

HANDLING HAZARDOUS MATERIALS

COURSE OUTLINE

- **Hazardous materials are all around us, every day.**
 - Even simple activities, like cleaning your home, can expose you to dangerous chemicals.
 - Areas that "appear" safe, such as your kitchen or garage, often contain a number of hazardous materials... ranging from tile cleaners to charcoal briquettes.
- **At home, these hazards usually exist on a small scale. But at work, hazardous chemicals can frequently be found in large quantities as well.**
 - They can also exist in more concentrated forms... which makes them even more dangerous.
- **This is why you need to be especially cautious when you are working with chemicals on the job.**
 - You must know how to properly handle the chemicals you work with, because accidents involving hazardous substances can result in serious injuries... even death.
- **To know how to handle a hazardous chemical, you need to know what its characteristics are... and what makes it hazardous.**
 - In this program, we will describe the major types of hazardous materials... and take a close look at how to work with them safely.
- **According to OSHA's Hazard Communication Standard, a hazardous chemical is defined as any material which poses either a physical or a health hazard.**
- **Physical hazards get their name from their hazardous physical characteristics, such as:**
 - Flammability.
 - Oxidization.
 - Combustibility.
 - Explosiveness.
- **These are all attributes which are measurable under laboratory conditions.**

- **Health hazards, however, are difficult to measure in a laboratory.**
 - More often, they are identified by how they affect the body.
 - If a material causes illness or death, then it is labeled a health hazard.
- **Health hazards can cause a broad range of problems, including:**
 - Shortness of breath.
 - Neurological conditions.
 - Organ failure.
- **Physical hazards can be broken down into a number of categories. Two of the most common are:**
 - Flammables.
 - Combustibles.
- **Chemicals that belong to this category can readily catch fire. They include:**
 - The gasoline that runs your car.
 - The kerosene used in space heaters.
- **Many flammables and combustibles exist in liquid form.**
 - But it is not the liquid itself that can ignite... it's really the vapors that the liquid gives off which can burn.
- **Because flammables and combustibles are similar, sometimes it's hard to know which is which.**
 - The key to telling whether a chemical is flammable or combustible is its "flashpoint."
 - This is the temperature at which a chemical releases the vapors that can burn.
- **Materials that have a flashpoint less than 100°F (38° C) are considered flammable.**
 - Gasoline, for example, has a flashpoint of -45° F (7° C), which means it is almost always giving off vapors that can burn.
- **Combustible liquids have a flashpoint between 100°F (38°C) and 200°F (93°C).**
 - Combustibles, such as kerosene, are much easier to control than flammables.
 - This is because they usually have to be heated before they will produce ignitable vapors.

- **But fuels aren't the only type of flammables and combustibles that you have to worry about.**
 - You also need to be cautious around materials such as paints and fertilizers.
- **A cigarette accidentally tossed into a container of these materials could cause a devastating fire.**
 - To help prevent these types of accidents, always keep flammables and combustibles in an approved storage area, far away from possible sources of ignition.
- **Next, let's look at an even more dangerous class of materials... explosives.**
 - TNT and nitroglycerin are examples of substances that can release devastating amounts of energy very quickly.
 - These discharges are called "explosions" or "detonations."
- **Fortunately, the use of explosives is highly regulated.**
 - As a result, they are not found in most workplaces.
 - If you are going to be working around explosive materials, you will receive the training you need to handle them properly.
 - Ask your supervisor if you have any questions about explosives in your facility.
- **Another type of chemical that you need to be aware of is called an "oxidizer".**
 - Unlike explosives, this kind of chemical doesn't blow things up.
 - Even so, they can be just as dangerous.
- **An oxidizer... such as sodium nitrate... can quickly enrich the atmospheric oxygen content, which normally doesn't exceed 25%.**
 - Above this level, the air itself becomes combustible... making it more likely that a spark or other ignition source will cause a fire or an explosion.
 - So you must be especially cautious using oxidizers when there are flammables, combustibles or explosives nearby.
- **While substances that present physical hazards can certainly be dangerous, they aren't the only threats that you face in the workplace.**
 - It is also important to be careful when you are handling chemicals that are health hazards.
 - They can have a devastating effect on your well-being too.

- **Adverse health effects are classified as either "acute" or "chronic."**
 - Acute effects, like burns or skin rashes, occur rapidly.
 - Chronic effects, like liver disease or many types of cancer, take a long time to develop.
- **Acute and chronic health effects differ in how long they take to damage the body... but both follow the "duration of exposure" rule.**
 - The "duration of exposure" is the period of time that you are exposed to a substance... such as the interval between getting a chemical on your arm and washing it off.
 - This rule states that the longer that you are exposed to any chemical, the greater the potential hazard will be.
- **Short periods of exposure to a health hazard often have an acute effect on the body, but one that causes no long-term health problems.**
 - Chronic health effects are most often caused by repeated long-term exposure to a chemical.
 - For example, smoking for many years might lead to emphysema or lung cancer.
- **In addition to being defined by whether they cause acute or chronic health effects, chemicals that present health hazards are also divided into groups or "classes".**
 - These groupings are based on the ways that the chemicals can damage the body.
 - They are also based on the safety precautions that you need to take when using the chemicals.
- **"Corrosives" are chemicals that can dissolve other substances.**
 - They include both acids and bases.
 - For example, sulfuric acid is a corrosive that is used in thousands of facilities.
 - But if it is not handled carefully, it could cause serious... even permanent... injury.
- **Even though it is a base, caustic soda is also a corrosive that is commonly used in:**
 - Soaps.
 - Detergents.
 - Water treatment processes.

- **Another class of chemicals... "irritants"... are somewhat similar to corrosives.**
 - But an irritant generally won't produce the severe effects that most corrosives cause.
 - In fact, irritants such as ammonia and antifreeze are often diluted forms of corrosives.
- **But don't let this fool you into thinking that irritants are danger-free.**
 - They can still blind or burn you.
 - If an irritant is swallowed... it could even kill you.
 - However, normally irritants aren't quite as potent as corrosives.
- **Another class of health hazards... "toxic substances"... can pose a very serious threat to your well-being.**
 - And unlike corrosives and irritants, toxic substances have the potential to disrupt physical processes such as breathing and coordination.
- **Many janitorial products, including ammonia-based cleaning fluids, are potentially toxic.**
 - If they are mixed with other incompatible cleansers, the results can be deadly.
- **While toxic substances usually produce acute symptoms, exposure to "carcinogens" can have chronic effects which may not be seen for years.**
 - Carcinogens are linked to cancer, which can lead to debilitating health problems... even death.
- **Some carcinogens, like vinyl chloride, even target specific organs, such as the:**
 - Liver.
 - Kidneys.
 - Lungs.
- **In a healthy organ, the cells follow a "pattern" in order to reproduce and grow.**
 - Carcinogens cause cells to grow abnormally by disrupting this pattern.
 - This creates cancer cells, which may eventually prove to be fatal.
- **Knowing the types of chemicals you may encounter is just the first step in protecting yourself from their hazards.**
 - To prevent exposure you also need to know what chemicals are being used where you work.

- **You should pay especially close attention to the substances in your work area.**
 - Examining the labels on chemical containers is a good place to start.
- **A container label not only lists the name of the material inside the container, it also provides information about the material's characteristics and hazards.**
 - In addition, a container label will indicate any special storage instructions, such as for shock-sensitive materials like explosives.
 - The manufacturer may include other safe-handling instructions on the label as well.
 - The label will also be dated, so that your facility can keep track of time-sensitive materials (this is especially important for substances that could change into a dangerous form if they are not used in a specified period of time).
- **While a container label can provide a lot of important information about a chemical, only a Safety Data Sheet (SDS) will give you detailed information about the chemical's:**
 - Ingredients.
 - Properties.
 - Hazards.
- **The SDS also lists the personal protective equipment (PPE) that you are required to wear while handling the chemical.**
- **Information on what you should do in the event of a spill, leak or other accident is included on the SDS as well.**
- **Once you have looked at a chemical's label, and read its SDS, you should have all the information you need to work with the chemical safely.**
 - If you still have questions, consult your supervisor.
- **While most people encounter hazardous chemicals in the facilities where they work, others have to deal with transporting hazardous materials from one place to another.**
 - Fortunately, there are special regulations and guidelines to aid workers who move hazardous materials from place to place.
- **The Department of Transportation (DOT) has created these "Hazardous Materials Regulations" (HMRs) to also cover anyone who:**
 - Prepares hazardous chemicals for transport.
 - Ensures that safe handling procedures are being followed.

- **The HMRs help workers by establishing guidelines for:**
 - Packaging.
 - Labeling.
 - Shipping.
 - Emergency response procedures.
- **Despite having all the information the label and SDS can give you about the chemicals you are working with, accidents can still happen.**
 - That's why it's important to learn first aid procedures for treating chemical-related injuries.
- **You should always know the location of the nearest source of running water.**
 - It's your first line of defense against chemical injuries.
 - In most cases you will need to quickly drench the victim with water.
 - For small chemical splashes, immerse the affected area in running water for at least 15 minutes.
- **For larger exposures, get the victim to a safety shower as quickly as possible.**
 - Remove their contaminated clothing.
 - Keep them under the shower stream for at least 15 minutes.
- **If a coworker has chemicals in their eyes, get them to an eye wash station immediately.**
 - Again, they must keep their eyes open and in the stream of water for at least 15 minutes... or until professional medical help arrives.
- **Inhaling hazardous materials can also be dangerous... even deadly.**
 - If someone is overcome by fumes, get them out of the area and into fresh air.
 - Check the chemical's container label or SDS to see what immediate medical attention the person may need.
- **Swallowing a hazardous substance is uncommon in the workplace, but it is extremely hazardous.**
 - If this occurs, immediately call 911 or the Poison Control Center (their number should be listed by your telephone).
 - Depending on the substance that has been swallowed, you may need to give the victim large quantities of water or milk to dilute the ingested material... or to induce vomiting.

- **Seek prompt medical attention for any victim of a chemical exposure... no matter how minor the incident may seem.**
 - Some chemicals have delayed or long-term effects, so be sure to supply medical personnel with the SDS for the material that the victim was exposed to.
- **Whether or not anyone is injured during a chemical incident, a number of people may need to be contacted to deal with the situation.**
 - So notify your supervisor as quickly as possible about any spills or other chemical accidents.
 - But if you encounter an emergency situation, it is up to you to contact first responders immediately.
 - Telephone numbers for in-house as well as local emergency service organizations... such as the fire department and the police... should be posted in all work areas.
- **Once the first responders arrive, they will begin evacuating the area.**
 - This gets everyone out of harms way, and prevents unauthorized workers from entering the contaminated site.
 - Usually, loud warning alarms will be sounding throughout the facility, so that everyone knows an incident is occurring.
- **As soon as the area is secure, the first responders will identify the spilled chemicals, and determine what hazards they present.**
 - This is called "site characterization."
- **This is generally done by "monitoring" the area, using devices such as combustible gas monitors and oxygen meters.**
 - These tools let the responders know instantly if the site is hazardous.
 - If the first-response team suspects radiation, they will use a field survey meter to detect it.
- **After the team has characterized the site, they will then have to clean up the area, based upon what they have learned about the spilled chemical.**
 - Usually this means diking and then absorbing the material, using materials such as spill blankets or vermiculite.
 - Next, the team will collect the spilled chemical and place it in appropriate waste containers, for later disposal.

- **After the cleanup is over, everyone involved will have to undergo decontamination... removing or making harmless any chemicals that have contaminated workers' PPE or other equipment.**
 - This usually takes place in what is called a "Contamination Reduction Corridor" (CRC).
 - The CRC restricts decontamination activities to a limited area, and keeps workers who are still contaminated from leaving the cleanup site.
- **Once the cleanup is completed, and workers may re-enter the site, it may seem that the crisis is over.**
 - A problem still remains, however, if the spilled hazardous materials have not been disposed of.
- **Hazardous chemicals can't be treated like everyday rubbish.**
 - In fact, if these materials are thrown out with the trash, they can pollute the local soil and water... even threaten the health of the general public.
 - If you are responsible for the disposal of spilled waste, see your supervisor about the guidelines that you should follow.
 - If the waste can't be removed immediately, it can be temporarily held at your facility.
 - However, the storage time in most states is limited to 90 days.
- **Once you know how to handle hazardous materials safely, you are ready for anything you may encounter.**
 - But always remember, you can never be too prepared for accidents or emergencies.
 - Make sure you know all the hazards of the materials you work with.

*** * *SUMMARY* * ***

- **Before you handle a hazardous substance:**
 - Read its container label.
 - Consult its SDS.
- **Follow your company's safe work practices, and wear the appropriate PPE for the job that you are doing.**
- **Know who to call... and what to do... in a spill or leak situation.**
- **Remember, water is always the best defense against chemical exposure, so know where the nearest eyewash and safety shower are located.**
- **In the event of a spill or leak, make sure that hazardous materials are disposed of correctly.**
- **Working with hazardous materials can be dangerous. But by learning about the chemicals in your facility, and following your company's safety rules, you can stay safe on the job today... and every day... for the rest of your life!**