Arlington Fire District

Hazardous Materials Awareness Manual

Unit 1

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Unit 1

Hazardous Materials: Laws, Regulations, and Standards

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FIREFIGHTING & EMERGENCY RESPONSE

Introduction

- Hazardous materials response is a specialty field within fire service
- Firefighters and EMS bombarded with exposures to hazardous materials
- Technology is changing to help monitor hazardous materials
- Even the most toxic chemicals are not dangerous if handled correctly

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Figure 24-1 A hazardous material team member surveys a chemical agent lab using air monitors.

1.3

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Figure 24-2 The material shown here is an example of one that ignites when it escapes its container and comes in contact with the air. A material that is air reactive is known as *pyrophoric*.

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Introduction (cont'd.)

- Hazardous material: any substance that when released is capable of creating harm to people, the environment, and property
- Agencies have more specific definitions
  - DOT hazardous material
  - EPA hazardous substances
  - OSHA hazardous chemicals

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Laws, Regulations, and Standards

- Important for the first responder to have a basic understanding of legislative history of hazardous materials
- Many environmental and safety regulations affect how firefighters respond to emergencies
- Consult local environmental and OSHA offices

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Development Process

- Understand the differences among:
  - **Laws**
  - **Regulations**
  - **Standards**
- Important for firefighters to participate in development and review

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Emergency Planning

- **Superfund Amendments and Reauthorization Act** (**SARA**)
  - Passed in 1986
  - Protection of emergency responders and community
  - Inform emergency responders of chemical hazards within community
- **Emergency Planning and Community Right to Know Act** (**EPCRA**)
  - Plan for emergencies
  - Provide a mechanism to get chemical storage information

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State and Local Emergency Response Committees

- Ensure the state has resources necessary to respond safely to chemical releases
- **Local Emergency Planning Committees** (**LEPCs**):
  - Representatives of community
  - Emergency responders
  - Industry and hospitals
  - Media
  - Other government agencies

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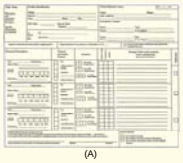
Local Emergency Response Plans

- Outline emergency contacts and procedures
- Important for personnel to have an understanding of this plan
- Important for emergency services to be an integral player in the LEPC
- Most federal HAZMAT grants are provided through LEPC

Chemical Inventory Reporting

- Facilities must report chemical information to the state
- To qualify as a reporting facility:
  - Store more than 10,000 pounds of chemical
  - Store one of 366 chemicals that the EPA considers an **extremely hazardous substance** (**EHS**)
- Must submit Material Safety Data Sheets (MSDS)
- Purpose: to inform emergency responders



(A)

This form is an example of what facilities are required to submit to the fire department and the Local Emergency Planning Committee on an annual basis.

OSHA HAZWOPER Regulation

- **Hazardous Waste Operations and Emergency Response** (**HAZWOPER**)
  - Far reaching effects:
    - Requires that certain training must be provided
    - Requires development of standard operating procedures
    - Mandates certain requirements when handling chemical releases
- EPA also adopted HAZWOPER to cover volunteer firefighters as well

Paragraph q

- Majority covers employers' responsibilities at hazardous waste sites
- **Paragraph q** covers emergency response and applies to the fire service
- Established:
  - Five levels of training
  - Annual refresher training
- Requires use of incident command system

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Medical Monitoring

- A physical is needed if the person:
  - Was exposed to a chemical above the permissible exposure limit
  - Wears a respirator or is covered by OSHA respiratory regulation
  - Was injured due to a chemical exposure
  - Is a member of a hazardous materials team
- Physician determines extent of exam
- Medical records to be kept by the employer for 30 years past last date of employment

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Standards

- NFPA establishes most standards and a variety of committees
- Person can be held civilly liable for violating an NFPA standard
- NFPA standards have the weight of a regulation in hazardous materials arena
- OSHA has used general duty clause to cite employers for violating NFPA standard

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NFPA 472

- Listing of objectives required to meet training levels established by NFPA
- Expands requirements in order for employer to certify employees
- Added objectives related to terrorism response
- **Mission-specific competencies** reflect realities of real-world incidents

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NFPA 473

- Adds additional competencies above EMS issues
- Provides EMS Level I and Level II training levels
- Standard now relies on BLS and ALS providers

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Standard of Care

- Responders have to abide by a standard of care
- Personnel could face federal charges for violating the Clean Water Act
- Violations of this standard based on three theories:
  - **Liability**
  - **Negligence**
  - **Gross negligence**

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Just as EMS responders have to follow a standard of care so that the patient is provided an appropriate level of care, HAZMAT response has a similar standard of care. *(Courtesy of Cambria County, Pennsylvania, Emergency Services)*

Additional Laws, Regulations, and Standards

- Firefighters should be aware of the items discussed next
  - Commonly encountered or applied in chemical releases

Hazard Communication

- Employers provide an MSDS for all chemicals located at a facility
- Above "household quantities"
- Employer must provide training on these MSDS materials and hazard communication program
- Firefighters are responsible for following this regulation

Superfund Act

- Established for the cleanup of toxic waste
- When responding to a Superfund site, some additional concerns must be followed:
  - Site has existing emergency response plan
  - Site should have its access limited
  - Local fire department should meet with site supervisor to learn hazards
  - Superfund sites vary greatly

Clean Air Act

- Passed in 1990
- Requires certain facilities file additional planning documents
- LEPC and local fire service involved in training and exercises
- Facilities required to submit emergency plans

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Respiratory Protection

- Inclusion of two-in/two-out rule
- Required to fit test all firefighters and provide medical survey or a physical exam
- Specific records must be kept by fire department

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Firefighter Safety

- Sometimes referred to when discussing hazardous materials issues
- "Broad-based" program
- Focused on providing safe workplace for firefighters

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NFPA Chemical Protective Clothing

- NFPA Standards 1991 and 1992 for chemical protective clothing ensembles
  - Establish design and use requirements
- NFPA 1994 has three levels of protective equipment
  - Used in event of chemical or biological attack

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Lessons Learned

- Maze of laws, regulations, and standards can be confusing
  - Most are not easy to read
  - They are subject to interpretation and change frequently
- Emergency responders must keep abreast of those that affect their everyday jobs

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Unit 2

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Unit 2

Hazardous Materials: Recognition and Identification

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Introduction

- Failure to recognize chemical hazards puts firefighters in severe danger
- Immediate effects from some materials
  - Multiple exposures have far-reaching effects
- Hazardous materials incidents kill thousands
- Four basic clues to recognition and identification:
  - Location and occupancy
  - Placards, labels and markings
  - Container types
  - Senses

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Location and Occupancy

- In general, the more industrialized a community is, the more hazardous materials it contains
- Buildings that store hazardous materials:
  - Hardware and auto parts stores
  - Hospitals
  - Dry cleaners
  - Manufacturing facilities, print shops
  - Doctors' offices, photo labs, agricultural supply stores
  - Etc.

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Placards, Labels, and Markings

- Many systems are used to mark hazardous materials containers, buildings, and transport
  - Result from laws, regulations, and standards
- **Building Officials Conference Association** (**BOCA**) code
  - Adopted as a regulation in local communities
  - Require use of the NFPA 704M marking system for certain occupancies

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Figure 25-4 This NFPA 704M symbol is used to warn of potential chemical dangers in the building. It warns of fire, health, reactivity, and special hazards.

Placards

- Department of Transportation (DOT) regulates movement of hazardous materials
  - Rail, air, water, roadway, and pipeline
- Shipper must placard a vehicle to warn of storage of chemicals
- Nine hazard classes that use more than 27 placards to identify a shipment
- Labels are smaller versions of placards

Materials that Require Placarding at any Amount (DOT Table 1)

HAZARD CLASS OR DIVISION	PLACARD TYPE
1.1	Explosives 1.1
1.2	Explosives 1.2
1.3	Explosives 1.3
2.3	Poison gas
4.3	Dangerous when wet
5.2 (Organic peroxide, type B, liquid or solid, temperature controlled)	Organic peroxide
6.1 (inhalation hazard Zone A or B)	Poison inhalation hazard
7 (radioactive label III only)	Radioactive

Materials that Require Placarding at 1,001 Pounds (DOT Table 2)

CLASS OR DIVISION	PLACARD TYPE
1.4	Explosives 1.4
1.5	Explosives 1.5
1.6	Explosives 1.6
2.1	Flammable gas
2.2	Nonflammable gas
3 Flammable liquid	Flammable
3 Combustible liquid	Combustible
4.1	Flammable solid
4.2	Spontaneously combustible
5.1	Oxidizer
5.2 (Other than organic peroxide)	Organic peroxide
6.1 (Other than inhalation)	Poison
6.1 (PG III)	Keep away from food
8	Corrosive
9	Class 9

Placards

- DOT - 49 CFR 170-180
  - DOT system uses nine hazard classifications with more than 27 placards.
  - DOT also requires United Nations/North America (UN/NA) identification number.

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Class 1, Explosives

- Division 1.1
- Division 1.2
- Division 1.3
- Division 1.4
- Division 1.5
- Division 1.6

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Class 2, Gases

- Division 2.1
- Division 2.2
- Division 2.3
  - Hazard Zone A
  - Hazard Zone B
  - Hazard Zone C
  - Hazard Zone D

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Class 3, Flammable Liquids

- Flash point less than 141 degrees F.
- Combustible liquids are those with flash points between 100-200 degrees F.

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Class 4, Flammable Solids

- Division 4.1
- Division 4.2
- Division 4.3

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Class 5, Oxidizers and Organic Peroxides

- Division 5.1
- Division 5.2
  - Type A
  - Type B
  - Type C
  - Type D
  - Type E
  - Type F
  - Type G

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Type 6, Poisonous Materials

- Division 6.1
- Division 6.2
- Hazardous Zone A
- Hazardous Zone B

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Class 7, Radioactive Materials

- Materials determined to have radioactivity at certain levels
- Radioactive I
- Radioactive II
- Radioactive III

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Class 8, Corrosives

- Acids
- Bases
- Visible destruction in skin or corrodes steel or aluminum

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Class 9, Miscellaneous Hazardous

- Catchall category

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Class or Division	Example
Flammable gases (Division 2.1)	Acetylene, propane
Non-flammable gases (Division 2.2)	Oxygen, nitrogen
Flammable or combustible liquids (Class 3)	Paint, paint thinners, gasoline
Flammable solids (Division 4.1)	Charcoal
Dangerous-when-wet materials (Division 4.2)	Some fumigants
Oxidizers (Division 5.1)	Bleaching compounds
Organic peroxides (Division 5.2)	Benzoyl peroxides
Poisons (Division 6.1)	Pesticides
Some infectious substances (Division 6.2)	Diagnostic specimens
Corrosive materials (Class 8)	Muriatic acid, drain cleaners, battery acid
Miscellaneous hazardous materials (Class 9)	Asbestos, self-inflating life boats
Consumer commodities (ORM-D)	Hair spray, spray paints

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Placards (cont'd.)

- Problems with the placarding system
  - Relies on a human:
    - To determine extent of load
    - To determine appropriate hazard classes
    - To interpret difficult regulations to determine if placard required
  - Placard must be affixed to all four sides of a vehicle
  - Only required for shipments that exceed 1,001 pounds
  - Ten to twenty percent of trucks not placarded correctly

Labels

- Package markings must include:
  - Shipping name of the material
  - UN/NA identification number
  - Shipping and receiving companies' names, addresses
- Packages containing more than a **Reportable Quantity** (**RQ**) of material must be marked
- Packages listed as ORM-D materials should be marked as such
- Labels identical to placards other than size

Other Identification Systems

- Several other identification systems used in private industry to mark facilities and containers
- Military shipments and pipelines are also marked
- Warnings are a clue to potential presence of hazardous materials

NFPA 704 System

- Designed for buildings, not transportation
  - Alerts first responders to potential hazards
- Triangular sign divided into four areas
  - Health hazard: blue
  - Fire hazard: red
  - Reactivity hazard: yellow
  - Special hazards: white
- Ranking from zero to four
  - Zero presents no risk

Figure 25-27 NFPA 704 system marking.

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Hazardous Materials Information System

- HMIS designed to comply with federal hazard communication regulation
- HMIS can be developed by the facility or manufacturer of the labels
  - One system may vary from another
- Colors and numbers usually same as NFPA
- Picture of required PPE for each substance may be provided

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Figure 25-28 HMIS label.

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Military Warning System

- Military uses DOT placarding system when possible
- Assume military is aware of incident involving extremely hazardous materials
  - Higher hazards more likely to be shipment escort
- Driver of the truck may not be allowed to leave the cab of the truck
- Notify military if driver and escort crew killed or seriously injured

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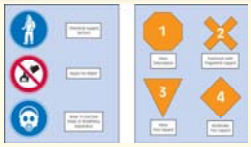

Figure 25-29 Military placards.

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Pipeline Markings

- Pipeline owner is required to place sign if underground pipeline crosses mode of transportation
  - Sign must contain a warning, hazardous contents of pipe, owner's name and phone
  - Pipeline buried a minimum of three feet
  - Product can vary from liquefied gases and petroleum products to slurried material
- Pipeline companies required to provide training and tours for emergency responders

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Container Markings

- Most containers marked with contents
- Cylinders have name of product stenciled on side of the cylinder
- Bulk container has product stenciled on the side
- Trucks that are dedicated haulers also stencil product name on two sides of vehicle

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Pesticide Container Markings

- Pesticides regulated by the EPA in terms of markings
- Label has manufacturer's name; no information about chemical make-up
- If label indicates "Danger," extreme caution should be taken
  - "Warning" and "Caution" present lesser hazards

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Radiation Source Labeling

- New warning label issued by the IAEA in 2007
- DOT still requires DOT labels and placards
- Responders should request assistance of radiation specialists

Figure 25-33 "IAEA Radiation" label.

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Containers

- Hazardous materials come in containers of many shapes and sizes
- Type of material and end use for product determine packaging
  - Household version usually different than industrial
- First responders should be alert for anything unusual
  - Example: 55-gallon drum in a bedroom along with laboratory glassware

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Figure 25-34 The type of container can provide some clues as to the contents of the container. Because this drum is reinforced, it has a high likelihood of containing an extremely hazardous material.

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General

- Most general containers for household use
  - Carried in large quantities when transported
- Cardboard boxes ship hazardous materials
- Chemicals shipped in glass bottles usually insulated and packed in cardboard boxes
  - One-gallon glass bottles transported in carboys
  - Glass bottles may be coated in plastic
- Bags may carry anything from food items to poisons

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General (cont'd.)

- Drum construction gives clue as to contents
- Cylinders hazardous because of contents and pressure
  - Relief valves mandated in the U.S.
- Totes and tanks have capacities between 119 and 793 gallons
  - Hold flammable, combustible, toxic, and corrosive materials
  - Transported on flatbed or box-type trailers
  - Common incident during offloading

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Figure 25-42 The most common type of spill occurs when a valve is knocked off, releasing the contents.

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Pipelines

- Sized between ½ inch and more than six feet
  - Commonly buried underground
- Some type of pipeline system is found in every state
  - Larger pipelines along east coast and in Alaska
- Amount in pipeline varies; must have contact information for pipeline owner
- If incident suspected, contact pipeline owner immediately

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Radioactive Material Containers

- Transport of radioactive materials regulated by DOT and **Nuclear Regulatory Agency** (**NRC**)
- Strong, tight container: for low-level radioactive material
- Excepted packaging: for materials that have low specific activity
- Type A container: for materials with higher radiation
- Type B container: must have ten inches of lead shielding

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Highway Transportation Containers

- Tractor trailer can carry variety of hazardous materials and portable containers
- Determining contents may be difficult
  - Use extra care with refrigerated materials
- **Specification plates** list information about tank
- Four basic types of tank trucks:
  - DOT-406/MC-306 gasoline tank truck
  - DOT-407/MC-307 chemical hauler
  - DOT-412/MC-312 corrosive tanker
  - MC-331 pressurized tanker

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Boiling Liquid Expanding Vapor Explosion (BLEVE)

- Heat inside container causes material to boil and vapors to expand
- Pressure inside container causes the tank to fail
- Withdraw immediately if rising sound from relief valve or discoloration of tank
- Fire must be fought from a distance with unmanned hose holders

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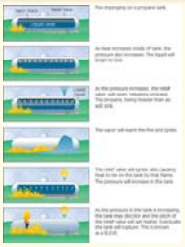

Figure 25-60
Diagram of a BLEVE

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Dangers Associated with BLEVE

- Fireball can engulf responders and exposures
- Metal debris can fly considerable distances
- Liquid propane can be released and ignite
- The shock wave, air blast, or flying metal created by the BLEVE can collapse buildings or move responders and equipment

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Dangers Associated with BLEVE (cont'd.)

- Firefighters should withdraw immediately in the case of rising sound from a venting relief valve or discoloration of the tank
- Fire must be fought from a distance with unmanned monitors or hoses that are cooling the tank with a minimum of 500 GPM
  - If water is vaporizing on contact, apply more water
  - Avoid icing around the relief valves

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Dangers Associated with BLEVE (cont'd.)

- Any tank that is exposed can fail at any time and in any direction
- If unmanned monitors are unavailable, firefighters should withdraw and let the fire burn

Specialized Tank Trucks

- Gases are liquefied and transported as with MC-331 tank trucks, refrigerated or compressed
- Dry bulk trucks carry variety of products
- Materials requiring high temperatures transported in special vehicles
- Intermodal tanks similar to full size highway tanks
  - Can be used on ships, railways, or highways

Figure 25-65 These trucks carry molten products and can be heating the product while driving. This practice is illegal but is found on occasion. The fuels used to heat the product are either diesel/kerosene or propane.

Rail Transportation

- Rail incidents involve multiple cars, in rural areas and multiple agencies
- Three basic types: non-pressurized, pressurized, specialized
- Dedicated railcars marked with the contents
- Non-pressurized cars have relief valve outside of expansion dome
- Pressurized cars have valves, pipes under a protective housing

Rail Transportation (cont'd.)

- Specialized railcars have same characteristics as highway vehicles
  - Highway box trailers often loaded onto railcars
- Railroads use same placarding system
  - More extensive information, printed larger
- Some railcars may be painted in a configuration to identify hazardous loads

Figure 25-75 Dedicated railcar stencil.

Bulk Storage Tanks

- Movement to remove **underground storage tanks** (**UST**) and replace with **above ground storage tanks** (**AST**)
- Inspection wells surround UST and detect leaks
- Two types of AST: upright and horizontal
- Vapors may accumulate in ordinary upright AST
  - Floaters prevent vapor accumulation
- Specialized tanks have external cover appears to be a tank within a tank

Figure 25-79 This is a cone roof tank. It has a weak roof-to-shell seam so that in the event of an explosion the roof will come off, but the tank should remain intact.

Figure 25-80 This is an open floating roof tank, in which the roof floats on top of the product. This reduces the release of vapors, as there is no vapor space, and reduces the fire potential.

Figure 25-81 This is a covered floating roof tank, which is the same as an open floating roof tank but has a cover to keep out snow, rain, and debris. Another term for this type of tank is *geodesic domed tank*.

Figure 25-82 The specialized tank such as the propane tank shown here has some of the same properties as its transportation equivalents.

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Senses

- Never smell, taste, or touch to identify materials
- Use information from exposed individuals only after decontamination
- Can use hearing and vision
  - Example: pitch of relief valve increases indicates pressure increasing
- Many chemicals are desensitizers
- Many severely toxic materials are colorless and odorless

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Chemical and Physical Properties

- As firefighter progresses through response levels, need for additional chemistry increases
- Firefighter should consult with hazardous materials team or other resources
- Basis of fire is a chemical reaction
- The better that firefighters understand chemical reactions, the better off they will be

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Containers and Properties

- When chemicals release, knowing how materials react is important
- Lower boiling point means more pressure in container in a fire
- Corrosives placed in wrong container cause container to fail
  - Good chance venting or rupture will be violent
- Lower flash point means greater fire risk

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Radiation

- Atom comprised of electrons, neutrons, and protons
  - Protons and neutrons in the nucleus of the atom
  - Electrons orbit the nucleus
- Protons have positive charge, determine element
  - Neutrons are the same size as protons, but neutral
- **Isotopes**: forms of an element, determined by the number of neutrons

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Radiation (cont'd.)

- Radioisotopes: isotopes whose nuclei are unstable
  - Emit radiation to become more stable
- If atom emits an alpha or beta particle, number of protons changes, becomes different element
  - Uranium is base for radon, which decays into lead
- **Half-life**: amount of time for half of a radioactive source to decay
- **Activity**: number of decays per second

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Types of Radiation

- Non-ionizing radiation: radio waves, microwaves, infrared, visible light
- Ionizing: alpha, beta, gamma and x-rays
  - Energy and weight: particulates such as alpha, beta
  - Just energy: gamma
- Alpha: two neutrons, two protons
- Beta: electrons and positrons
  - Moves farther in air and causes more damage

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Types of Radiation (cont'd.)

- Gamma: comes from energy changes in the nucleus of the atom
- Neutron: not common, but used in nuclear power
  - Neutrons ejected from nucleus during fission
  - Neutron radiation transfers its energy to water
    - Human body 68 – 75 percent water
  - Neutron radiation activates non-radioactive isotopes
    - Materials in nuclear reactor become radioactive
- X-rays comparable to gamma radiation

25.61

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

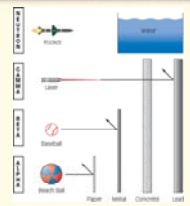

Figure 25-92 Examples of risks for ionizing radiation.

25.62

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Toxic Products of Combustion

- Firefighters suffer considerable chemical exposures
- Breathing smoke bombards body with toxic chemicals
- Many toxic chemicals produced in a fire
- House, car, and dumpster fires are worst type of chemical accident
  - Brush fires may have pesticides, herbicides or other
- Wear all protective clothing, especially SCBA

25.63

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Lessons Learned

- At any incident, there is always a factor that relates to identification of hazardous materials
- Know where to access hazardous materials information
- Materials with high vapor pressures present great risk
- Understanding the harms from radiation is an important safety consideration
- Local hazardous materials responders a good source of information

25.64

Unit 3

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Unit 3

Hazardous Materials: Information Resources

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Introduction

- Chemical information available through variety of sources
- Shipper and facility required to maintain certain documents
- Know what information is available
- Understand how to interpret the information in common sources

26.2

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Known as the "DOT Book" or the "Orange Book"
- Published every four years
- Covers Canada, Mexico, and the USA
- http://hazmat.dot.gov/gyd ebook.htm

26.3

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- DOT makes one copy for every emergency response apparatus in the country
- Provides information regarding potential hazards
- Intended as a guide for first responders during the initial phases of a hazardous materials incident

26.4

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Figure 26-1 The DOT *Emergency Response Guidebook* should be found in every emergency vehicle in the United States. It provides chemical emergency response information that is valuable to the first responder.

26.5

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Consists of these major sections:
  - Placard information
  - ADR/RID marking system information
  - Listing by DOT identification number
  - Alphabetical listing by shipping name
  - Response guides
  - Table of initial isolation and protective action distances
  - List of dangerous water-reactive materials

26.6

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- This Department of Transportation book provides a contact number for federal assistance, although responders should proceed initially by requesting local, state, and then federal assistance.

26.7

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- You must be familiar with guide prior to an incident.
- Abbreviations are used in the DOT ERG.
- The guide provides a list of the hazard class system.

26.8

FIREFIGHTER'S HANDBOOK
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Emergency Response Guidebook

- Placard information
- Information about how to proceed at an incident where the only information available in a placard
- Guide for explosives

26.9

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Yellow section
- Numerical listing by DOT identification number
- Can be used when placard is visible
- Highlighted numbers – turn to orange and green sections

26.10

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Blue section
- Alphabetical listing by chemical shipping name
- For reference with shipping papers
- High lightened numbers – turn to orange and green sections

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Orange section
- Actual guide pages for more than 4,000 chemicals
- Sixty-one total response guides
- Three-digit number

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Two pages per guide, divided into three sections
  - Potential hazards
  - Public safety
  - Emergency response

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Using the DOT Emergency Response Guidebook

- Look up the three digit guide number of the material in either:
  - ID number index
  - Name of the material index
- Turn to the numbered guide

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Green section
- Table of initial isolation and protective action distances for highlighted chemicals
- Subdivided
  - Small and large spills
  - Day or night

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- Evacuation distances
- List of dangerous water-reactive materials

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Emergency Response Guidebook

- WMD cross reference is now available.
- PPE levels of protection are listed.
- It is available for online reference and download.

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

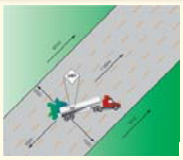

Figure 26-13 A large spill of ethyl isocyanate (ID 2481) is listed as having an isolation distance of 1,700 feet in all directions. In such a case, responders need to protect those persons downwind for 7+ miles.

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Using the DOT Emergency Response Guidebook

- Resist rushing in
- Approach incidents from an uphill/upwind direction
- Identify the material by finding one of the following:
  - Four digit ID on placard/ID panel
  - Four digit ID number on shipping document or package
  - Name of material on shipping document, placard, or package

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Material Safety Data Sheets

- Result of the hazard communication standard
- Employers with larger than "household quantities" must create MSDS
- Required to have a variety of information
- Intent is to protect employees working at the facility

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Material Safety Data Sheets

- Quality of information varies from MSDS to MSDS
- Typical MSDS provides a worst-case scenario
- Firefighter should rely more on technical information on MSDS
- MSDS has remained the same since inception

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Using the MSDS Wisely

- Always use more than one source of information
- Determine action plan using MSDS
  - Determine chemical threat
  - Don appropriate level PPE
  - If material has released, follow evacuation procedure and secure building
  - Determine which extinguishing agents are required

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Accidents and How the MSDS Relates

- Chemical information on MSDS usually presents hazards associated with particular product
- Once product is placed in a process some factors may change
  - Increase, decrease, or elimination of hazards
- Factors include:
  - Reactions with other chemicals
  - Changes in temperature, pressure, or physical characteristics

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

MSDS in the Workplace

- Employers to provide employees with an MSDS for every hazardous chemical
- An MSDS provides information on physical/chemical characteristics and first-aid procedures

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

MSDS in the Workplace

- Can be insufficient depending on provider
  - Vagueness
  - Technical jargon
  - Understandability
  - Product versus process
  - Missing information

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Shipping Papers

- Shipping papers generally provide the following information:
  - Shipping company
  - Destination of packages
  - Emergency contact information
  - Number and weight of packages
  - Proper shipping name of materials
  - Hazard class of materials
  - Special notation for hazardous materials

26.26

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Mode of Transportation

- Shipping papers are also called a bill of lading
- Papers should be close to the driver
- On tank trucks a duplicate set is located in a tube attached near landing gear
- Hazardous materials are sometimes color coded
- For rail, shipping papers are called **consist** or **waybill** and placed in control of the engineer

26.27

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Mode of Transportation

- Most railcars are identified well
  - **Standard Transportation Commodity Code** (**STCC**)
    - Seven-digit number
    - Number beginning with "49" are hazardous
- On a ship, papers are called **dangerous cargo manifest** (**DCM**) and placed in control of the captain
- In air, shipping paper are called **Air Bills** and placed in control of the captain

26.28

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Facility Documents

- Those with an MSDS requirement:
  - Tier 2 form
  - Site plan
- Those with extremely hazardous substances (EHS)
  - Emergency plan
- Many facilities leave MSDS binder at gate with security guard
- SARA reports updated annually and should be reviewed by responders

26.29

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Chemtrec

- Chemical Transportation Emergency Center
  - Information service provided by American Chemistry Council
  - Chemtrec service
- Chemtrec is well connected
- Chemtrec does not make regulatory notifications

26.30

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Chemtrec

- Responder should have the following information when calling Chemtrec:
  - Caller's name and phone number
  - Name of the shipper or manufacturer
  - Shipping paper information

26.31

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Industrial Technical Assistance

- Each community usually has a technical specialist in a given field
- Many areas of the country have industrial mutual aid groups designed to assist each other
- Each industrial facility usually has a person responsible for safety and health
- Many facilities have industrial hygienists

26.32

FIREFIGHTER'S HANDBOOK
FIREFIGHTING & EMERGENCY RESPONSE

Lessons Learned

- Obtain as much information as possible
- Information combined with reference sources can provide useful data
- Obtain as much information as possible prior to arriving on scene
- Responders should not take risks attempting to get this information

26.33