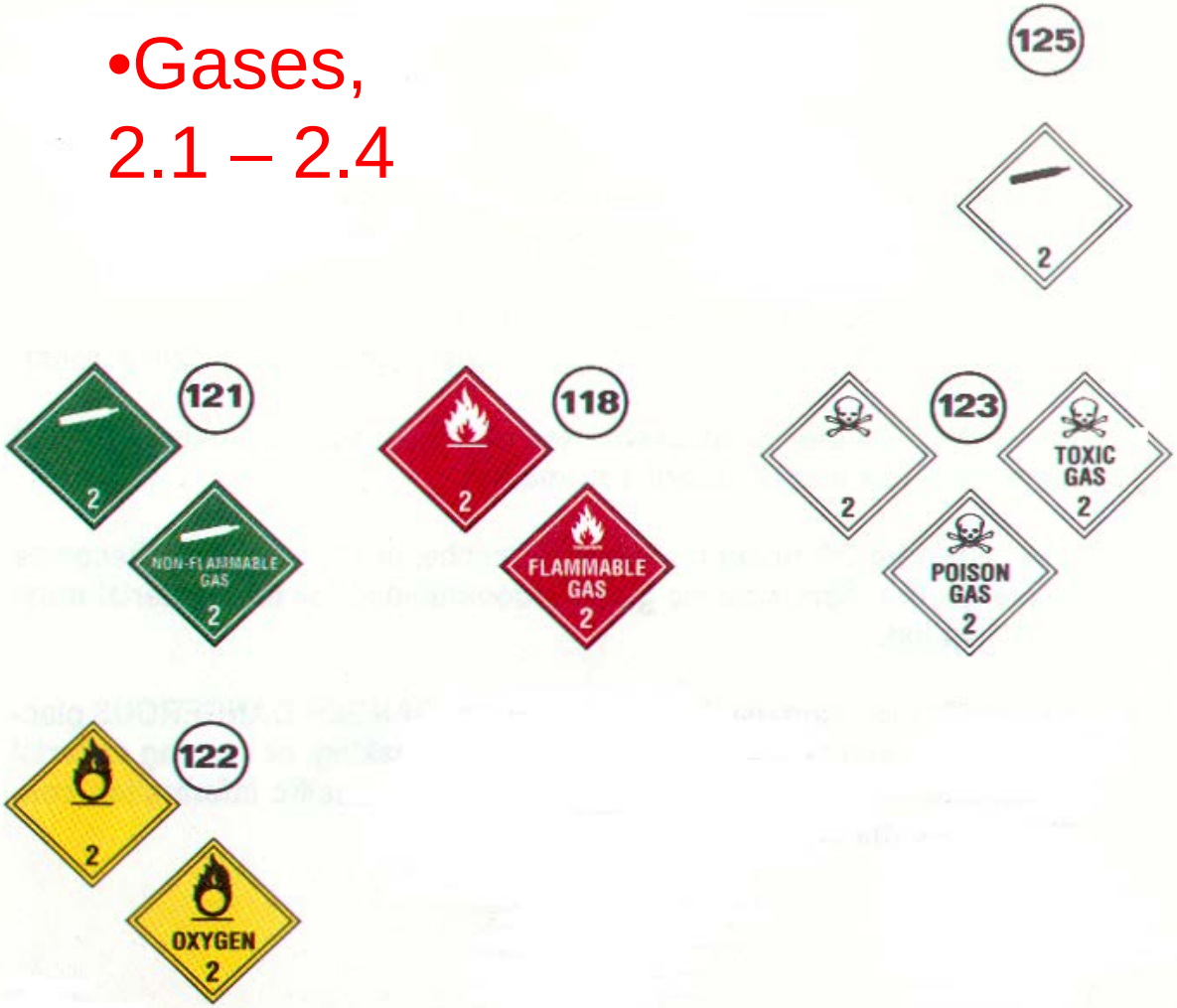
Class One

- Explosives, 1.1 – 1.6



Class Two

- Gases, 2.1 – 2.4

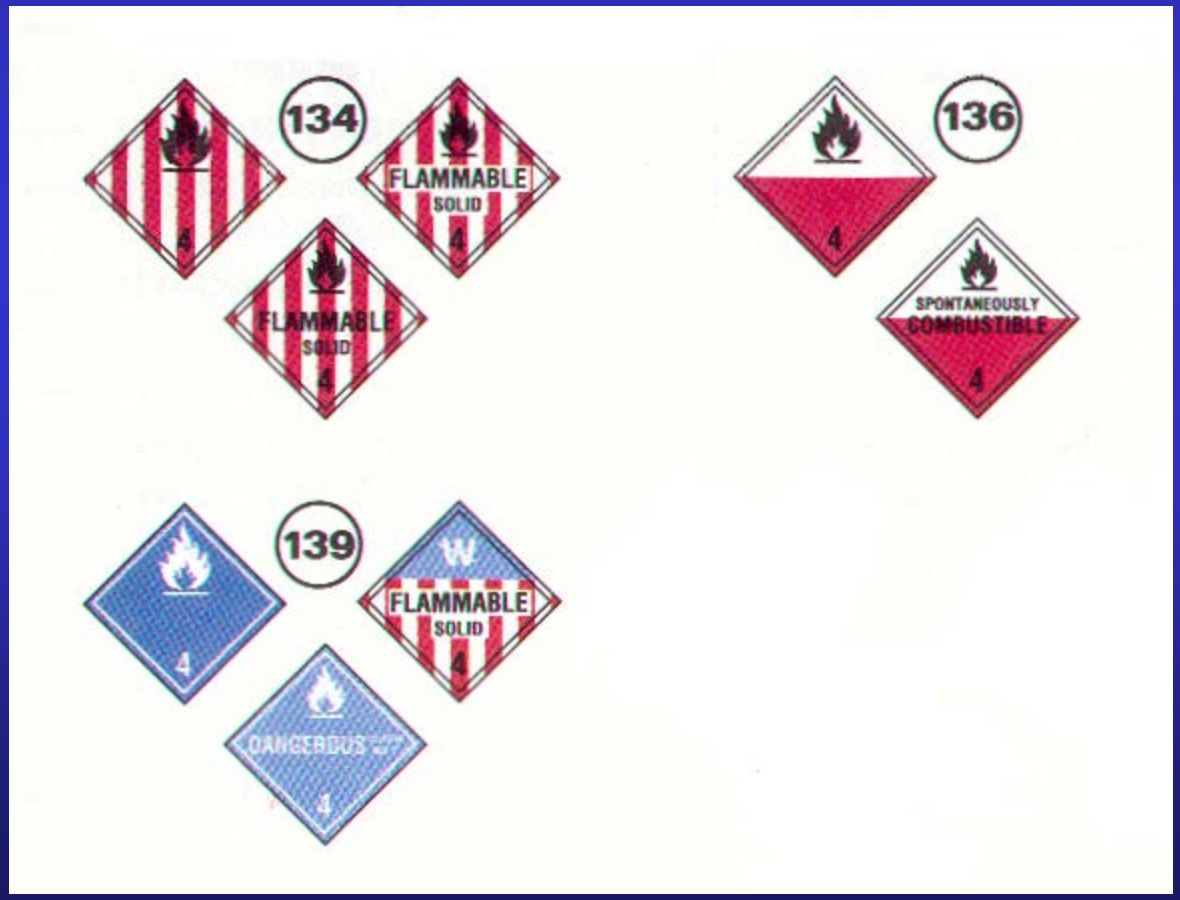


Class Three

- Flammable Liquids

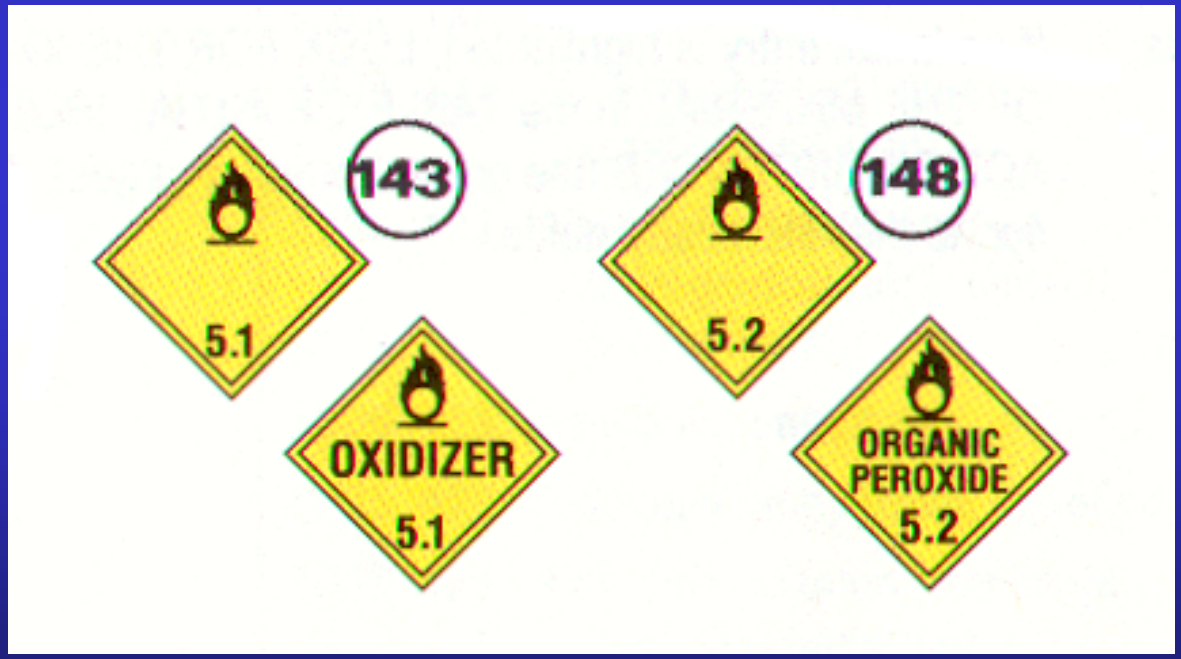
Class Four

- Flammable Solids, Spontaneously Combustible, Dangerous When Wet



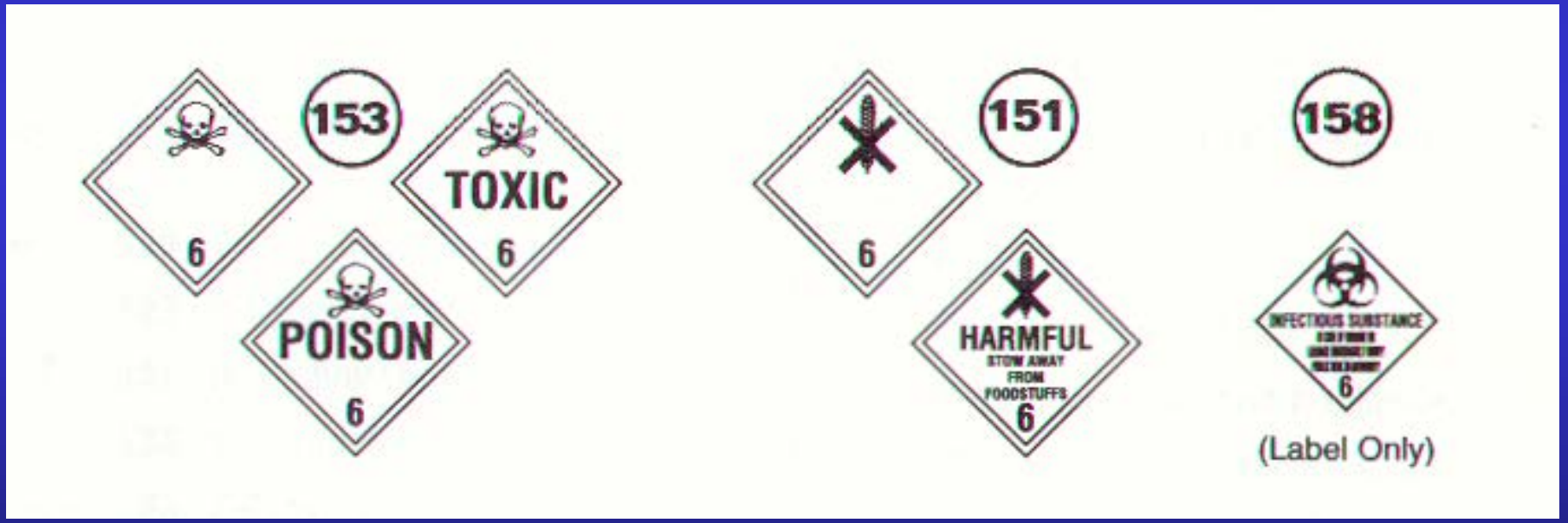
Class Five

- Oxidizers and Organic Peroxides



Class Six

- Poisonous and Etiological Materials



Class Seven

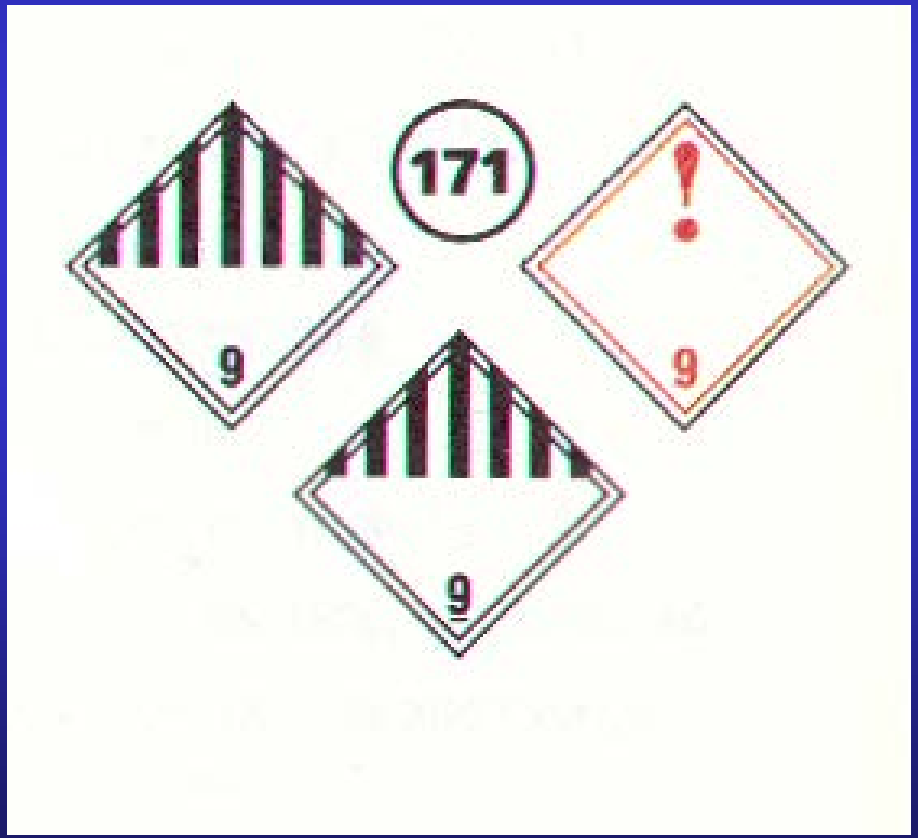
- Radioactive 1, 2 and 3

Class Eight

- Corrosives

Class Nine

- Miscellaneous Hazardous Materials ???????



Dangerous

- May be seen in conjunction with other placards

Hazard and Risk Assessment

Incident Assessment

- Assess the following variables:

1. Risk to rescuers
2. Probability of victim survival
3. Difficulty of rescue
4. Capabilities of resources
5. Possibility of escalation
6. Escape routes, safe work areas
7. Constraints of time and distance

Mitigation

- MITIGATION: Those actions taken to lessen the harm or hostile nature of an incident.

- The first step in mitigating is recognizing that a hazardous material is present.

Immediate Concerns

Primary Objective

Immediate Concerns

- Carried out by the First Responder
- Minimal or no risk to the responder
- Accomplished quickly and easily
- Will aid in stabilizing scene, will diminish or control potential effects of an incident, and will lower the anxiety over an event.

Immediate Concerns

- Increases Life Safety
- Prevents incident from escalating by: Isolating, Denying access, Evacuating, Sheltering in place, Diking, Diverting, Eliminating ignition sources, Cooling tanks

Primary Objective

- The Primary Objective is the operational goal at the incident:
  - Generally requires more than first responders
  - Extinguishing Fires
  - Control of Toxic Clouds
  - Stopping Leaks
  - Diking and Damming Large Volume Spills

Factors to Incident Control

- Location and Severity
- Properties of Involved Materials
- Size and Extent of the Incident
- Damage to Containers
- Availability of Resources
- Limitations of First Responders
- Accuracy of Tactics Applied

Container Integrity

- Integrity of containers is important. Failure of the containers may cause the incident to become unstable, escalate or produce a catastrophic impact on events.

Strategic Objectives

- Rescue
- Exposure Protection
- Fire Extinguishment
- Containment
- Confinement

Strategic Objectives

Strategic Objectives are based upon:

- Ability to be achieved
- Ability to prevent further injuries/deaths
- Ability to minimize environmental and property damage

Strategies

There are three possible strategies:

1) Defensive – actions taken to confine the incident to an area.

2) Offensive – actions to control the incident.

3) Non-Intervention – allowing the incident to run it's own course.

Personal Protective Equipment

- Level A – Totally encapsulated protective suit with SCBA.
- Level B – Protective garment with SCBA.
- Level C – Protective garment with Respirator.
- Level D - Minimum skin protection, No respiratory protection.

Personal Protective Equipment

- Structural firefighting clothing provides minimal protection against hazardous materials.
  - Susceptible to corrosives
  - Do not prevent vapors from penetrating to the skin
  - Begin to degrade over time
  - SCBA should provide adequate respiratory protection.

Command, Safety and Scene Control

Incident Command Decisions

I	Identify the nature of the problem
F	Formulate objectives based on available info
S	Select desired alternatives
T	Take appropriate actions
A	Analyze outcomes continually

SARA Title III

- Title III requires fire departments to:
  - Utilize the Incident Command System at hazardous materials responses.
  - Utilize a Safety Officer
  - Hazard Assessment (Size-Up)

Strategic Goals

1. Life-Safety

   •Safety of yourself, your crew, bystanders and victims.

2. Environmental Protection

   •Consider affects of your actions on the environment prior to implementation

Strategic Goals

3. Property Conservation

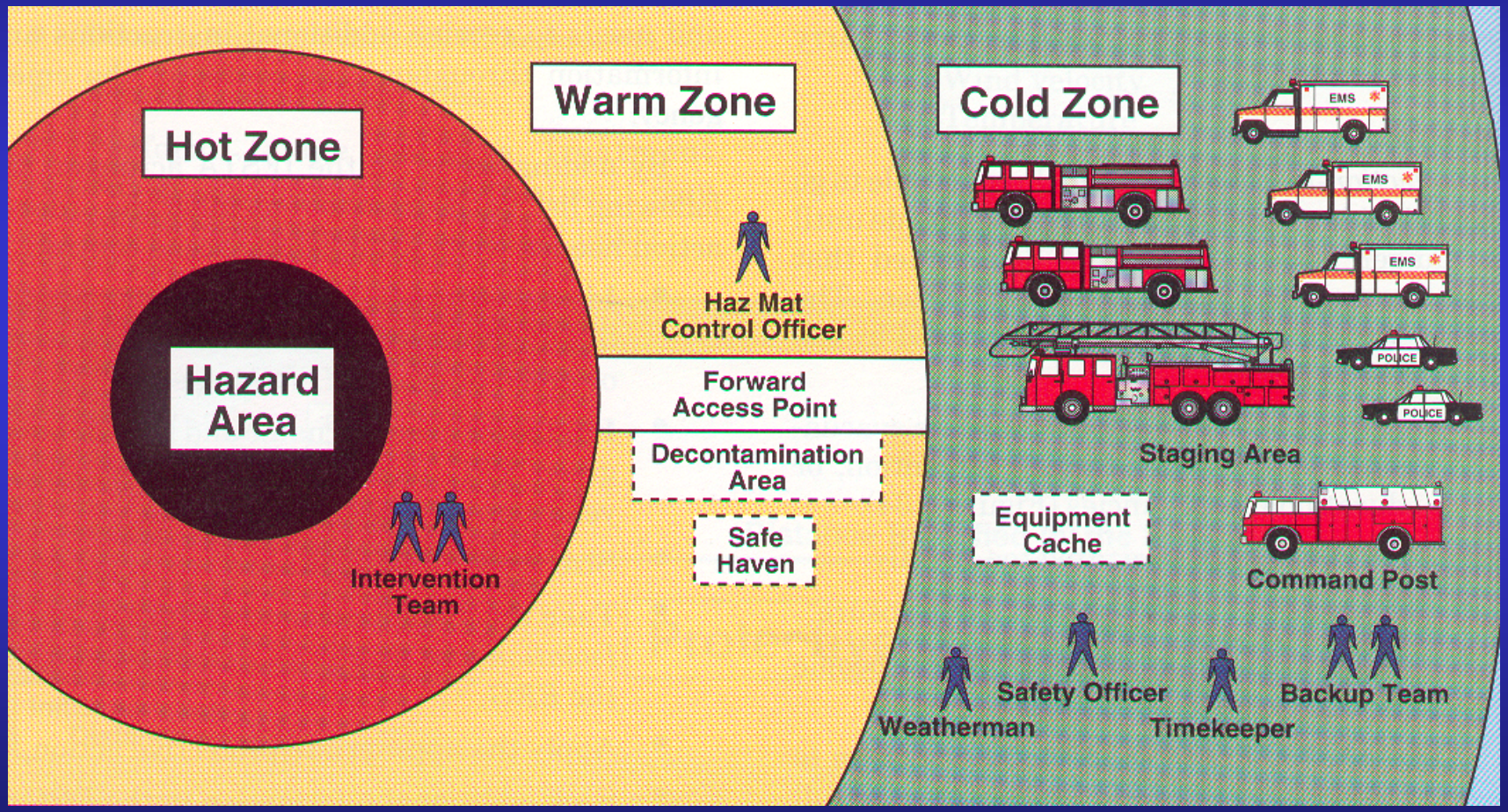
- Property conservation is a bonus, but is the least of our concerns

NO PROPERTY IS WORTH A LIFE!

Scene Control Zones

- Hot Zone – Intervention Team
- Warm Zone – Support Personnel
- Cold Zone – Staging, EMS, Command Post, Media, Etc…
- Single, controlled entry/exit corridor which exits through decontamination

Scene Control Zones



Tactical Priorities and Defensive Control Strategies

Material Identity

- The most important action we can perform as first responders is to identify that a hazardous material is present, determine what the material is and evaluate the threats the material poses.

Material Identity

- Three categories:

1. Material Known and poses a Substantial Threat
2. Material Known and poses No Threat.
3. Material Unknown, Threat Unknown.

Unknown Substances

- The most prudent action to take when dealing with an unknown substance is to assume the worst.

- Never use touch, taste or smell.

Defensive Control Options

- Absorption
- Confinement
- Dilution
- Vapor Dispersion
- Vapor Suppression

Defensive Actions

- Control and confine the scene
- Eliminate ignition sources
- Protect material from heat, shock, contamination, moisture, etc…
- Confine material, avoid runoff
- AVOID CONTACT WITH THE MATERIAL

Decontamination

Decontamination

- The systematic process of removing contaminants from protective outer garments before removal.
- Prevents spread of hazardous materials or residue to other personnel, apparatus, equipment, locations.
- Typically a three-step process.

Emergency Decontamination

- Emergency (Gross) decontamination is the rapid decontamination of personnel inadvertently exposed to hazardous materials or who are in distress.
- Responder safety is main priority.
- Utilized when no other materials are available.

Emergency Response Procedures

- Newburgh Fire Department personnel are trained to the Hazardous Materials First Responder Operations Level ONLY.

- NVFD does not possess the proper training or safety equipment to perform Level II or Level III Hazardous Materials mitigation.

Emergency Response Procedures

- Newburgh Fire Department Standard Operating Procedures require the assistance of a formal Hazardous Materials Team at emergency responses beyond a Level I “Clean-Up” incident.

Safety Equipment

Incident Command System

- Safety Officer
- Standard Operating Procedures
- Toxic / Combustible Gas Detector
- Full structural firefighting PPE
- Self – Contained Breathing Apparatus
- ERG, Chemtrec, MSDS

Summary

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Instructions

Answer the test questions and place completed test in Nick Donnan's (1106) box. A passing grade of 70% is required to get credit for this Mandatory Training

TESTS ARE DUE BEFORE 3RD WEDNESDAY OF FEBRUARY

A failure in submitting completed materials will result in not receiving credit for the Mandatory Training.