

## **MAJOR PROGRAM POINTS**

# **"UNDERSTANDING HAZARDOUS MATERIALS LABELING"**

**Part of the "GENERAL SAFETY SERIES"**

**Quality Safety and Health Products, for Today...and Tomorrow**

# Outline of Major Points Covered in the "Hazardous Material Labels" Course

The following outline summarizes the major points of information presented in the course on "Hazardous Material Labels". The outline can be used to survey the course before taking it on a computer, as well as to review the course when a computer is not available.

- **How can you tell the difference between a non-hazardous chemical and a hazardous one? By its smell?**
  - Some HAZMATs have none... while a number of safe materials have a foul odor.
- **By how it looks?**
  - In appearance, some HAZMATs are indistinguishable from water.
- **By the emission of vapors?**
  - A number of the deadliest HAZMATs release gases that are invisible to the naked eye... while harmless water vapor can look ominous under certain conditions.
- **In truth, many HAZMATs can seem harmless... at first.**
  - But if you treat them as if they are harmless, the results can be devastating.
- **Mishandling HAZMATs can lead to:**
  - Fire.
  - Explosion.
  - Serious burns.
  - Cancer.
  - Blindness.
  - Brain damage.
  - Pollution so severe that it can render areas uninhabitable.
- **No matter what its potential effects, the only way you can handle any hazardous chemical properly is to know its characteristics.**
  - Only then will you be able to work with it safely.

- **One of the best ways to provide people with information about hazardous materials is through a container label.**
- **In fact, "labeling" containers is so important that OSHA, the Department of Transportation (DOT) and the Environmental Protection Agency (EPA) have all established labeling requirements for the materials that they regulate.**
  - The DOT and the EPA have even developed their own labeling systems.
- **As you would suspect, the Department of Transportation's labeling system is used with materials that are transported. The labels address issues such as:**
  - Preventing shocks.
  - Keeping incompatible materials away from each other.
- **To keep workers safe in all types of situations, the Occupational Safety and Health Administration (OSHA) has incorporated two types of labeling requirements in the Hazard Communication Standard (1910.1200).**
  - First, OSHA requires the manufacturers, importers and distributors of hazardous chemicals to label all containers of these substances that leave their facilities.
- **These labels must include:**
  - The name of the hazardous chemical.
  - Appropriate hazard warnings.
  - The name, address and telephone number of the manufacturer, importer or distributor.
- **But OSHA doesn't stop there.**
  - They also require companies that use HAZMATs to attach warning labels to any other containers, such as mixing vats or "secondary" containers, that hazardous substances are transferred into.

- **The focus of the Environmental Protection Agency (EPA) is on hazardous waste.**
  - Any containers of hazardous materials that are being disposed of must have labels that identify each of the materials in the containers, no matter how thoroughly they are blended with the rest of the waste.
  - EPA waste labels must also include the originating company's name, address and telephone number.
  
- **While the labeling requirements of the various government agencies have some significant differences, they have some things in common, as well.**
  - First, labels must be firmly attached to their containers.
  - Second, hazardous materials labels must be displayed prominently, so that they are easily noticed by anyone working with the container.
  - Third, the information on all labels must be legible.
  
- **Because hazard information can be shown in a number of ways, several different types of labels have been developed.**
  
- **The four labeling systems that are used most often with HAZMATs are:**
  - EPA and state Hazardous Waste Labels.
  - Hazardous Materials Identification System (HMIS) labels.
  - National Fire Prevention Association (NFPA) labels.
  - Department of Transportation's Hazard Class labels.
  
- **Under federal law, EPA-approved "hazardous waste labels" must be attached to all containers holding waste that may be harmful to human health or the environment.**
  - The labels must identify the contents of the waste containers.
  - They must also include the originating company's name, address and telephone number.

- **An EPA "waste identification number" must be provided for each discarded substance.**
  - These are assigned by the EPA based on a description of the materials in the container.
  - This identifier must then be displayed on the hazardous waste label, along with the waste's DOT proper shipping name, and, if it has one, its UN number.
- **To prevent confusion, all other labels must be removed from the container before a hazardous waste label is attached.**
- **Some states use their own hazardous waste labels instead of the federal labels.**
  - You may need to check with your state's Department of Environmental Resources to determine which label to use.
- **In addition to the waste label, a "workplace accumulation label" must be attached to a container if it holds a mixture of two or more discarded chemicals.**
  - These accumulation labels identify the individual materials that make up the waste.
- **If a leaking container must be placed into an over-pack drum, a hazardous waste label must also be placed on that drum.**
- **Most importantly, never put a hazardous waste label on any container that does not hold waste.**
- **But if you find a chemical container that is unlabeled, you must treat it as if it contains hazardous materials until proven otherwise.**
  - This means that everyone should stay away from the container.
  - Your supervisor or safety manager should be informed immediately.

- **While hazardous waste labels are only used with discarded substances, the labeling systems that we will look at next identify materials that are being stored or are used in manufacturing or maintenance activities.**
- **HMIS labels address OSHA's labeling requirements for the end users of hazardous chemicals.**
  - The HMIS was originally developed by the National Paint and Coatings Association (NPCA) to aid its members in complying with these requirements.
- **This system groups hazards into three color-coded categories:**
  - Blue for health.
  - Red for flammability.
  - Yellow for reactivity.
- **Numbers are used within each category to indicate the degree of hazard. In the "Health" category:**
  - **4:** Deadly.
  - **3:** Extreme Danger.
  - **2:** Dangerous.
  - **1:** Slight Hazard.
  - **0:** No Hazard.
- **In the "Flammability" category:**
  - **4:** Materials that have flash points below 73°F and boiling points below 100°F.
  - **3:** Substances with flash points below 100°F.
  - **2:** Chemicals with flash points below 200°F.
  - **1:** Materials with flash points above 200°F.
  - **0:** Substances that will not burn.

- **In the "Reactivity" category:**
  - **4:** Substances that are capable of exploding at normal temperatures and pressures.
  - **3:** Materials that can be detonated by a strong initiating source, such as heat, shock or water.
  - **2:** Substances that are capable of violent chemical changes at normal or elevated temperatures and pressures.
  - **1:** Chemicals that may become unstable at elevated temperatures and pressures, or when mixed with water.
  - **0:** Substances which will not detonate under any conditions.
- **Here's how this system works. An HMIS label for gasoline would have:**
  - A "1" in the blue space, since gasoline is only a slight health hazard.
  - A "3" in the red space, because it can ignite at below 100°F.
  - A "0" in the yellow space, since it won't detonate.
- **In addition to this numbering system, the personal protective equipment (PPE) that should be worn when handling the substance is indicated at the bottom of every HMIS label.**
  - It is identified by the capital letters "A-K."
- **By consulting charts and wallet cards showing what each letter stands for, it's easy for workers to see what level of protection is needed.**
  - For example, the capital letter "C" shows that workers should wear safety glasses, gloves and a synthetic apron.
  - If the personal protection column is marked by an "X", special handling is required.
  - You can get additional information from the material's MSDS or your supervisor.
- **Some variations of the HMIS system use pictograms instead of letters to indicate what PPE should be worn.**

- **HMIS labels may also display "target organ" information stickers as well.**
  - These indicate that specific organs can be affected by the substance.
- **You also need to watch for an "asterisk" in the health hazard section of an HMIS label.**
  - This indicates that the substance is a chronic health hazard, and that repeated exposure to it might cause health problems.
- **If you encounter labels that contain any of these special warnings, consult the material's MSDS or ask your supervisor for instructions.**
- **The next type of label we will look at, from the National Fire Prevention Association (NFPA), is also divided into colored sections.**
- **NFPA labels are similar to HMIS labels in that they can be found wherever chemicals are used or stored.**
  - Where they differ is that their focus is on information that is important when a chemical is involved in a fire, such as whether it reacts with water.
- **NFPA labels:**
  - Are diamond-shaped.
  - Use four color-coded sections to convey hazard information.
  - The colors are red, yellow, blue and white, each representing a type of hazard.
- **Like the HMIS system, NFPA labels use the numbers zero through four to indicate the severity of the hazards in each color category.**
  - On this scale, zero is nonhazardous, while four is extremely hazardous.

- **The colored sections provide information about specific types of hazards.**
  - The red zone at the top of the label shows the material's degree of flammability, a special interest for a fire control agency such as the NFPA.
  - On the right, the yellow section indicates the stability of the substance.
  - On the left, the blue quadrant tells you how likely the substance is to cause health problems.
  - At the bottom of the label, the white area uses icons to indicate if the substance is a special hazard.
  
- **Three of the most frequently seen special-hazard icons represent:**
  - Radioactive materials (indicated by the international symbol for radioactivity).
  - Water-reactive materials (identified by the capital letter "W" with a line drawn through it).
  - Oxidizers (designated by the capital letters "OX").
  
- **Water-reactives and oxidizers present particular fire-control issues.**
  - By including information about these substances on their labels, the NFPA makes workers and firefighters aware that these materials pose special fire hazards... so that they can be approached and handled appropriately.
  
- **NFPA labels show that a lot of information can be provided in a small space. The next category of labels we'll look at also does this, but in a different way.**
  - These are the Department of Transportation's (DOT) Hazard Class labels.
  
- **DOT labels are used on materials that are transported.**
  - You will see DOT labels on all sorts of containers, as well as the sides of trucks, trains and other vehicles used to carry HAZMATs from one place to another.

- **For quick identification, the DOT has grouped hazardous materials into nine "classes," each representing a specific type of hazard.**
  - A number of the classes are broken down into smaller sub-categories, called "divisions."
  - Each class and division is identified by a number, from 1 to 9, that can be found at the bottom of each DOT label.
  
- **Class 1 is made up of explosives.**
  
- **Division 1.1 consists of mass explosion hazards.**
  
- **Division 1.2 contains projection hazards.**
  - These substances can launch solid chunks of material through the air.
  
- **Division 1.3 covers fire hazards.**
  
- **Division 1.4 is made up of materials that are neither mass explosion nor projection hazards.**
  - For example, an explosion of one of these substances would only affect a small surrounding area, not an entire building.
  
- **Division 1.5 is comprised of very insensitive explosives or blast agents that must be purposefully detonated.**
  - Although they are capable of exploding on their own, these materials are so inert that the chances of accidental detonation are extremely low.
  
- **Division 1.6 includes extremely insensitive detonating articles.**
  - Similar to materials in Division 1.5, the items in this class are even less sensitive to accidental detonation.
  
- **Class 2 consists of all gases.**
  - It includes any materials that are gaseous at 68°F (20°C) or less at standard sea-level, whether they are flammable, non-flammable, toxic or inert.
  - This class is broken into three divisions.

- **Division 2.1 is made up of flammable gases.**
- **Division 2.2 includes non-flammable, non-toxic compressed gases.**
- **Division 2.3 covers gases that are toxic by inhalation.**
- **Class 3 is comprised of flammable liquids, specifically those with flash points below 141°F (60°C).**
- **Class 4 is made up of flammable solids.**
  - It also includes spontaneously-combustible and water-reactive materials.
  - This class has three divisions.
- **The first of these, Division 4.1, consists of flammable solids. This group is further broken down into three subdivisions:**
  - Wetted explosives, which cannot detonate when they are dry.
  - Self-reactive materials that are likely to catch fire if exposed to heat or certain contaminants.
  - Readily-combustible solids that can cause fires through friction, like matches.
- **Division 4.2 contains spontaneously combustible materials.**
- **Division 4.3 consists of dangerous-when-wet chemicals, which ignite upon contact with water.**
- **Class 5 contains only two divisions:**
  - Division 5.1, which consists of oxidizers.
  - Division 5.2, made up of organic peroxides.
- **Class 6 includes all poisonous substances.**
  - Class 6 has two divisions.
- **Division 6.1 is comprised of "toxic materials".**
- **Division 6.2 covers all infectious substances.**
  - It encompasses any microorganisms that cause diseases in humans or animals.

- **Class 7 is made up of all the radioactive materials.**
- **Class 8 contains corrosives.**
- **Class 9 is called "Miscellaneous Hazardous Materials."**
  - It includes any substance that doesn't clearly fit into one of the other eight categories.
- **All of these hazard classes are identified by diamond-shaped labels that can be found on:**
  - Barrels.
  - Cylinders.
  - Shipping containers.
  - Vehicles (the labels on vehicles are often called "placards").
- **In order to ensure their visibility, DOT labels have strict design requirements.**
  - For example, labels on containers must never be smaller than 3.9 inches (100mm) on each side.
  - This allows workers to identify the labels from ten to fifteen feet away.
- **Vehicle placards must be significantly larger than container labels, since the placards are most often viewed while they are in motion and from a distance.**
  - The DOT requires that placards measure at least 10.75 inches (273 mm) on a side.
- **No matter what their size, all DOT labels display symbols at the tops of their diamonds.**
  - These icons designate the various hazard classes.
- **Directly opposite these symbols, at the bottom of all DOT labels, you will find numbers that are unique to each hazard class.**
  - These help to rapidly identify a substance, especially during emergencies.

- **In addition to their symbol and number systems, DOT labels also share a color-coding scheme.**
  - If a label is too far away to be read, color-coding allows emergency responders to determine which DOT hazard class the material belongs to.
  
- **The following are the DOT color codes:**
  - **Red** means flammables and combustibles... both solids and liquids.
  - **Orange** stands for explosives.
  - **Yellow** indicates oxidizers and oxygen.
  - **Yellow, black and white** on the same label designate radioactive materials.
  - A **half-black, half-white** diamond identifies corrosives.
  - **White** signifies toxins, poisons and infectious substances.
  - **Blue** denotes water-reactive chemicals.
  - **Green** indicates non-flammable substances.
  
- **When this color-coding is used in conjunction with chemical ID numbers and the DOT's officially-recognized group of symbols, the result is an easy-to-use, comprehensive labeling system that can identify any sort of substance.**
  
- **The DOT system is used primarily in North America.**
  - Some DOT labels do have one feature that is recognized world-wide, however... they use UN Identification Numbers.
  - The chemical ID numbers that appear on these labels are part of an international identification system developed by the United Nations.
  - Under this scheme, each type of substance is assigned a unique four-digit number.
  
- **In a hazardous materials incident, UN numbers can be a crucial source of information for responders, and help HAZMAT crews to bring events quickly under control.**
  - In fact, the yellow section of the *North American Emergency Response Guidebook* is arranged according to UN number.

- **We've seen that DOT labels and UN numbers work in unison to allow quick identification of HAZMATs.**
  - When you know how to read these... and the other kinds of HAZMAT labels... you're well on your way to working safely with these dangerous substances.
- **While the four labeling systems we've looked at use somewhat different methods to convey information about hazardous chemicals, they all accomplish the same thing... to provide us with the knowledge we need to work with the materials safely.**

**\* \* \* SUMMARY \* \* \***

- **Always look for labels on any containers you encounter.**
  - Read them carefully, and pay attention to their warnings.
- **When a label recommends wearing personal protective equipment... do it!**
- **Know all the labeling systems thoroughly.**
  - Learn the various color codes.
  - Be familiar with all symbols.
  - Memorize the substance categories.
- **In a HAZMAT situation, the knowledge gained from container labels could mean the difference between a small incident and a disaster!**
- **If you're not sure what a label means, ask your supervisor.**
- **If you are responsible for labeling containers, make sure that it's done correctly.**
- **Hazardous materials can come in a broad range of "innocent" guises... but they can cause serious harm, nonetheless!**

- **By making sure that all HAZMAT containers are labeled, and always paying attention to the information that these labels contain, you can help to keep your workplace safe from chemical hazards!**