Rail Worker's HazMat Pocket Pamphlet

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The dangerous properties of hazardous materials are:

- **Corrosive** – materials that can wear away, corrode or destroy many substances.
- **Ignitable** – materials that can burst into flames.
- **Reactive** – materials that can explode or create poisonous gas when combined with other substances.
- **Toxic** – materials that can poison people and other life.
- **Radioactive** – materials that can emit harmful amounts of radiation.

Risks of hazardous materials in transportation include but are not limited to:

- Chemical Exposure
- Explosion
- Death
- Fire
- Radiation

Note: *It is important to remember that one or more of these may occur simultaneously, producing an extremely hazardous situation.* ***Always be on the lookout for secondary hazards.***

A hazardous materials incident is an uncontrolled release of a hazardous substance into the air, water or land. As a first responder you may be exposed to hazardous materials by:

1. An unintentional release by human error.
2. An accidental release caused by train derailment, vehicle rollover or industrial accident.
3. Defects or leaks in rail cars, transport containers, or other packaging.
4. Terrorist or criminal activities.

Unit 1 – First Responder Awareness

A first responder must know how to identify hazardous materials and the risks associated with them during an incident.

They must also know the responsibilities and role of the first responder trained at the awareness level. (29 CFR 1910.120*)

Move Upwind of the Incident

Warn Others of the Danger

Notify Proper Authorities

*"CFR" refers to the "Code of Federal Regulations"

Unit 2 – Regulatory Agencies

U.S. Department of Transportation (DOT) – Issues and revises the Hazardous Materials Regulations (HMR) to regulate the shipping, packaging and labeling of hazardous materials transported by air, ground and sea. The DOT regulations can be found in Title 49 of the Code of Federal Regulations (CFR). (www.dot.gov)

Federal Railroad Administration (FRA) – Responsible for promoting railroad safety, enforcing safety standards and DOT hazardous materials regulations. (www.fra.dot.gov)

Unit 2 – Regulatory Agencies

Occupational Safety and Health Administration (OSHA) – Part of the U.S. Department of Labor, it is responsible for enforcing the safety and health standards that protect workers on the job. OSHA regulations can be found in CFR Title 29. (www.osha.gov)

Note: *OSHA regulations apply to railroad employees when no specific FRA regulation governs.*

U.S. Environmental Protection Agency (EPA) – Responsible for enforcing the regulations that protect the environment (air, land and water). (www.epa.gov)

National Institute for Occupational Safety and Health (NIOSH) – Makes recommendations for OSHA standards and gives advice to workers and employers. (www.cdc.gov/niosh)

National Institute of Environmental Health Sciences (NIEHS) – Administers a research program and model worker education and training program (WETP). WETP provides hazardous materials training grants. (www.niehs.nih.gov/wetp/)

IMPORTANT OSHA PROTECTIONS:

Emergency Response Plans (ERP) – (29 CFR 1910.120) are required whenever employees are expected to respond to an incident involving hazardous materials, such as cleaning up a spill or extinguishing a fire.

Emergency Action Plans (EAP) – (29 CFR 1910.38(a)) are required when employees are evacuated and not expected to respond to a hazardous materials incident.

OSHA Hazard Communication Standard (29 CFR 1910.1200) gives workers the right to know the identity of and hazards associated with the chemicals they may be exposed to in the workplace.

Unit 3 – Hazardous Materials Regulations

Hazardous Material Regulations (HMR) can be found in Title 49 of the CFR, Parts 100-185. They set the standards for packaging, transporting, and handling hazardous materials including labeling, shipping papers, placarding, loading and unloading requirements. They also specify the training needed for personnel who handle and transport hazardous material. This includes railroad workers.

The DOT defines a hazardous material as:

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety and property when transported in commerce, and which has been so designated. (49 CFR 171.8)

The HMR contain mode specific requirements for hazardous materials transported by air, water, rail and highway. Hazardous materials regulations for rail can be found in 49 CFR Part 174.

Unit 3 – Hazardous Materials Regulations

The HMR defines a hazmat employee as "a person who is employed by a hazmat employer and who in the course of employment directly affects hazardous materials transportation safety".

Most railroad workers meet the definition of a hazmat employee under 49 CFR 171.8.

Training requirements can be found in 49 CFR 172, Subpart H. These requirements include: general awareness/familiarization, function specific, safety training, security awareness training and mode specific.

Also included in the regulations are specific requirements for initial and recurrent training for hazmat employees:

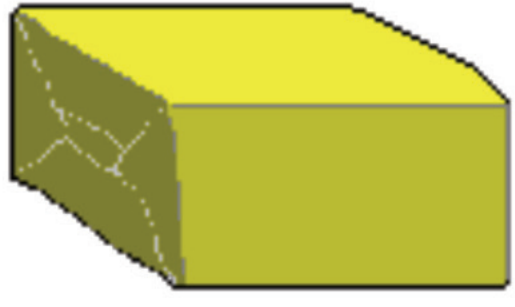
- Must be trained within 90 days of employment.
- Must be trained in the new function within 90 days of the job change. Employees can perform a new job function before completing training if the employee performs a hazmat function under the supervision of a trained and knowledgeable hazmat employee.
- Must receive training at least once every three years.

Unit 4 – Chemical and Physical Properties

All chemical substances are made up of about 100 building blocks called atoms. Each atom is unique and has its own properties. Atoms will link together to form molecules with each molecule having its own distinct chemical and physical properties. It is these properties that determine how a substance looks, feels, smells and acts. These properties also determine how dangerous a substance is.

The physical states of matter are:

Solid



Liquid

Gas

Vapor Pressure (VP) – A measure of a liquid's ability to evaporate and form a vapor (liquid in a gas state). Low VP chemicals are less likely to form high vapor concentrations in the air. High VP chemicals, like acetone and gasoline, evaporate quickly to form high vapor concentrations in the air and create potentially dangerous atmospheres.

Unit 4 – Chemical and Physical Properties

Vapor Density is a measure of how heavy a vapor or gas is compared to air, which has a vapor density of 1. Vapor density tells us how a gas or vapor will initially behave when released. High vapor density (greater than 1) means the vapor is heavier than air and will tend to sink to the ground. Low vapor density (less than 1) means the vapor is lighter than air and will tend to rise, collecting near ceilings.

Fire Triangle refers to fuel, heat and oxygen – all necessary to fire. Ignition temperature is the minimum temperature required to ignite a substance without a spark or flame.

Flammable and Explosive Range is the range of chemical concentration where the fuel-air mixture will ignite. Upper flammable limit (UFL) is the highest concentration that will ignite; lower flammable limit (LFL) is the lowest concentration that will ignite. Between the UFL and LFL, ignition can take place. Above the UFL, the mixture is to rich, and below the LFL, the mixture is too lean for ignition.

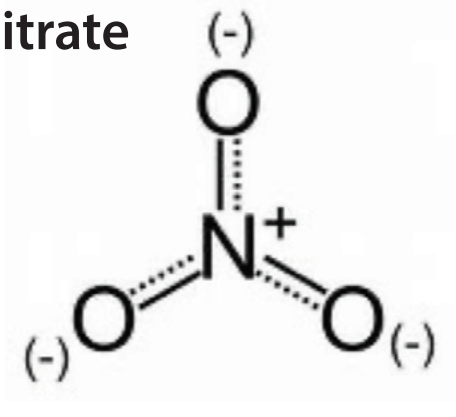
Flash Point is the temperature at which enough vapors are generated to create an ignitable mixture near the surface of a liquid.

Flammable and Combustible Materials – DOT regulations define flammable materials as those that have a flash point of 141° F and below. Combustible materials have a flash point above 141° F and below 200° F.

pH – The pH scale is used to measure how corrosive a material is. Substances with a pH below 7 are acids; those with a pH above 7 are bases. A very high or very low pH means the material is a strong corrosive and will begin to burn, damage, or destroy body tissue on contact.

Oxidizers – A dangerous and unpredictable group of chemicals that contain large amounts of oxygen in their chemical structure. Oxidizers may release oxygen to make combustible materials burn hotter and faster. They may also explode when exposed to heat, shock or friction.

Nitrate



"All substances are poisons; there is none which is not; the dose differentiates a poison from a remedy". – *Paracelsus 1493-1541*

Toxicology is the study of harmful effects of chemicals on humans and the environment. **Toxicity** is used to describe the potential of a chemical to produce harmful effects.

Other factors that contribute to this determination are:

- Duration
- Dose
- Routes of entry
- Personal factors

Unit 5 – Health Effects

Chemicals do their damage to human cells by killing the cell or altering the DNA of the cell.

All substances, given the right amount, have the potential to harm your body; this is referred to as ***biological effects***. Biological effects may be:

- **Acute** – occurs during or soon after exposure.
- **Chronic** – may not be seen until 10 or 20 years after exposure.

Unit 5 – Health Effects

Exposure is coming into contact with a substance.

Acute exposure is a single exposure to a hazardous substance over a short time period.

Chronic Exposure is repeated or continuous exposure to a chemical for an extended period of time.

Unless you get regular medical checkups, repeated exposures to low levels of chemicals can go undetected.

Routes of Entry are the way chemicals enter the body. The three most common routes are:

Inhalation

Absorption

Ingestion

After chemicals enter the body, the organs they affect are called target organs. **Examples of target organs include:**

- Lungs
- Digestive system
- Liver
- Kidneys

Dose is the total amount of a substance taken into the body.

Unit 6 – Hazard Recognition

Hazard recognition is the act or process of identifying potentially dangerous conditions or situations. Hazard recognition starts by looking for the following clues:

- Shipping papers
- Placards
- Labels
- Markings
- Container shape and design

Shipping papers must be readily available during transport and contain the following information:

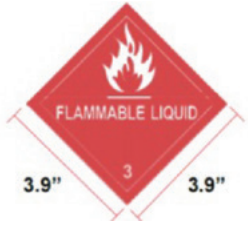
- Proper Shipping Name
- Hazard Class and Division Number
- Four-digit Identification Number
- Packing Group Number
- Emergency Phone Number
- Total Quantity
- Reportable Quantity (RQ)
- Shipper's Certification

In addition, shipping papers must be accompanied by emergency response information for the commodity.

Placards, Labels and Markings

Placards are diamond-shaped – 10 ¾ x 10 ¾ inches – and are required on each side and each end of vehicles or bulk containers carrying hazardous materials.

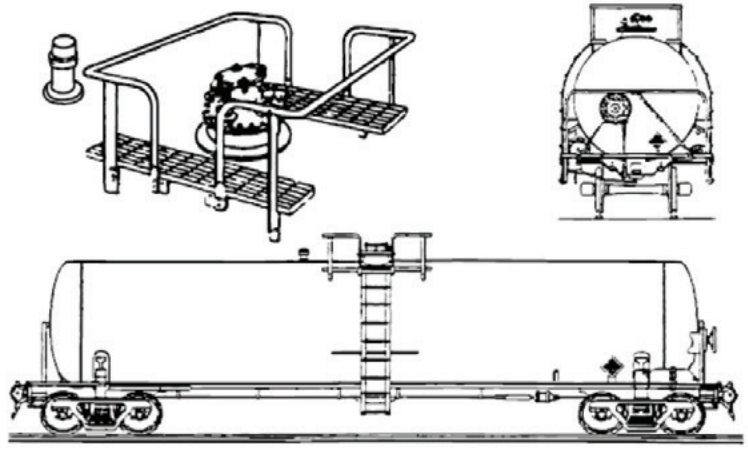
DOT Labels are 4-inch diamonds on non-bulk packages of hazardous materials.



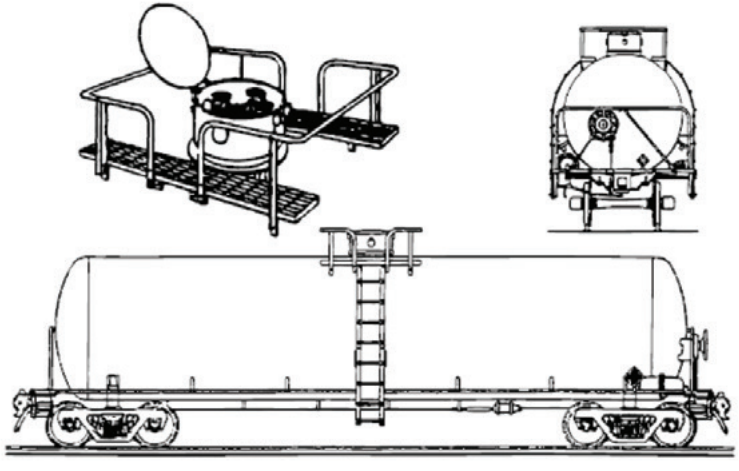
Markings are information required on the outside of a package or container of a hazardous material.

In addition to placards, labels, and markings, car type can provide clues whether hazardous materials are being transported. Tank cars come in two types – pressure and non-pressure.

Non-pressure tank cars can be identified by the following features: Flat or rounded ends designed for pressures below 100 psi, exposed fittings visible at the top of the car, and bottom outlets for unloading product.



Pressure tank cars can be single- or double-shelled and typically transport liquefied compressed gases. They can be identified by the following features: Head shields (heavy steel plates at the ends of some tank cars), bonnet (dome cover) located on top of the car, and rounded ends designed for pressures up to 600 psi.



Intermodal tanks can be pressure or non-pressure tanks and are used to transport toxic, corrosive and flammable liquids.

Unit 7 – DOT Hazard Communication

Communication devices include placards, labels and markings.

The placarding system is based on nine hazard classifications:

<u>Class 1</u> – Explosives – orange in color and have no identification number located on them.

<u>Class 2</u> – Gases – Flammable gas is red, non-flammable gas is green, poison gas is white with black lettering.

Class 3 – Flammable liquids – all red; combustible liquids – all red or red with bottom white triangle.

Class 4 – Flammable solid – red and white vertical stripes; spontaneously combustible – red in the lower half and white in the upper; dangerous when wet – blue background with white lettering.

Class 5 – Oxidizers – yellow. **Organic peroxides** – red over yellow. (Note: The all-yellow 5.2 placard is no longer used in rail; it will be retired in 2014 in trucking.)

Unit 7 – DOT Hazard Communication

Class 6 – Poisonous/Toxic material (not gases) have a white background and black lettering.

Class 7 – Radioactive is white and yellow with black lettering and has the tri-foil symbol at the top.

Class 8 – Corrosives are black on the bottom and white on top with the corrosive symbol on top and lettering is white.

Class 9 – Miscellaneous hazardous materials have black and white vertical stripes on top with a white bottom. (Note: UN ID numbers are required in this class but placards are not.)

Note: *Toxic Inhalation Hazards (TIH), both Class 2 gases and Class 6 solids and liquid, are identified by a black diamond and white skull and crossbones at the top of placard. These are deadly poisons.*

Certain commodities in hazard classes 1.1, 1.2, 2.1, and 6.1 require a placard on a white square background for rail, as do Highway Route Control Quantities of radioactive material.

Bulk and non-bulk packaging is defined as follows:

Bulk – A container with a maximum capacity greater than 119 gallons or 1001 lbs. (i.e., tank cars, hopper cars, etc.)

Non-Bulk – A container with a maximum capacity of 119 gallons or less or 1000 lbs. or less (i.e., drums, boxes, cylinders etc.)

Subsidiary Placards – Some shipments of hazardous materials have a secondary hazard and will display two placards. These are called subsidiary placards and can be readily identified by their lack of an identification number.

Dangerous Placard – This placard is used for non-bulk packages only. It will not be displayed on a tank car or hopper.

The following hazard classes may not display the dangerous placard:

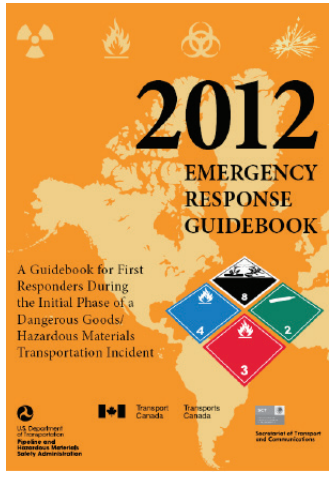
- Explosives 1.1, 1.2, 1.3
- Poison/Toxic Gas 2.3
- Dangerous when Wet 4.2
- Organic Peroxide 5.2
- Poison/Toxic Material (TIH) 6.1
- Radioactive 7 (Yellow III label)

Unit 7 – DOT Hazard Communication

Labels – Labels are generally not visible because they are on non-bulk packages. Packages can require subsidiary labels.

Markings – Markings on a package are used to inform transportation workers and emergency response personnel about the package contents.

Unit 8 – Emergency Response Guidebook (ERG)



The Emergency Response Guidebook (ERG) is a resource that helps first responders make informed decisions about what actions to take during a transportation incident involving hazardous materials.

- **White Front Pages** – Contain information on how to use the book, safety precautions, who to call for assistance, hazard classification system, table of placards, rail car and road trailer identification chart, and inter-modal hazard ID codes.

Unit 8 – Emergency Response Guidebook (ERG)

- **Yellow Pages** – List hazardous chemicals numerically by I.D. number.
- **Blue Pages** – List hazardous chemicals alphabetically by proper shipping name.
- **Orange Pages** – Contain 62 emergency response guides for groups of materials with similar chemical and toxic characteristics.
- **Green Pages** – List recommended initial isolation distances and protective action distances for toxic inhalation hazards (TIH) or water reactive materials.

- **White Back Pages** – Contain information on protective clothing, fire and spill control, criminal and terrorist use of chemical, biological, and radiological agents, protective distances for BLEVE (boiling liquid expanding vapor explosions) and IEDs (improvised explosive devices), and glossary.

The ERG meets the requirement for having emergency response information if not included with shipping papers.

It is not chemical specific and distances recommended are only for the initial response phase of an incident.

- Safety Data Sheet (SDS) or Material Safety Data Sheet (MSDS)
- New Jersey Hazardous Substance Fact Sheet (NJHSFS)
- NIOSH Pocket Guide To Chemical Hazards

The OSHA Hazard Communication Standard (29 CFR 1910.1200) requires chemical manufacturers and importers to evaluate hazard potential of chemicals they produce and import. The SDS (replacing MSDS) is a manufacturer-produced technical document outlining the properties, hazards, and safe use and handling of each chemical. Employers must make SDSs accessible to workers and must train workers to read and understand the SDSs.

The NJHSFS provides easy-to-understand information about many chemicals. It has a standard format for all chemicals, is comprehensive and yet is printed in laymen's terms. It was developed by the NJ Department of Health and Senior Services and can be found at http://web.doh.state.nj.us/rtkhsfs/factsheets.aspx.

The NIOSH Pocket Guide (http://www.cdc.gov/niosh/npg/) provides information for hundreds of chemicals or chemical groupings used in the workplace or transported in commerce. Recommendations by NIOSH are strongly considered in the development of OSHA permissible exposure limits.

Unit 10 – DOT Security Awareness

Hazardous materials are essential to the economy of the United States. But, in the wrong hands, they can pose a significant threat. So, DOT requires railroads to develop and implement security plans and to train their employees about their role in security.

Security awareness training provides overall awareness of DOT requirements regarding security risks associated with hazardous materials transportation and methods to enhance transportation security, including how to recognize and respond to possible security threats. Requirements for this training are found in 49 CFR 172.704.

Unit 10 – DOT Security Awareness

Security Plans – Carriers are required to assess the security risks of transporting hazardous materials and to address those risks. (49 CFR 172.800) At a minimum, security plans must address:

- Personnel Security
- Unauthorized access
- Enroute Security

Security plans must be in writing and retained for as long as they remain in effect. Plans must be revised and updated as necessary to reflect changing circumstances.

Unit 11 – Safety and Health Websites

DOT – www.dot.gov

Pipeline & Hazardous Materials Safety Administration – www.phmsa.dot.gov

National Institutes of Health (NIH) – www.nih.gov

NIEHS – www.niehs.nih.gov

NIOSH – www.cdc.gov/niosh

OSHA – www.osha.gov

Rail Hazmat Regional Peer Trainer:

Trainer _____

Phone: _____ Email: _____

For further information go to:

http://hazmatworkerrailtransport.com

or call

301-967-4704

Peer trainers dedicated to providing quality education and awareness of hazardous materials, empowering rail workers and communities