

Hazardous Materials Awareness



Overview

2-29-1 to 2-29-18

Hazardous Materials Awareness

What Is a Hazardous Substance?

- A material that can produce an adverse effect on the health and safety of the person exposed



Hazardous Materials Awareness

What Is a Hazardous Substance?

- A hazardous substance can be almost anything.
- Hazardous substances can be found anywhere.
- More than 80,000 chemicals are registered for use in commerce in the United States.
- An estimated 2000 new chemicals are introduced annually.



Hazardous Materials Awareness

Hazardous Waste

- Any waste material, which is ignitable, corrosive, reactive, or toxic, and “which may pose a substantial or potential hazard to human health and safety and to the environment when improperly managed”
 - Can be mixtures of several chemicals, resulting in a hybrid substance
 - Can be just as dangerous as pure chemicals

Extremely Hazardous Substances

- Products that have an extremely high degree of toxicity and are most likely to induce serious acute reactions following short-term airborne exposure
 - Ammonia
 - Chloroform
 - Phosgene
 - Sarin

Standard of Care

- The level of competency anticipated or mandated in the performance of a service or duty
 - Accepted practices
 - Moral, ethical and political issues
 - Court's interpretations and opinions

Standard of Care

- Legal implications
 - Negligence: Failure to perform one's duty or responsibility with reasonable regard for foreseeable harm to another
 - Gross Negligence: Willful or wanton failure to perform one's duty or responsibility

Superfund Amendments and Reauthorization Act (SARA)

- Funded waste site cleanups and emergency response activities
- Required OSHA to develop health and safety standards
- Title I & Title III

SARA Title I

- Requires the administrator of USEPA to adopt identical standards in non-OSHA states
- Brought about 29 CFR 1910.120 Hazardous Waste Operations & Emergency Response (HAZWOPER)

SARA Title III (1 of 4)

- Also known as the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986
- Requires local planning committee to create effective plans for hazardous materials emergencies
- Four major sections

SARA Title III (2 of 4)

1. Emergency planning

- Requires the governor of each state to designate a State Emergency Response Commission (SERC)

2. Emergency notification

- Requires an industry to notify SERC, LEPC and the local fire department if there is a release of a listed hazardous substance that exceeds a certain quantity as specified in the law

SARA Title III (3 of 4)

3. Community right to know reporting requirements

- Grants citizens the right to obtain information on hazardous materials in their community

4. Toxic chemical release and emissions inventory reporting

- Requires hazardous materials facilities to inform the public about routine day-to-day releases of chemicals

SARA Title III (4 of 4)

- Section 312 requires Tier II reports
 - Tier II reports must include:
 - A brief description of the manner of storage of the chemical
 - An estimate of the maximum amount of the chemical present at any time during the preceding calendar year and the average daily amount
 - The location of the chemical at the facility
 - An indication of whether the owner elects to withhold location information from the public

Organizations Receiving Notification of Hazardous Materials Inventories

- State Emergency Response Commission (SERC)
- Local Emergency Planning Committee (LEPC)
- Local Fire Department (FD)

State Emergency Response Commission (SERC)

- Designate emergency planning districts within the state
- Appoint local emergency planning committees
- Supervise and coordinate local emergency planning committee activities

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State Emergency Response Commission (SERC)

- Establish procedures for receiving and processing information requests regarding hazardous chemicals that may be stored and used at fixed facilities
- Designate an official to serve as coordinator for information
- Carry out other responsibilities as designated by the Act and any amendments

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Local Emergency Planning Committees (LEPCs)

- Develop emergency response plans for the jurisdiction they serve
- Process requests from the public regarding hazardous materials

Levels of Training

- HAZWOPER identifies five levels of training:
 - First Responder Awareness
 - First Responder Operations
 - Hazardous Materials Technician
 - Hazardous Materials Specialist
 - On-Scene Incident commander

Hazardous Materials Awareness

Awareness Level

- Awareness-level responders can:
 - Recognize and identify a hazardous materials emergency.
 - Initiate an emergency response by notifying appropriate authorities.
 - Standby at a safe location until arrival of emergency responders.
 - Deny entry into an area.
- Awareness-level responders take protective actions.

Operations Level

- Responders can:
 - Isolate the area.
 - Take defensive actions without touching the product.
- Act in a defensive fashion.



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Technician Level

- Enter heavily contaminated areas using the highest levels of protection.
- Hazardous materials technicians take offensive actions.



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Specialist Level

- Fire fighters at this level receive more specialized training than a hazardous materials technician.
 - The technician and specialist levels are not very different.
 - The majority of training relates to a specific product or mode of transportation.

Incident Commander

- Responsible for coordinating and controlling all operations
- Must have all certifications to qualify for Incident Commander
- Designated to manage the incident from beginning to end

Incident Command System

- Recognized as a system that is documented to have been successfully used in managing available resources at emergency operations
- Consists of procedures to control:
 1. Personnel
 2. Facilities
 3. Equipment
 4. Communications

SARA Title III

Rights and Responsibilities

- Worker Responsibilities
 - Workers cannot be cited or fined by IDOL, but employers can take disciplinary action for violation or established safety rules.
 - Workers are normally required to follow reasonable workplace safety rules established by the employer and all IDOL regulations.
 - Workers are responsible for wearing required safety equipment.
 - Workers shall seek medical treatment promptly when required.
 - Depending on applicable state law, workers have a right to be treated by a physician of their own choice for work-related injuries. The key here is not to delay medical treatment when necessary.
 - Workers should bring safety and health hazards or concerns to the attention of their supervisor or foreman as soon as possible.

Hazardous Materials Awareness

SARA Title III

Rights and Responsibilities

- Employer Responsibilities
 - To furnish a safe and healthy job and work environment.
 - To comply with OSHA-IDOL Standards
 - To maintain records of injuries and exposures
 - To maintain baseline and subsequent medical physical records as prescribed by law.
- Consensus Standards
 - Standards that were developed and approved based on the recommendations of representatives of a specific industry, trade, profession, etc.

Hazardous Materials Awareness

SARA Title III

Rights and Responsibilities

- Consensus Standards
 - NFPA 471 - Provides detailed methods and operational procedures for responding to hazmat incidents
 - NFPA 472 - Establishes specific knowledge and competence levels that response personnel need for hazardous materials incidents
 - NFPA 473 - Addresses specific competencies needed by emergency medical services personnel

Hazardous Materials Awareness

The Life Cycle of a Hazardous Material

1. Manufactured
2. Stored by manufacturer
3. Transported to producer
4. Used to produce a product
5. Stored by producer
6. Transported to a user or distributor
7. Stored by user or distributor
8. Used by user
9. Transported to a waste treatment facility
10. Treated, stored or disposed

Terms Used in Reference to Hazardous Materials (1 of 17)

- Toxicity
 - TLV (Threshold Limit Values)
TWA (Time Weighted Average)
 - Threshold limit value established for workers based on a safe chemical exposure for eight hours a day for forty hours per week. Unit of measure is Parts Per Million (PPM)
 - PEL (Permissible Exposure Limits)
 - Used by OSHA in its health standards covering exposure. Similar to TLV-TWA

Terms Used in Reference to Hazardous Materials (2 of 17)

- Toxicity
 - TLV-STEL (Short Term Exposure Limits)
 - Threshold value established for a safe (without permanent toxic effects) short-term exposure (15 minutes) for emergency workers. This is more appropriate than TLV-TWA for emergency workers.
 - TLV-C (Ceiling):
 - Threshold limit value that is set just below the concentration that will cause immediate irritation. This limit may not be exceeded for even an instant.

Terms Used in Reference to Hazardous Materials (3 of 17)

- Toxicity
 - IDLH (Immediately Dangerous to Life and Health):
 - The maximum level to which a healthy worker can be exposed for thirty minutes to a chemical and escape without suffering irreversible health effects or escape impairing symptoms.

Terms Used in Reference to Hazardous Materials (4 of 17)

- Toxicity
 - LD50 (Lethal Dose 50%):
 - The concentration of an ingested, absorbed, or injected substance that results in the death of 50% of the population.
 - LC50 (Lethal Concentration 50%)
 - The concentration of an inhaled substance that results in the death of 50% of the population in a specified time.

Terms Used in Reference to Hazardous Materials (5 of 17)

- Radiation
 - Energy that is emitted, transmitted or absorbed in wave or energetic particle form
 - Types:
 - Alpha
 - Beta
 - Gamma
 - Neutron

Terms Used in Reference to Hazardous Materials (6 of 17)

- Radiation
 - Alpha
 - Have a very low penetrating ability
 - Can be stopped by a very thin sheet or paper or outer layer of skin
 - Not an external hazard
 - Ingested or inhaled, become very hazardous

Terms Used in Reference to Hazardous Materials (7 of 17)

- Radiation
 - Beta
 - Low penetrating ability
 - Can be shielded or stopped by thin sheets of metal, plastic, or clothing
 - Can cause burns ranging in severity from minor to extreme
 - Also harmful if inhaled or ingested

Terms Used in Reference to Hazardous Materials (8 of 17)

- Radiation
 - Gamma
 - Not particles, but waves similar to light waves
 - Can be shielded by lead, steel, concrete or water
 - Great penetration powers
 - Is the most dangerous common form of ionizing radiation
 - Causes much cellular damage

Terms Used in Reference to Hazardous Materials (9 of 17)

- Radiation
 - Neutron
 - Radiation is high energy form of ionizing radiation
 - Most penetrating, but not very reactive
 - Very rarely encountered

Terms Used in Reference to Hazardous Materials (10 of 17)

- Etiological Harm
 - Involves exposure to microorganisms or their toxins
- Psychological Harm
 - Stress of dealing with severe trauma, destruction, death or slow pace of incidents
 - Should include a policy to provide assistance

Terms Used in Reference to Hazardous Materials (11 of 17)

- **Boiling Point**
 - Temperature at which the vapor pressure of a material is equal to or greater than atmospheric pressure.
- **Flashpoint**
 - Minimum temperature of a liquid at which it will give off sufficient vapor to form an ignitable mixture with air near the surface.
- **Ignition temperature**
 - Minimum temperature at which a material will ignite without a spark or flame being present.

Terms Used in Reference to Hazardous Materials (12 of 17)

- Explosive (flammable limits)
 - Lower Explosive Limit (LEL): Minimum vapor or gas concentration in air below which a substance will not burn.
 - Upper Explosive Limit (UEL): Maximum concentration of a substance in air above which ignition will not take place.
- Flammable Range
 - Numerical difference between UEL and LEL.

Terms Used in Reference to Hazardous Materials (13 of 17)

- Vapor Density
 - Weight of a volume of pure gas or vapor compared with an equal volume of dry air; useful in determining if a vapor will rise or settle.
- Specific Gravity
 - Weight of a substance compared with an equal volume of water; useful in determining if a material will sink or float in water.

Terms Used in Reference to Hazardous Materials (14 of 17)

- Water solubility
 - Degree to which a material will dissolve in water.
- Toxicity
 - ability of a substance to cause tissue damage; impairment, severe illness, or death when ingested, inhaled, or absorbed by the skin.
- Corrosiveness
 - Destructive to tissue and/or metal.

Terms Used in Reference to Hazardous Materials (15 of 17)

- Radioactivity
 - Materials which emit radiation
- Oxidizing Ability
 - Materials which contain large amounts of free oxygen
- Instability
 - Materials capable of undergoing rapid chemical change.

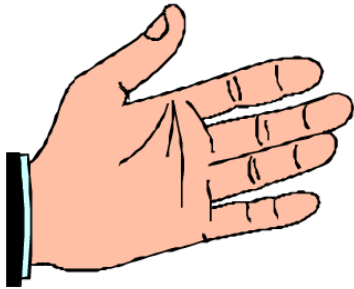
Terms Used in Reference to Hazardous Materials (16 of 17)

- Reactivity
 - Materials that undergo rapid change when exposed to air or water.
- Expansion Ratio
 - Determination of how many volumes of a gas or vapor are produced by the evaporation of one volume of liquid.

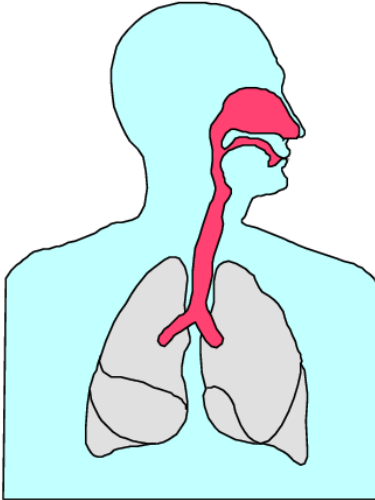
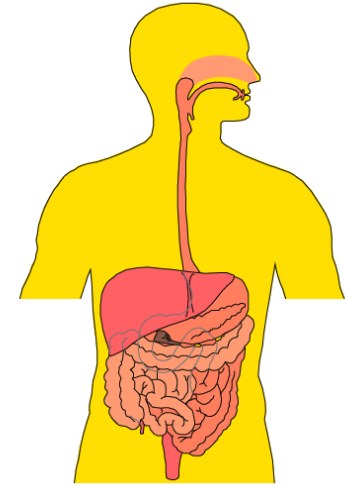
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Routes of Entry for Human Exposure



- Absorption
- Inhalation
- Ingestion
- Injection



Hazardous Materials Awareness

Differences Between Exposure & Contamination

- Exposure
 - Implies being in physical proximity to a hazard.
 - No physical contact has been made
 - Cannot be spread by exposed person to others
 - Severity of any injury depends on the substance involved as well as susceptibility of the individual

Differences Between Exposure & Contamination

- Contamination
 - Implies direct physical contact with a hazardous substance
 - Contaminated individual may be injured by substance
 - Contaminated individual may spread risk to others
 - Severity of injury depends on substance and the individual

Differences Between Acute & Chronic

- Acute
 - Develops quickly usually after exposure at high concentrations of a hazardous substance
- Chronic
 - Takes a long time to develop or requires exposure over a long period of time, usually at low concentrations

Differences Between Internal & External

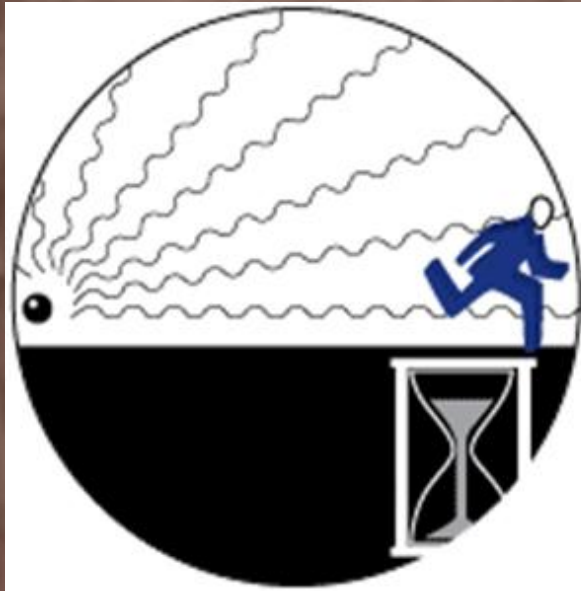
- Internal
 - Develops when a substance enters the body and attacks internal organs.
- External
 - Develops when a substance comes in contact with external tissues.

How Hazardous Materials are Harmful at Incidents

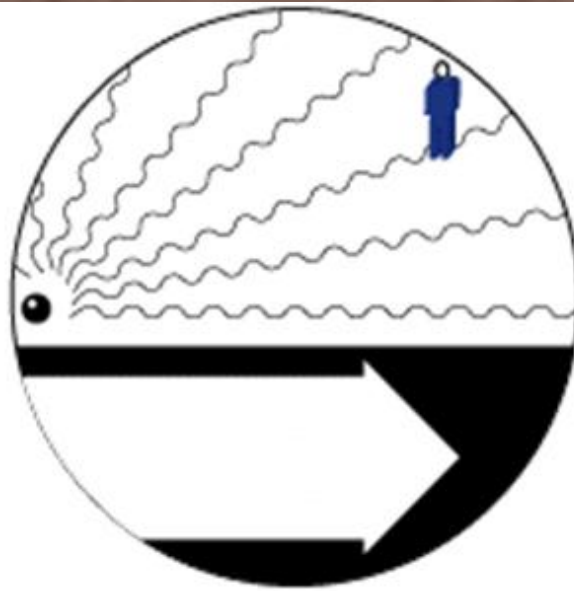
- People
 - Health
 - Evacuation
- Environment
 - Pollution
 - Wildlife Hazard
- Property
 - Contamination (Long Term)
 - Destruction/Non-usage (Long Term)

Hazardous Materials Awareness

Three Methods to Limit Exposure



Time



Distance



Shielding

Hazardous Materials Awareness

Signs and Symptoms of Exposure to Hazardous Materials

- Confusion
- Light-headedness
- Anxiety
- Coughing or painful respiration
- Tingling or numbness of extremities
- Changes in behavior mannerisms
- Unconsciousness
- Dizziness
- Blurred or double vision
- Change in skin color or blushing
- Loss of coordination
- Nausea, vomiting, abdominal cramping and diarrhea

Hazardous Materials Awareness

Health Hazards

- Poisons/Toxins
 - Chemicals which cause disruption or alteration of the nervous system
 - May be classified as nerve poisons, anesthetics, narcotics and organ poison
- Carcinogens
 - Substances which may cause cancer

Health Hazards

- Corrosives

- Substances that cause the chemical degradation of tissues or metals.
- May be classified as acids or bases
 - Acids: substances that denature the protein of tissue ahead of nerve cells
 - Bases: substances that react with fatty tissue to form soap

- Cryogenics

- Substances that have been refrigerated to temperatures of -130 degrees F. or below.
- Cryogenic gases are gases that have been liquefied by the reduction of temperature