

## **FEMA Online Course: Household Hazardous Materials – A Guide for Citizens**

### **Unit 1: Chemicals & You**

#### **Objectives**

After completing this lesson, you will be able to:

1. Define a hazardous material.
2. Define simple chemistry terms.
3. Identify four ways your body can come in contact with a chemical.

#### **Chemicals & You**

Even though we may not realize it, most American families have become dependent upon the daily use of chemical products in our homes. Many of these chemical products require special handling, storage, and disposal. We depend upon these products because they are quick and easy to use.

Dangers from chemicals depend greatly on the individuals using them. Chemicals are safe to use when people read the directions and use them correctly. Chemicals play an important role in our health, economy, and social lives by providing us with better medicines and foods, creating jobs, and making our living environment more comfortable.

#### **What is hazardous material?**

A hazardous material is any chemical when released or incorrectly used has the potential to hurt you or the environment.

When people assume they know how to deal with a chemical or they just do not follow the directions, injuries, illness, and even death can occur. Our homes can sometimes be more dangerous than a laboratory because people ignore safety measures.

Americans have about half a million different products containing chemicals available for use in our homes. Most people use chemicals safely everyday without incident, but as the number of chemical products increases, the rate of improper use and injury also increases.

#### **Chemical and Physical Properties**

The Children's Health Environmental Coalition estimates the average American has 3-10 gallons of hazardous materials in his/her home. You may not believe your home generates enough household hazardous waste to cause a problem, but when you combine it with the waste from all the other homes in your community, you can begin to understand how household hazardous products can pose a danger to your health and the environment.

There are a few simple chemical and physical properties you should keep in mind when using hazardous materials. Chemicals come in three different forms: solids, liquids, and gases. Chemicals in the home are found in all three forms.

### **Chemical and Physical Properties (Cont'd)**

- Solids - typically keep their own shape. Solids can be found as large chunks, crystals, or powder. Scented carpet powders and rat poison are examples of solids found in the home.
- Liquids - take on the shape of the container and when released or spilled will run everywhere. Bleach, antifreeze, and gasoline are examples of liquids found around the home.
- Gases - spread out to fill any container they occupy. Gases are all around us and constantly moving. Natural gas and propane are examples of gases used in the home.

### **Chemical and Physical Properties (Cont'd)**

In order for a chemical to move from a solid to a liquid or a liquid to a gas, an increase in energy is needed. Energy is usually provided through an increase in temperature (heat).

In order to reverse the process, a decrease in temperature (cooling) is needed.

The influence of temperature is important because the physical properties of chemicals can change when heated or cooled. Many liquids change to gases when heated and can create enough pressure inside a container to explode. Cooling can cause some liquids to become hard or clumpy.

### **Chemical and Physical Properties (Cont'd)**

Liquids have the ability to either sink or float in water. This is referred to as specific gravity. Water equals a specific gravity of 1. Any chemical with a specific gravity greater than 1 will sink; any chemical with a specific gravity of less than 1 will float. Corrosives such as drain cleaner will sink because they are very heavy compared to water. Gasoline and oil will float because they are lighter than water. [Click here](#) to see an activity you can do at home!

### **Chemical and Physical Properties (Cont'd)**

Gases also have the ability to either rise or sink compared to the air we breathe. This is referred to as vapor density. Air equals a vapor density of 1. Any gas with a vapor density greater than 1 will sink. Any gas with a vapor density of less than 1 will rise. If propane gas, which is heavier than air leaks inside your home, it will sink and stick low to the floor. Natural gas, which is lighter than air, will rise and hug the ceiling if it leaks.

## Chemical and Physical Properties (Cont'd)

The majority of chemicals found in and around your home can be grouped into 3 main groups: flammable, corrosive, poison/toxic. It is important to remember that some chemicals can fit into more than one group at a time. A chemical could be both flammable and corrosive.

- Flammable - a chemical that easily ignites or catches on fire.
- Corrosive - a chemical that can burn or destroy the skin.
- Poison/Toxic - a chemical that can hurt our body by causing injury, illness, or death.

Almost any substance in a large enough amount can be poisonous/toxic.

## The pH Scale

Corrosive materials include both acids and bases. Acids and bases are chemical opposites. Acids and bases can range from being very weak to being very strong.

The strength of an acid or base is measured using a pH scale. The pH scale measures the corrosiveness of a chemical ranging from 0 to 14. Pure or distilled water is 7, which is neutral. Anything lower than 7 is acidic and anything higher than 7 is basic.

Strong bases, such as ammonia, drain cleaner, and oven cleaner have a pH range of 11-14. Strong acids, such as muriatic acid, hydrochloric acid and metal cleaners range from 3-0. Strong acids and bases are highly corrosive and can cause chemical burns after brief contact with the skin. The picture to the right shows a chemical burn on a finger.

## The pH Scale (Cont'd)

August 2002

Des Moines, IA - A 20-year old suffered severe burns when he accidentally drank from a plastic Gatorade bottle that someone had filled with sodium hydroxide (drain cleaner). He reportedly lost his taste buds and three layers of skin from his mouth and throat.

Acids and bases make up the largest group of chemicals used in the home. Household acids are found in many tub and tile cleaners, toilet bowl cleaners, and batteries. Common household bases include drain openers and oven cleaners.

The label on a household chemical's container will tell you if it is corrosive but will not point out whether it is an acid or base. There is no way of knowing how strong or weak a corrosive chemical is in your home. If the label tells you it is a corrosive and has the word DANGER, it is a strong acid or base.

## The pH Scale (Cont'd)

You might be surprised to learn many of the foods we eat are also acids and bases. Acids taste sour or tart. Citrus fruits, such as oranges, lemons, and grapefruits all contain citric acid. Baking soda, antacids,

and tonic water are all basic and have a bitter taste. It is hard to go through a day without running into an acid or base; they are everywhere.

### **Chemicals and Your Body**

Chemicals can enter your body in a combination of ways. There are four main ways chemicals enter your body. The first two ways are through: swallowing or eating, and touching or direct contact with the skin.

- Swallowing or eating (ingestion) - The swallowing of household hazardous materials is the number one cause of childhood poisonings. Many adults eat chemicals accidentally by touching food products without first washing their hands.

Example: Eating a hamburger while using a cleaner to wipe down your counters.

- Touching or direct contact with the skin (absorption) - Some chemicals seep into the skin quickly while others enter through open wounds. Different parts of your body soak up chemicals more quickly than others. Chemicals can damage tender areas of skin, such as the groin area or stomach, more readily than tougher areas like your hands and feet. Your eyes are extremely sensitive to chemicals. Chemicals can seep into the bloodstream rapidly through contact with the eyes.

Example: Having a chemical drip or splash onto your skin.

### **Chemicals and Your Body (Cont'd)**

The second two ways chemicals enter the body are through: puncture of the skin, and breathing into the lungs.

- Puncture of the skin (injection) - Needle pricks from syringes are most commonly thought of when talking about punctures, however, pieces of glass or metal objects can also poke through the skin. Punctures are of great concern because they allow the chemical to immediately enter the bloodstream.

Example: stepping on a piece of glass from a broken mercury thermometer.

- Breathing into the lungs (inhalation) - Breathing is the most common way of bringing chemicals into the body, and it is also the easiest to prevent. The danger from breathing chemicals is sometimes a difficult thing to understand because we cannot see or smell many of the chemicals that are most harmful to us.

Example: spraying pesticides without using appropriate respiratory protection.

### **Chemicals and Your Body (Cont'd)**

Chemicals you use may affect the body both immediately and over long periods of time.

- A brief contact with a large amount of a chemical can result in immediate or short-term effects. These effects are also referred to as acute. Signs and symptoms may include shortness of breath, chest pain, sweating, nausea, coughing, and salivation.
- Contact with small amounts of a chemical over long periods of time can result in long-term effects. These effects are also referred to as chronic. These effects are usually not noticed for years after contact began, but can lead to serious health problems. Health problems resulting from chronic or long-term effects include: cancer, respiratory illness, nervous system disorders, and reproductive disorders.

### **Chemicals and Your Body (Cont'd)**

Three types of chemicals that harm our bodies over long periods of time include:

- Carcinogenic chemicals increase your chances of developing cancer.
- Mutagenic chemicals permanently change your DNA or genetic code, and may be passed on to future children.
- Teratogenic chemicals increase your chance of having a baby with birth defects if you are pregnant.

Some chemicals can even target specific organs such as the liver, kidneys, prostate gland in men or ovaries in women.

### **Chemicals and Your Body (Cont'd)**

Our bodies can generally tolerate small amounts of most chemicals. However, many chemicals even in small amounts can trigger our natural body defenses, indicating it is more than our body can handle. Coughing, sweating, and tears are internal defenses that our body uses to keep chemicals from getting inside us.

However, it is important to keep in mind the symptoms above can also result from other medical conditions! Tracing a symptom to one source is extremely difficult, especially when it may take years for any symptoms to become noticeable.

Note: Some people may react violently to certain chemicals with a life-threatening allergic reaction including: chest pains, vomiting, and trouble breathing. In an allergic reaction, our bodies are telling us we are in severe danger. These people should seek medical attention immediately, by calling 9-1-1 or your local Emergency Medical Services!

### **Chemicals and Your Body (Cont'd)**

How our bodies respond to chemicals depends on three things:

- the type of chemical
- how long we are in contact with the chemical

- the amount of the chemical

Other factors such as pre-existing medical conditions, age, gender, weight, and overall health also play a big part in how your body responds to a chemical. The overall health of a person can also negatively affect the body's ability to respond to chemicals. For example, if you smoke, your lungs may not be able to handle chemicals as well as a non-smoker's lungs.

### **Chemicals and Your Body (Cont'd)**

Children, the elderly, and people with weakened immune systems are more sensitive to injury or death from a chemical. A small child's immune system and internal organs may not be fully developed leaving them unable to fight off the effects of many common chemicals.

On the other hand, the elderly and people with illnesses or diseases have organs and immune systems that may be worn out or injured and are slow to respond to chemicals entering the body.

### **Summary**

Let's review. A hazardous material is any chemical when released or incorrectly used has the potential to hurt you or the environment. When using hazardous materials, you should keep in mind some of the chemical and physical properties they possess. Chemicals can come as solids, liquids, or gases. Changes in temperature can cause chemical products to change forms. Some chemicals may move from liquids to gases or from liquids to solids depending on which way the temperature moves.

Liquids have a specific gravity which determines if they will sink or float on water. If liquids are spilled outside, they may be carried away by rainwater or a stream. Gases have a vapor density which gives them the ability to rise or sink when released. Vapors can be extremely dangerous because you may not be able to see or smell them.

Swallowing or eating, direct contact with the skin, puncture of the skin, and breathing into the lungs are the four ways chemicals can enter your body. Clearly, the best way to keep your body healthy and safe is to prevent the chemicals from getting into your body in the first place. Staying safe and healthy is why it is so important for people to be aware of the dangers that household hazardous materials pose to themselves, the community, and the environment.

## **Unit 2: Hazardous Materials Inside the Home**

### **Objectives**

After completing this lesson, you will be able to:

1. List what hazardous materials are commonly found in the home.
2. Identify possible hazards associated with using chemicals in the home.
3. Describe how improperly used chemicals could adversely affect your health and/or safety.

### **Introduction**

The National Center for Health Statistics reports an estimated 2.2 million poisonings were reported to poison control centers in 1998. Typically younger children, those not yet in school, are at highest risk for home poisonings because they spend the most time at home.

Hazardous materials can be found in a variety of places throughout our homes. Kitchens and bathrooms are probably the most ordinary places to store hazardous materials. Although we use many different types of chemicals in our homes, cleaning products are typically the most common. In this unit, we will discuss a variety of different hazardous materials found in the home.

The easiest, safest thing to do with hazardous materials in the home is to keep them locked up. If you can not keep hazardous products locked up, keep them out of reach and out of sight, of children. If the products are out of sight they will not draw the child's attention.

### **Hygiene**

Hygiene and beauty supplies include: skin care products, fragrances, makeup, manicure products, hair coloring products, shampoos, deodorants, shaving products, baby products, mouthwashes, tanning products, bath oils and bubble baths.

Many of the ingredients used in hygiene and beauty supplies are poisonous if eaten, especially by children and pets. In 2000, the American Association of Poison Control Centers, reported cosmetics and personal care products were the most common form of poison exposure in children under 6 years of age. Other products such as nail polish remover and hairspray are flammable and should not be used around open flames.

New cosmetics can sometimes be very dangerous to people because unlike drugs, there are no laws to prevent cosmetics from being sold before being tested or proven safe. The Food and Drug Administration (FDA) does require manufacturers to test color additives before being used in cosmetic products.

### **Medical Supplies and Medicine**

Medical supplies and medicine include: prescription medications, over-the-counter medications, home oxygen cylinders and machines, and antiseptics.

Medications are an important part of our lives. They help us to stay healthy by relieving pain, killing germs, preventing illnesses, and by curing or treating diseases. Chemistry for Changing Times states there are over 25,000 combinations of prescription medications and 300,000 combinations of over-the-counter medications available today. Both prescription and over-the-counter medications come in many shapes and sizes. The most common medications come as pills, sprays, creams, and liquids. Although many medications contain the same chemical ingredients, companies can sell them under a variety of different names.

Taking medications can sometimes be overwhelming. Before you or your child take any medications, you should consult a doctor first, especially if you or the child are taking other medications. Pills are usually brightly colored, children and pets can easily mistake them for candy. The American Academy of Pediatrics reports that pills containing iron, such as vitamins, are one of the most common causes of poisoning from medication in children under age 5.

### **Medical Supplies and Medicine (Cont'd)**

Most medications and other hazardous substances come with child-resistant lids; this does NOT mean that the containers are "child proof." Many people keep their medications in the bathroom medicine cabinet, but if a young child stands on the toilet or counter, the cabinet can easily be opened. Medications and all other hazardous products should be kept in a cabinet that locks.

Even if you keep your medicines locked up safely, people who visit your home may carry their medications in their purses or in their pockets. Also be cautious when you take your children to other people's homes, they may not lock up their medications. Many older people keep their medications divided up in pillboxes in the kitchen or beside their beds, so it is easier for them to remember to take them.

Whether pets eat pills accidentally or are given the medication by well meaning adults, it is important to remember many medications made for us are poisonous to pets. You should always contact your veterinarian before giving your pets any type of medication.

### **Medical Supplies and Medicine (Cont'd)**

Home oxygen cylinders and concentrators pose a couple of hazards. While oxygen is not flammable, it is an oxidizer. An oxidizer is a chemical that makes things burn more rapidly. Oxygen can cause materials that would not burn in normal air to become flammable. You should stay away from all sources of open flame while using oxygen. This includes all gas appliances, candles, and cigarettes. When introduced to oxygen, flames can burn violently.

You should also avoid using oil-based health products while using oxygen, including petroleum jelly and heat rubs. These products could easily catch on fire if you come in contact with an ignition source.

## Medical Supplies and Medicine (Cont'd)

- Oxygen cylinders should be secured at all times to prevent tipping. Straps and non-tip bases are available for use with home oxygen cylinders.
- Avoid dragging and rolling cylinders, even for short distances. Oxygen cylinders are under high pressure. If the valve on the top of the cylinder is broken, it can take off like a rocket hurting you or damaging your home.
- Oxygen cylinders and concentrators should be placed in areas away from heat sources including those without open flames, such as electric heaters.
- Avoid using grease or oil of any type on the fittings of oxygen cylinders or concentrators.
- NOTE: UNDER NO CIRCUMSTANCES SHOULD ANY ATTEMPT BE MADE TO REPAIR A DAMAGED CYLINDER OR VALVE! Contact the equipment provider for assistance.

## Soaps and Detergents

Soap and detergents include: hand soaps, laundry detergent, fabric softener, stain sticks, multipurpose cleaners, dish liquids, carpet cleaners, antibacterial and disinfectant cleaners, special purpose cleaners, and metal cleaners.

Soaps and detergents are things we use everyday. The cleansing ability of soaps and detergents is essential to ensure proper hygiene and public health. We use them to remove dirt from our bodies, clothes, and home. According to the Soap and Detergent Association, soap and detergent products can be grouped into four main groups:

- ☐ personal cleansing products
- ☐ laundry products
- ☐ dishwashing products
- ☐ household cleaners

## Soaps and Detergents (Cont'd)

The group of soaps and detergents to be most concerned about are the household cleaners. They can come in a variety of forms. There are two basic types of cleaners:

- Multi-purpose cleaners are usually less powerful and able to be safely used on almost any surface.
- Specialty cleaners are designed to be used on specific surfaces and to remove certain types of dirt.

For example, window cleaners, oven cleaners, and metal cleaners are designed to remove dirt on specific surfaces. Window cleaner will not work to remove baked-on grease in the oven, while the oven cleaner will not clean windows.

### **Soaps and Detergents (Cont'd)**

Disinfectant (antibacterial/antimicrobial) cleaners contain special ingredients to kill bacteria and viruses. These cleaners are frequently used in kitchens where food is cooked, prepared, and served; to prevent contamination. Products that claim they have antibacterial or disinfectant properties are required by the Environmental Protection Agency (EPA) to undergo testing.

Only products that meet the EPA requirements are approved for sale as disinfectants. All approved products must carry the EPA registration number on their label. It is important to read the label for instructions on use. **IMPORTANT:** Over-use of disinfectants may lead to a build up of antibacterial-resistant germs!

### **Soaps and Detergents (Cont'd)**

Clogged drains are an inconvenience. Drain cleaners contain sodium hydroxide, a strong base (about 13 on the pH scale). Drain cleaners are very corrosive and react with the water in the pipe to create heat. The heat is what melts away grease and other substances that are clogging the drain.

When different types of drain cleaner are used or when it is mixed with another cleaner, it can sometimes react violently creating toxic gases, splashing, or extreme heat that could cause the pipes to explode. Reactions like this leave the home-owner with a dangerous situation and messy clean up. Preventing grease and hair build-up in the first place is the easiest way to make sure your pipes will not get clogged.

### **Soaps and Detergents (Cont'd)**

Most people do not realize how dangerous the chemicals under their sink really are. When used alone, cleaning products generally remain safe. When they are mixed with other cleaners, it can result in a disastrous situation. When bleach is mixed with other cleaning agents containing hydrochloric acid such as toilet bowl cleaner, toxic chlorine gas is produced. After coming in contact with chlorine gas, many people suffer from burning eyes, nausea, and difficulty breathing. If enough gas is inhaled, death can occur.

Bleach and ammonia are the two most commonly misused household cleaning chemicals. When bleach and ammonia are mixed, they create a chloramine gas, similar to chlorine and just as toxic. Breathing in these gases can cause permanent damage to the inside of your nose, mouth and lungs.

### **Pesticides**

Pesticides include: rodenticides, fungicides, and insecticides.

You may think you do not have pesticides in your home, but if you have pets, you probably have flea and tick collars, flea dips and shampoos.

- Insecticides are used to kill insects. Most insecticides are very specific as to what type of insect they will work on. Flea sprays do not work to kill wasps.
- Fungicides are used to kill fungus. The most common fungicide used in the home is mold and mildew remover used in bathrooms.
- Rodenticides are used to kill rodents. Mouse poison is commonly used in many households. Mouse poison is typically placed inside of cabinets, in corners, or behind furniture. This is especially dangerous if you have small children or pets because they can easily mistake the poison for food or candy.

### **Pesticides (Cont'd)**

Bug repellents are not normally thought to be pesticides, but some products do contain Diethyltoluamide (DEET). DEET was widely used years ago to repel mosquitoes carrying malaria. As with any chemical, avoid overuse and use with caution on children or people with skin disorders. In 1993, the Environmental Protection Agency reported 80,000 children were poisoned by pesticides in the home.

You should also use caution when applying insecticides to your pets. Be sure to thoroughly rinse flea and tick shampoo from pets' coats. Residue can cause skin irritation or be licked off by the animal. Flea collars should also be securely fastened around the animal's neck so it can not chew or pull the collar off. Poisoning of pets can result from improper use of insecticides.

Some pesticides are also flammable. Read the label! Foggers are typically flammable; before using inside the home, it is important to extinguish all flames including pilot lights on gas appliances.

### **Pesticides (Cont'd)**

Pesticide usage in the home can be reduced by using the following preventive techniques:

- Block holes and cracks where pests can enter using weather stripping material or caulking;
- Remove or seal all food sources (including garbage cans);
- Fix leaky pipes and keep open water supplies to a minimum;
- Bathe pets regularly and keep their bedding clean;
- Keep your house picked up (do not give the pests places to hide) and vacuum regularly.

If you have a small pest problem such as a few flies or bees, try using a fly swatter to kill them. If you have a problem with mice try using spring-loaded mousetraps rather than poison or use non-toxic glue boards.

## **Lead**

Sources of lead include: candles, old painted surfaces, old pipes, and solder around pipes.

Lead poisoning is of greatest concern with respect to children. The Consumer Product Safety Commission reports that 1 out of every 25 children has unsafe levels of lead in their blood. Lead hazards are typically found in older homes. Lead poisoning can occur by drinking water contaminated with lead, eating chips of lead paint, or breathing in dust from remodeling. Lead poisoning is of greatest concern to babies and small children because the lead causes anemia, digestive problems, and damage to the central nervous system. Children exposed to lead can develop brain damage including a variety of learning and behavioral disabilities.

Symptoms of lead poisoning, according to the National Institute of Health Sciences, include: headaches, muscle and joint weakness or pain, excessive tiredness or lethargy, behavioral problems or irritability, difficulty concentrating, loss of appetite, metallic taste in the mouth, abdominal pain, nausea or vomiting, and constipation. These symptoms are shared by many other illnesses. However, in cases where the symptoms occur for an extended period of time and no other cause has been found, lead poisoning should be considered.

### **Lead (Cont'd)**

Lead paint was banned in 1978. The National Safety Council reports, 2/3 of homes built before 1940 and 1/2 of homes built between 1940 and 1960 contain lead-based paints. Few homes built after 1960 contain lead paints. Even if you are careful, small children and pets can still accidentally ingest paint by chewing on toys that collect tiny dust particles of the paint. If you have lead paint in your home and would like it removed, contact a professional. It is safer to pay a professional to do the removal than to try to do it yourself.

Many homes built before World War II have lead water pipes which may corrode and add lead to drinking water. Some newer copper pipes also pose a risk because they may have been installed with lead solder. Lead pipes are gray and do not attract magnets. If you suspect you have lead pipes, get your water tested to make sure the water you are drinking is safe. Call your county health department to get names of licensed testing facilities.

### **Lead (Cont'd)**

A recent study conducted by the U. S. Consumer Product Safety Commission shows that there is a significant amount of lead given off by burning candles with lead wicks. Lead given off from candles affects children more severely, than adults. Lead wicks are most likely found in container, pillar, votive and tea light candles made in other countries.

Before you purchase a candle, check with the store to make sure they sell only candles with cotton wicks. Check the candles you already have in your home to see if there is a piece of metal in the middle of the wick. Although this is not an accurate way to tell whether or not the metal is lead, you may feel safer replacing or not burning those candles.

The National Lead Information Center is available for questions and to provide information to the general public at 1-800-424-LEAD.

### **Heating Product**

Heating products include: propane or LP gas, natural gas, kerosene, fuel oils, starter logs or bricks, lighters and starter fluid for use in stoves, furnaces, hot water heaters, wood/coal stoves, dryers, and fireplaces.

While propane, natural gas, kerosene, and fuel oils are not typically found inside the home, any of the above heating appliances that burn these fuels have the potential to release carbon monoxide (CO) gas when not working properly. Carbon monoxide is a colorless, odorless gas that weighs about the same as air. When released, CO gas will move evenly throughout your home.

The Consumer Product Safety Commission estimates on average 10,000 people are treated each year in emergency rooms for injuries resulting from carbon monoxide poisoning. Deaths resulting from carbon monoxide averaged more than 500 per year.

### **Heating Product (Cont'd)**

Small children and pets are typically the first to develop symptoms of CO poisoning. Carbon monoxide prevents oxygen in your blood from being released to tissue and organs in your body. Organs and tissue, especially your brain, need oxygen to function correctly.

Symptoms of CO poisoning include: headache, confusion, dizziness, fatigue, drowsiness, and nausea. Symptoms typically will disappear when you are away from your home. If the problem is not corrected, symptoms will return and worsen with extended stays in your home. A simple carbon monoxide detector can be purchased from hardware or home improvement stores to help prevent CO poisoning.

### **Heating Product (Cont'd)**

January 2001

Silver Spring, MD - A natural gas explosion destroyed a house, killed 2 people, and injured others. The explosion was felt several miles away.

August 2002

West Haven, CT - 2 people died and 3 townhouses were destroyed during a natural gas explosion at 3:30 am. The odor of gas could still be smelled at the scene hours after the gas was shut off.

Gas leaks can also be extremely dangerous. Natural gas and propane are both odorless gases, however, they have a flagging agent or identifier added to them which gives them their noticeable smell. Natural gas is lighter than air and will rise to the ceiling. Propane is heavier than air and will sink to the floor.

If you have a leak, you will notice the smell first, which is actually the additive. If you are sleeping while the leak occurs, your nose may become desensitized to the smell. You may not notice the smell until

after you leave your home and return again.

If you smell a strong odor of gas, leave your home immediately and call the gas company or local emergency services!

### **Flammable Liquids**

Paints, strippers, varnishes, and lighter fluids are all flammable. Flammable products should be used outdoors whenever possible. If you can not use these products outside, make sure you have properly cross ventilated the room before using. Open all doors and windows to create a breeze that flows through the room. Flammable products should be stored in an outside garage or shed away from the home.

Other flammable liquids, frequently used in cooking, are cooking sprays, oils, alcohols, and extracts such as vanilla or almond flavoring. While these products are safe to keep in your home, you should use care when using them next to open flames. Cooking sprays normally come in pressurized cans and you should keep them away from all sources of heat. If the can becomes too hot, it will explode. Even though extracts are used in food products, they can also be poisonous if ingested straight from the bottle. Alcohol can also be extremely dangerous to small children and pets. Extracts and alcohol should be kept up high where children can not reach them.

### **Mercury**

Sources of mercury include: fluorescent bulbs, thermometers, barometers, batteries and thermostats.

While mercury use in batteries, thermometers and paints has gone down drastically, its use has steadily increased in electric lighting and other electronic devices. Mercury has become widely used in fluorescent light bulbs. Fluorescent bulbs use less energy and last much longer than regular bulbs.

Mercury is contained in fluorescent bulbs, barometers, old thermostat switches and glass thermometers. Mercury is especially dangerous when aerosolized. For example, if you vacuum or sweep up a broken thermostat or bulb, it may cause tiny particles to become airborne which can then be inhaled. If you inhale the mercury particles, they can cause damage to your central nervous system.

### **Mercury (Cont'd)**

If you have a small mercury spill, you should:

1. Secure the area. Keep everyone away from the spill (including pets).
2. If possible, open a window to ventilate the area.
3. Contact your local poison control center, emergency services, or local public health agency for directions in cleaning up the spill.

If you have a large mercury spill, contact your local emergency services immediately! Stay away from the spill, only trained professionals should attempt clean up.

### **Mercury (Cont'd)**

Mercury poisoning in the U. S. occurs primarily when people eat fish. Mercury is commonly found in many types of seafood. Fish that live in the ocean absorb mercury that is produced naturally in our environment. Large fish accumulate more mercury than smaller fish. The Food and Drug Administration recommends PREGNANT WOMEN AND WOMEN OF CHILDBEARING AGE WHO MAY BECOME PREGNANT avoid eating long-lived, large fish that feed on other fish. Women can safely eat a variety of smaller fish up to 12 ounces per week during pregnancy or while nursing. For information about the risks of mercury in seafood, call the FDA toll-free at 1(888) SAFEFOOD.

A study by the National Academy of Sciences found it possible 60,000 children a year are born in the U.S. with neurological problems related to mercury-contaminated fish eaten by their mothers. Mercury is dangerous to humans and animals because, once eaten, it stays in the body for a long time causing damage to the neurological system.

### **Mercury (Cont'd)**

Many lakes and rivers across the United States are contaminated with mercury as well. The mercury contamination comes primarily from coal-burning power plants. Coal contains mercury compounds that when burned are released in smoke to the environment. To find out if fish from lakes and rivers in your area are safe, call your State or local health department.

Mercury is a problem for the environment because once it is released it stays around for a long time. Mercury-containing products such as fluorescent bulbs, thermometers, thermostats, and barometers need to be taken to a hazardous waste recycling center. Many States have banned mercury products from being disposed of in household trash. Mercury disposal services are sometimes provided by counties, private businesses and electrical utility companies.

### **Batteries**

The U.S. Consumer Product Safety Commission reports that around 3,700 people a year are taken to the hospital to be treated for burns from batteries. Of the 3,700 injured each year, 20% are children under age 16. Before you give batteries to children, make sure you show them how to correctly install them.

Alkaline batteries that you use in your house can cause injury and burns from the Potassium Hydroxide (strong base) they contain. Some old batteries may also contain mercury, lead and other harmful substances. Putting batteries in backwards, recharging the wrong type of battery, and mixing fresh batteries with old ones can cause them to overheat and burst.

According to the National Capital Poison Center, nearly 2,000 people of all ages unintentionally swallow button batteries from watches, hearing aids, and other electronic devices each year in the United States.

If a button battery is swallowed you should immediately call the National Button Battery Ingestion Hotline at (202) 625-3333 (TDD 202-362-8563), they accept collect calls too.

### **Asbestos**

Sources of asbestos include: insulation around pipes, automobile brake linings and pads, resilient floor tiles, and cement roofing, shingles and siding.

The simple fact that you have asbestos in your home does NOT make it dangerous. Asbestos is not a serious health threat if left alone. Once it is damaged or disturbed, it releases tiny particles into the air. These tiny particles are fibers of asbestos that, once inhaled into the lungs, may lead to cancer over a long period of time.

Asbestos is listed as a known carcinogen by the Environmental Protection Agency (EPA). Breathing in large amounts of asbestos can eventually lead to chronic illnesses such as, chest and abdominal cancers and lung disease. Smoking dramatically increases the risk of cancer from asbestos. Nearly all products sold today are asbestos free. The safest thing to do with asbestos material in good condition is to leave it alone!

### **Asbestos (Cont'd)**

Asbestos may still be present in older homes and appliances. Asbestos was widely used prior to the 1970's because of its excellent fire resistant and insulation capabilities. Household building materials that frequently contained asbestos prior to 1970 include textured paints, floor tiles, cement siding, roofing materials, and wall and pipe insulation.

The only way to tell if a specific product contains asbestos is to take a sample and look at the fibers under a microscope. Contact the product manufacturer or an asbestos handler such as a plumber, building or heating contractor to determine if a specific material or product in your home contains asbestos. Given the dangers associated with asbestos, repair and removal of asbestos should be handled only by trained and licensed contractors.

### **Summary**

Let's review. Hazardous materials can be found in a variety of places throughout our homes. Kitchens and bathrooms are probably the most ordinary places to store and use hazardous materials in the home.

Cleaners, pesticides, mercury, batteries, soaps and detergents, medical supplies, and hygiene products are all considered household hazardous materials. These products have varying degrees of danger. For example, hand lotion is not something we find dangerous, however, if ingested it can be poisonous to children and pets. Many beauty products and cleaners are decorated with bright colors and pleasant scents which can attract both children and pets. On the other hand, pesticides can be extremely dangerous and you must use caution when using them in your home or on pets. The National Center for Health Statistics reports an estimated 2.2 million poisonings were reported to poison control centers in 1998.

Some of our homes can be full of hidden dangers too. While injuries from lead, asbestos, and carbon monoxide can be severe and irreversible, they are easily preventable. Don't take a risk with your life or your family members' lives. The easiest, safest thing to do with hazardous materials in the home is to keep them locked up. If you can not keep hazardous products locked up, keep them out of reach and out of sight of children and pets.

### **Unit 3: Hazardous Materials Outside Your Home**

#### **Objectives:**

After completing this lesson, you will be able to:

1. List what hazardous materials are found outside the home.
2. Identify possible hazards associated with using chemicals outside the home.
3. Describe how improperly used chemicals could adversely affect your health or damage the environment.

#### **Hazardous Materials Outside The Home**

Pictures of a swimmer, flowers in garden, and various outside chemicals including gasoline, antifreeze, paint thinner, etc....

You probably have hazardous materials stored around your home if you have a shed, garage or barn. There are a large variety of hazardous chemicals used outside the home. Flammables, pesticides, and oxidizers are some of the most common hazardous chemicals used outside the home. Depending upon their intended use, chemicals can be found in varying amounts from several hundred gallons to a few tablespoons.

Exposure to hazardous materials outdoors increases during the summer months because people are working in their yards and gardens, grilling on the patio, and swimming in pools.

#### **Fuels and Oils**

Fuels and oils include: gasoline, diesel fuel, kerosene, and petroleum-based oils.

Children under age three suffer more than half of all burns associated with flammable liquids in the home. (Shriner's Hospitals for Children) Gasoline is the most dangerous and improperly used chemical around the home. Gasoline and the vapors it gives off are highly flammable. Gas is made to burn only as a motor fuel - nothing else!

Vapors from gasoline and other flammable liquids are very heavy and will sink to the floor. You may be able to smell the vapors but you will not be able to see them. This can create a special hazard for homeowners because even the vapors are flammable. Any open source of flame, such as a pilot light or a spark from an electrical appliance can be enough to ignite the vapors or cause an explosion.

For this reason, gasoline and other flammables absolutely can NOT be used inside the home or any other building where an open flame is present.

#### **Fuels and Oils (Cont'd)**

Diesel fuel, fuel oil and kerosene are all commonly used fuels as well. Diesel fuel is used to power diesel engines. Kerosene and fuel oil are used in furnaces to heat homes. Kerosene can also be used in lamps and in space heaters. Picture of a kerosene space heater.

Kerosene space heaters should be used with extreme caution in the home! They should only be used for emergency purposes or to supplement other heating sources. Kerosene heaters should not be used while you are sleeping. Kerosene heaters give off carbon monoxide gas, a byproduct of the burning process. If you are using a kerosene space heater inside your home or an exterior building, make sure you provide adequate ventilation when in use. Read and follow the manufacturer's recommendation before using.

### **Fuels and Oils (Cont'd)**

Many homeowners store a few gallons of gasoline, kerosene or diesel fuel for lawnmowers, heaters and other motorized equipment. You should purchase only enough fuel to get the job done. When purchasing fuel, follow a few simple rules:

1. Purchase only enough to get the job done.
2. Use only an approved flammable liquid container.
3. Leave about 2 inches of room at the top when filling so the vapors can expand.
4. Make sure to close all openings on the container tightly to prevent vapors from escaping.
5. Store flammable liquids away from the home (at least 50 feet) in a separate building in a locked metal cabinet.

When refilling a vehicle, machine or power tool, make sure the engine is turned off and has been given time to cool. If you are using or storing more than one fuel, you should purchase different colored containers to avoid using the wrong one. Using the wrong fuel could result in disaster.

### **Large Tanks**

In agricultural areas, homeowners may have large tanks of gasoline or diesel fuel. The fuel is a necessity for running farm equipment. People who run small businesses from their home may also have large tanks to fuel equipment or vehicles. These tanks should be placed as far away from homes as possible.

You need to pay special attention when mowing, weedwacking, and burning brush around these tanks. Lawn mowers and other power tools can hurl rocks and other objects causing damage to tanks. If you have an old tank, you may want to periodically check it for weaknesses.

The typical large tank found at home holds 275 to 500 gallons of flammable liquids. If these tanks are damaged, they can release fuel damaging the environment. Stay at least 50 feet away from a tank if using equipment that produces a spark or open flame .

### **Gas Pumps**

Have you ever gotten shocked by static electricity while getting out of your car in the winter? Did you know static electricity can cause gasoline vapors to catch fire? It can, and it happens more often than you think, especially at gas stations. Here are a few things you can do to help protect yourself from a gasoline flash fire at the gas pumps:

- \* Picture of a gas nozzle in the side of a vehicle. When you get out of your car to pump gas, touch the metal part of your door. This will ground out the electrical charge.

- \* ONCE YOU ARE OUT OF YOUR VEHICLE, STAY OUT! Do not get back in your vehicle for anything while the pump is running.

- \* While pumping, stand off to the side, and not directly in front of the nozzle.

- \* Put all containers on the ground before opening them or turning the pump on. Containers can build up static electricity too.

Use these simple tips to protect yourself and others while pumping gas.

### **Automotive Products**

Automotive products include: cleaners, anti-freeze, windshield wiper fluid, brake fluids, batteries, waxes and polishes.

Picture containing automotive products including motor oil, power steering fluid, washer fluid, polish, and tire cleaner. Many of the automotive products you use to keep your car running and looking good are also flammable and toxic. Make sure engines are cool before replacing fluids. Car polishes and cleaners can be absorbed through the skin, so use gloves and wash hands thoroughly when done.

Automobile batteries are typically lead-acid batteries that contain sulfuric acid. The acid is highly corrosive and can cause severe burns to the skin and eyes. The batteries also contain hydrogen gases that can cause the battery to explode if improperly handled. When working with a car battery, you should avoid leaning over the battery and wear proper protective equipment. If you need to jump start your battery, read your owner's manual or consult a professional to make sure you do it correctly. Connecting the cables incorrectly can result in overheating of the battery causing it to explode.

### **Automotive Products (Cont'd)**

Antifreeze or ethylene glycol is used in vehicle radiators to prevent freezing and overheating during extreme temperature changes. It is especially dangerous for children and pets. It is a yellowish-green liquid with a sweet smell. The sweet smell attracts pets and children. Through absorption and ingestion, antifreeze can cause irreversible damage to the brain, kidneys, and heart resulting in death. It is highly toxic, a tablespoon can be enough to kill a cat.

Most animal poisonings are accidental. The smell attracts the pets who drink from puddles they find on the ground. Do not store antifreeze near food products including pet foods. If you spill antifreeze put

kitty litter or another absorbent down to soak it up, discard, and rinse the area with water. Use gloves to prevent skin contact. Windshield washer fluids can also contain ethylene glycol to prevent freezing.

When purchasing antifreeze, read the labels and look for brands containing propylene glycol. Propylene glycol is much safer and less toxic than ethylene glycol. Remember, you want to replace as much of the ethylene glycol as possible, so be sure to drain and rinse the radiator before switching.

## **Solvents and Paints**

August 2002

Columbia, MO - A woman using a solvent to remove carpet glue received second degree burns to her legs and feet. The vapors from the solvent built up and ignited when they reached the pilot light of the natural gas water heater in the apartment.

Solvents and paints include: paint thinners, varnishes, lacquers, polishes, waxes, oil-based paints, and spray paints.

Solvents are fluids that dissolve other substances. Most household solvents are petroleum-based. This makes them highly flammable. Solvents also give off toxic vapors and can be easily absorbed through the skin. Some solvents contain cancer-causing chemicals. Solvents of any kind are dangerous to pregnant women at any time during pregnancy and should be avoided!

Read the labels. Some of these products may require use of personal protective equipment like solvent-resistant gloves, respirators, goggles, or coveralls to protect your skin and clothing. If clothing or leather shoes become contaminated, they should be left to dry, then thrown away.

## **Solvents and Paints (Cont'd)**

Paint is the most common solvent-containing product found around the home. Oil-based paint is flammable because it contains petroleum distillate to keep it in a liquid form. Paints and solvents should always be used outside if possible. When using these products, you should provide proper ventilation to the work area. If painting in a shed or garage, make sure windows and doors are open. If necessary, use a fan to push air through the room. Stay away from open sources of flame or spark-producing equipment.

Latex paints are non-flammable because water is used as the solvent to keep it in liquid form. If possible use latex paints, they are much safer than oil-based products. Latex paints are not considered hazardous; however, ingested paint could be toxic. Store all paints and solvents out of the reach and sight of children and pets. Paints can remain usable for 10 years or more. If you can not find a way to use up your paint, you may want to contact non-profit organizations in your community to see if they could use it.

## **Pool and Spa Chemicals**

Pool and spa chemicals include: any chlorinated product, bromine tablets, hydrogen peroxide, algaecides or fungicides.

Picture of containers of chemicals sitting near the edge of an in ground pool. While it is important to keep your pool/spa free of germs by using chlorinated pool chemicals, it is just as important to understand the dangers these chemicals can pose. Chlorinated pool chemicals are classed as oxidizers. Oxidizers make things burn more easily. Because they are oxidizers, it is extremely important to keep pool chemicals away from other flammable products and sources of open flame.

Pool chemicals can be extremely dangerous when misused. They are incompatible with just about everything. Pool chemicals can react violently when mixed with other chemicals including flammables, and other pool chemicals.

### **Pool and Spa Chemicals (Cont'd)**

When using chemicals for your pool or spa, you should: 

- \* Avoid mixing with other chemicals!

If using a bucket or scoop for chemicals, always make sure it is clean before using. Use the bucket and scoop only for that product and label them if possible.

- \* Always add pool chemicals to water!

Pool chemicals are intended to be added to large volumes of water. If even a small amount of water is added to the chemicals, it can react releasing toxic gases.

### **Pool and Spa Chemicals (Cont'd)**

When storing pool chemicals, you should: There were 565 exposures to chlorine gas from improper mixing of acids and hypochlorite in 2001. (American Association of Poison Control Centers)

- \* Make sure you replace caps and lids tightly after use.
- \* Keep out of direct sunlight, in cool dry place.
- \* Keep away from all flammable products or sources of open flame
- \* Do not put containers on top of one another.
- \* Do not combine old containers with new, even if they are the same brand.

### **Pool and Spa Chemicals (Cont'd)**

The metal bowl in the video below contains chlorinated pool chemicals. A small amount of brake fluid has just been added to the bowl a few seconds ago. Click on the video below to see what happens when chlorinated pool chemicals mix with brake fluid. (Warning: Video may take a minute or two to load!)

You may be surprised how dangerous mixing chemicals can be. After only a few seconds, the mixture begins to produce heavy smoke and then burst into flames. Violent reactions like this one occur when chemicals are not used and stored properly. The fire in this video burned out quickly, but had it been inside a garage or shed, it would have quickly spread to its surroundings.

### **Compressed Gases**

Compressed gases include: propane, oxy-acetylene, argon, and helium.

Homeowners who use gas for heating or cooking may have large propane tanks outside their homes. These cylinders are generally owned by the gas company and are kept in good working condition. However, small 20-pound propane tanks commonly used for barbecues are often neglected, resulting in fires and explosions. Before turning on the propane in the grill this summer, check to make sure:

- \* All hoses are in good condition and properly connected.
- \* Keep hoses away from hot surfaces and dripping hot grease.
- \* The cylinder has not been damaged and is upright.
- \* Keep away from other flammable materials, especially gasoline.
- \* Use only outside in a well-ventilated area.

As of April 2002, a new industry standard requires an over-fill prevention device be installed in all new 4- to 40- pound cylinders. If you have a barbecue cylinder that has not been filled since April 2002, you should return it to the dealer for a new safer one.

### **Compressed Gases (Cont'd)**

Some people have cylinders of gas used for welding around their homes or farms. People use welding supplies to make repairs to farm equipment, restore old cars, general household repairs and for hobbies. The most common and least expensive welding supplies involve oxy-acetylene or propane, both highly flammable gases.

Picture of oxy-acetylene cylinders. Green cylinder is oxygen and the black cylinder is acetylene. Oxy-acetylene uses a combination acetylene and oxygen gas from two separate cylinders. Although the cylinders come in a variety of sizes and colors, oxygen is typically green and acetylene black.

Other non-flammable gases, such as argon and helium are used for Gas Metal Arc Welding (MIG welding) and Gas Tungsten Arc Welding (TIG welding). While these gases are not flammable, they are under pressure and care should be taken when handling and storing these cylinders too.

## **Compressed Gases (Cont'd)**

A few safety rules to keep in mind while working with cylinders:

- \* All cylinders are under pressure, keep away from open flame and sources of heat. Increase in temperature can cause the gas to expand and rupture.
- \* Chain or lash all cylinders while in use, storage or transportation.
- \* When not in use, all cylinders should be capped and oxygen should be kept at least 20 feet from all flammable materials, including other cylinders.
- \* Rolling or dragging can cause damage to cylinders and valves, causing them to take off like a rocket.

Cylinders should be kept upright at all times. If you upset an acetylene cylinder, you need to give it extra time to settle. Acetylene is dissolved in acetone, which takes time to drain back out of the valve. If you try to use an acetylene torch before it has settled, it may spit and injure you or someone around you. Remember to always wear recommended protective equipment.

## **Camping Supplies**

Camping is a recreational activity many Americans enjoy. Stoves, lanterns, and space heaters require specific fuels which are flammable. Hikers typically use appliances requiring liquid-fuels, such as gasoline, denatured alcohol or white gas. These fuels can be transported in small lightweight bottles.

Gas-fueled equipment uses propane, butane, iso butane or a combination of any of the three. Gas can be transported in small one-pound or larger cylinders. Cylinders can be many different shapes, sizes and colors depending on the manufacturer. Read the directions for the appliance and only use the recommended fuel.

If you are camping in an RV, you may also need to use these same fuels but in larger quantities. Many RV's have one or more mounted 20-pound propane tanks for heating and cooling. RV's also require the use of chemicals in toilets and holding tanks, purchase non-toxic chemicals when possible.

## **Pesticides**

April 2002

Clinton, NC - Twenty-one firefighters required medical attention after inhaling pesticide fumes at a barn fire. Approximately 60 people were evacuated from a half mile area around the fire. The barn contained several pesticides in quantities from one pint to 20 pounds.

Pesticides include: herbicides, insecticides, rodenticides, and fungicides. Pesticides are an important asset for many farms and homeowners. Pesticides are chemicals used to kill weeds, insects, rodents, and fungus.

Homeowners use pesticides to rid their homes of unwanted insects and mice. They also use pesticides in their yards and gardens. Herbicides, designed to destroy weeds, are the most commonly bought and used. According to a 1997 Environmental Protection Agency (EPA) report, homeowners buy approximately \$20's worth of pesticides a year.

Farmers mainly use pesticides to protect crops. Weather plays a large role in the production of crops. If there is a drought, it may not be appropriate for farmers to apply pesticides to crops. For this reason, farmers may have large amounts of pesticides in storage. All pesticides, whether on a farm or used around the home, must be kept locked up away from children and animals.

### **Pesticides (Cont'd)**

Pesticides are extremely poisonous! Personal protective equipment is a must when using them. Read the label and wear the appropriate respiratory, skin and eye protection. Most pesticides are also flammable; do not use around motorized equipment or near flames. Avoid applying pesticides on windy, rainy or cold days. Always make sure the windows and doors to your home are closed before applying sprays.

Many people do not apply pesticides themselves, instead they hire a pest control company to do it for them. When you hire a company to apply pesticides, they usually do it several times a year. Ask what types of chemicals they are using. If you have pets or children, make sure they are using the least toxic chemicals available. Pesticides can be accidentally brought into homes on your shoes, clothing and children's toys. Keep all pets and children away from the area until pesticides have dried or for the amount of time recommended on the label. According to the American Association of Poison Control Centers, 90,010 exposures to pesticides were reported in 2001. Of those 90,010 reported, 46,929 were exposures to children under age 6.

### **Poisonous Plants**

Plants are not considered hazardous materials, however, some plants can be highly poisonous if eaten. Although many poisonous plants are not grown inside the home, people frequently use branches or flowers from these plants in the home. For example, around the holidays many people use Holly branches to decorate their homes. However, many berry-producing plants such as Holly are poisonous. Picture of pink Tulips.

The bright colors and sweet smells of plants attract both children and pets. Children love to pick flowers to surprise their parents. Beware! For example, tulips can cause intense vomiting, depression, and diarrhea when eaten. If you live on a farm or own livestock, pay special attention to the types of trees and other plants that grow in your pasture, many are toxic.

Some of the most beautiful plants are also some of the most dangerous. If you do have poisonous plants around or in your home, you should consider replacing them with nontoxic varieties, especially if you have children or pets. Several web sites located in the additional resources page contain listings of poisonous plants and non-toxic alternatives.

## Summary

Let's review. We have talked about everything from flammable liquids to poisonous plants. Outside hazardous materials are generally kept in a garage, shed or barn. Depending on their intended use, chemicals can be found in varying amounts from several hundred gallons to a few tablespoons. Flammables, pesticides, and oxidizers are the most commonly found chemicals outside the home.

Gasoline is the most dangerous and improperly used chemical outside the home. Flammable materials should only be kept in a metal locked cabinet in a detached building at least 50 feet from your home. All other hazardous materials should be kept out of sight and reach of children and pets. Some chemicals are extremely toxic like antifreeze, which is particularly attractive to children and pets because of its sweet smell. Other petroleum-based products, such as solvents, can contain cancer-causing chemicals. Don't let your summer fun or recreation result in disaster. Reading labels, and following the manufacturer's recommendations for these products can help keep your whole family safe.

## **Unit 4: Safe Handling, Storage & Disposal**

### **Objectives**

After completing this lesson, you will be able to:

1. List different parts of a hazardous substance label.
2. Identify proper personal protective equipment for various chemicals.
3. Describe things you can do to be prepared for a chemical emergency in your home.
4. Identify safe disposal techniques for household hazardous waste.

### **Safe Handling**

Here are a couple of important things you should remember before buying any new household chemical from a store. Picture of a pile of household hazardous waste.

1. Buy only enough of the chemical to do the job.
2. Make sure you are buying the right type of chemical for the job.
3. Reading the product's label is the single most important thing you can do when buying, using, storing or disposing of a chemical.

### **Safe Handling (Cont'd)**

First, buying a larger amount of a chemical just because it is a better buy does not mean it is the safest thing to do. If you only need one cup of something, don't buy a gallon. It is not safe to have large amounts of chemicals sitting around your house for years and years.

Secondly, we have all bought something at the store thinking this is just what you need only to take it home and find out it will not do what you thought it would. With any chemical it is especially important to always read the container's label to make sure the product will do what you want it to. Also, with regard to cleaners, pay close attention to the surfaces you can use the chemical on. Some chemical cleaners are very harsh and may actually damage or destroy certain surfaces.

Lastly, the product's label is full of information specific to that chemical. Although product labels may look similar, the information contained on them is different. Even if you have two products that do the same thing, the ingredients may be different. Making assumptions about chemical products without reading the label can lead to disaster.

### **Labels**

The Federal Hazardous Substances Act (FHSA) provides specific guidelines regarding labeling of hazardous substances. This act covers all hazardous substances sold for use in the home except pesticides, drugs, and cosmetics. Pesticides are covered under the Federal Insecticide, Fungicide, and

Rodenticide Act, while drugs and cosmetics are covered under the Federal Food, Drug and Cosmetics Act.

The FHSA states all of the following must appear prominently on the label. The signal word, statement of principal hazard, and statement of precautionary measures must be blocked together within a square with or without a border. The labels on hazardous substances must include the following:

- \* Signal words
- \* Statement of principal hazard
- \* Common, usual, or chemical name of substance
- \* Name and place of business of manufacturer, packer, distributor, or seller
- \* Statement of precautionary measures to follow
- \* Instructions for safe handling and storage (when appropriate)
- \* "KEEP OUT OF THE REACH OF CHILDREN" or equivalent statement
- \* First aid instructions (when appropriate)

### **Accidents**

Sometimes, even when you are careful, accidents occur. The product's label is very important to medical professionals during an accident with household hazardous materials. Most labels instruct you to call your local Emergency Medical Services (EMS), family physician or a Poison Control Center in case of an emergency. Whoever you decide to call, you will need to have the product's container in order to provide information they will request such as the chemical name, manufacturer, and first aid instructions. Some other things that may come in handy during an emergency are:

- \* Memorize and post Poison Control Center 1-800-222-1222 number next to phone
- \* Be trained in first aid and cardiopulmonary resuscitation (CPR)

### **Personal Protective Equipment**

Some product labels also provide you with recommendations for personal protective equipment (PPE). PPE is extremely important in protecting you from injury while using hazardous materials. Different products create different hazards so understanding the hazards and being able to determine what type of PPE is needed is important. Read the label! If no PPE is recommended, use common sense. If a chemical produces irritating fumes, a large amount of spray or mist, a splash hazard or is a corrosive, PPE should be used.

Goggles, respirators, gloves, and coveralls are common types of PPE used in the home. These types of PPE can all be purchased at local hardware stores, safety equipment suppliers, or farm supply stores for relatively inexpensive prices. If you obtain PPE and are not sure how to properly use it, read the directions. If directions are missing or unreadable, do not take a chance by guessing; contact the PPE manufacturer for assistance. Be sure to check the PPE for damage before using. If goggles, respirator, gloves, or coveralls are torn, badly worn, or cracked, do not use them.

A few dollars spent on proper PPE now may save you hundreds of dollars in medical bills later. Remember, if no PPE is recommended, use common sense to protect yourself!

### **Goggles**

Goggles provide protection for your eyes. When purchasing goggles, remember you are wearing them to keep chemicals from splashing into your eyes. There are many types of goggles out there. Goggles used for splash protection should have both a solid brow and side shield. Goggles should not interfere with vision, and most can be worn over top of regular glasses.

Glasses, including reading glasses, and safety glasses do not provide proper protection from chemical splashes. Goggles can be purchased through most hardware or home improvement stores.

### **Respirators**

Respirators provide protection for your lungs and upper respiratory system. A respirator is needed when you use a chemical that produces hazardous fumes. For example, products that contain chlorine or a derivative produce pungent odors that can cause you to cough and have trouble breathing. Respirators require cartridges specific to the chemical you are working in. Be sure you match the cartridge to the product you will be using. In order for a respirator to provide adequate protection, it must cover both the nose and mouth.

Respirators are used as a filter to keep the hazardous chemicals out of your lungs. Dust masks do not offer protection from chemicals. Read the respirator directions before use. People with severe allergies or asthma may NOT be able to use a respirator because it restricts air flow to the lungs. Cartridges and respirators can be purchased from safety supply companies.

## **Personal Protective Equipment**

### **Gloves**

Gloves provide protection for your hands. Many of the cleaning chemicals you use in your home are corrosive. These products can burn and cause irritation to the skin. Protect your hands by using a simple pair of thick rubber gloves. Rubber gloves for cleaning can be found in most grocery stores in the same aisle as the cleaning products. Rubber gloves may not work with all chemicals. If you are using a strong corrosive, read the label to see if specific gloves such as nitrile or butyl are suggested. Nitrile and butyl gloves can be purchased from safety supply companies.

coveralls

Coveralls provide protection for your skin. Tyvek coveralls are typically needed if you are working with a product that will produce a large amount of spray or mist. Tyvek coveralls and boot covers can be purchased from home improvement stores. A hat to cover your head is also strongly suggested. Avoid using cloth coveralls and leather boots when using chemicals as they can become contaminated with product.

### **Storage**

If you have not completely used up the chemical you bought, you will need to store it for later use. There are several things you need to keep in mind when storing hazardous materials used in the home.

1. Picture of chemicals in old glass jars with no labels Always keep chemicals in the original containers.
2. Make sure the labels remain readable and fixed to the container.
3. Keep products out of reach and sight of children and pets.
4. Keep in a cool, dry place.
5. Keep reactive products stored separately. For example, acids and bases should be kept apart to prevent accidental mixing.
6. All flammable products should be stored away from the home in a locking metal cabinet.

Always read the product's label before storing. If the product has recommendations for special storage, follow the instructions. Always keep chemical products away from food products!

### **Disposal**

Many people dump household hazardous materials down the drain. Most people think that this is safer than placing it in the garbage. In cities and towns, the sewer system carries waste to sewage treatment plants. Dumping vast quantities of hazardous chemicals in the sink can cause problems at these treatment plants. In rural areas, people rely on bacteria in septic tanks to break down non-hazardous waste. Significant amounts of chemicals, especially disinfectants, can destroy the needed bacteria and eventually move through the soil to contaminate sources of water. In either case, when dumped down the drain, many chemicals can corrode pipes and release dangerous fumes when mixed with other chemicals. Graphic of a sink

If you are connected to a municipal water source, it is safe to dispose of small amounts of certain types of household chemicals by pouring them down the drain. For example, small quantities (usually 1/2 cup or less) of disinfectants, window cleaner, multipurpose cleaners, and bleach can be slowly poured down the drain with large amounts of water. You should wait at least 3 hours before pouring another product down the drain; mixing can result in splash back or release of gases.

## **Disposal (Cont'd)**

Years ago, the only way to dispose of household garbage was to place it in a landfill. In a landfill, organic waste such as food, leaves, and grass quickly decompose. However, household hazardous materials pose a serious problem in landfills because they leach into groundwater.

When it rains, the water moves down through the landfill, and it carries discarded hazardous waste with it. The water carries the hazardous waste down through the soil where it can contaminate the environment including ground water, streams, ponds, and rivers. Discarding hazardous waste in household garbage is also a danger to sanitation workers who handle the garbage.

## **Disposal (Cont'd)**

Due to increased public awareness of the dangers of hazardous materials, many communities in the United States now have designated household hazardous waste collection days or permanent collection facilities. To see if your community has a household hazardous waste collection event or site, contact your local or State government or check Earth 911's web site at [www.earth911.org](http://www.earth911.org).

After collection, waste is then transported to specially designed treatment or recycling facilities. Used motor oil and antifreeze are two of the most commonly recycled household hazardous wastes. If your community does not have a collection day or facility, you may be able to take your used motor oil or antifreeze to a local auto mechanic shop. Call and check first before taking used motor oil or antifreeze to a shop in your area.

## **Disposal (Cont'd)**

A large part of the household hazardous waste disposal problem is due to the fact that much of this waste is generated and disposed of individually. It may not seem like a big deal to you to place one can of pesticides in the garbage or pour one bottle of toilet bowl cleaner down the drain, but when combined with the waste from all the other households around you it becomes a major problem. In many places across the United States, it is illegal to dispose of hazardous products improperly.

So how should you dispose of your hazardous waste?

- \* The safest way is to use the product until it is completely gone.
- \* If you can not use the product up, try to recycle the material.
- \* If it is not recyclable, take it to a household hazardous waste collection site.

Remember, read the product's label to see if specific disposal instructions are listed. If not, or if you are unsure about the proper disposal for a product, contact the manufacturer or call your local government office before disposing of the product.

## **Collection and Recycling**

Most communities hold collection events once or twice a year. These days provide the public with the opportunity to properly dispose of unwanted household hazardous materials at event sites. Considerable time, money, and publicity are needed to make these programs work. If collections do not occur regularly, people are more inclined to dispose of the products improperly to prevent them from accumulating in their homes. Collection days also give the local government and/or private organizations the opportunity to increase awareness by providing the public with information on household hazardous materials.

### **Collection and Recycling (Cont'd)**

Depending upon where you live, your local government may have a permanent household hazardous waste site. The operating hours of these facilities varies from a few hours a week to a few days a week. Some may be seasonal. These sites are sometimes housed with fixed-site recycling centers for plastic, glass, and other recyclable materials to make them more convenient.

### **Summary**

Let's review. Here are a couple of important things you should remember before buying any new household chemical from a store: 1) Buy only enough of the chemical to do the job 2) Make sure you are buying the right type of chemical for the job 3) Reading the product's label is the single most important thing you can do when buying, using, storing, or disposing of a chemical.

The Federal Hazardous Substances Act (FHSA) provides specific guidelines regarding labeling of hazardous substances. The signal words on the label are your best indicator of the degree of hazard presented by the product. DANGER = highest degree of hazard; WARNING = moderate degree of hazard; CAUTION = lowest degree of hazard. The words "Keep out of the reach of children" MUST be present on all household hazardous substances as well.

The label may also recommend specific PPE to be worn while using the product. Goggles, respirators, gloves, and coveralls are common types of PPE used in the home. Read the label! If no PPE is recommended, use common sense. These instructions are provided to help protect you from injury.

### **Summary (Cont'd)**

Proper storage and disposal of hazardous materials at home is extremely important. A citizen carrying a 5 gallon bucket in his hand to drop off at a hazardous waste collection facility. Due to increased public awareness of the dangers of hazardous materials, many communities in the United States now have designated household hazardous waste collection days or permanent collection facilities. Remember, read the product's label to see if specific storage and disposal instructions are listed. If not, or if you are unsure about the proper storage or disposal of a product contact the manufacturer or call your local government office.

Remember, it is better to be safe now than sorry later!

## **Unit 5: Disaster Prevention Tips**

### **Objectives**

After completing this lesson, you will be able to:

1. Identify preventive measures to take before natural disasters.
2. Describe why some hazardous materials pose special threats during disasters.
3. List alternatives to using household hazardous materials.

### **Introduction**

Recovery costs following a disaster are bad enough without adding clean up from contamination of hazardous materials in your home. This unit is intended to provide you with some tips to help prevent hazardous materials in and around your home from posing an added danger during a natural disaster.

Pictures of household hazardous materials washed away by flood waters.

Floods, earthquakes, tornadoes and hurricanes pose significant risks to Americans all across the United States. The following are some simple inexpensive tips to reduce the damage to your home. These preventive tips will help protect you and your family from injury as well.

### **Propane Cylinders**

Chain propane cylinders securely to prevent them from floating away during a flood situation. The tanks may seem heavy but flood water can push the tank over and carry it away. Floating propane cylinders can cause damage to buildings and possibly even explode.

### **Propane Cylinders (Cont'd)**

Graphic of propane cylinder with one chain around the top and another around the bottom. It is important to use 2 chains on each cylinder you are securing. Place the first chain just below the top of the cylinder and the second chain just above the bottom. Anchor the chains tightly to the wall.

Chaining propane cylinders is also helpful in earthquake prone areas to prevent the cylinder from moving around and falling over. However, make sure the top chain is tight and can not slip up and damage the valve or regulator on top of the cylinder.

Know how to shut off your propane cylinder if you have an emergency. For example, if you smell gas after an earthquake and you can get to the cylinder without injuring yourself, shut the cylinder off. The knob for turning off propane cylinders is located on the top of the tank.

### **Propane Cylinders (Cont'd)**

When you have your propane installed ask the installer to show you how to correctly shut off the cylinder. Propane is heavier than air so it will hang low to the floor. You may have to open windows to

ventilate your home if you have a propane leak. If you have a propane leak do not use anything that may produce a spark, propane is highly flammable.

Large propane tanks of 250 pounds or more can be found on farms or homes that rely on propane for heating. Some large propane tanks can even be found underground. For people living in earthquake prone areas you can request the gas company to install a seismic shut off valve on large tanks. This valve will automatically turn off the gas during an earthquake.

**NOTE: ONCE YOU TURN OFF A CYLINDER OF ANY KIND LEAVE IT OFF AND NOTIFY THE GAS COMPANY. ONLY THE GAS COMPANY SHOULD TURN THE GAS BACK ON!!!**

### **Natural Gas**

Natural gas is a primary concern with earthquakes. Natural gas is provided to your home through underground pipes. During an earthquake the pipes can easily break or become damaged allowing gas to leak into your home. Knowing how to shut off the gas outside at the meter can save your life. Picture of natural gas meter on outside of house You should shut off the valve if you smell gas and can do so without injuring yourself. Natural gas has a low vapor density so it will rise and dissipate fairly quickly. However, you should still not turn on any switches or electrical devices that could produce a spark until the gas has been shut off because natural gas is also highly flammable.

Automatic gas shut off valves may also be available through the gas company. These devices will shut off the gas automatically during an earthquake. Keep the area around the meter clear for easy access in case of an emergency.

### **Natural Gas (Cont'd)**

Pictures of natural gas shut off valve. The main gas shut off valve is located on the outside of your home with the meter. The valve will be located on a pipe coming out of the ground.

You will need to keep a wrench tied outside to the gas pipe or kept in an easily accessible location. To shut off the gas you use the wrench and turn the valve 1/4 turn, so that it is perpendicular or crosswise on the pipe. The picture to the right shows the valve in the open position.

You should teach all family members how to properly shut off the gas during an emergency. Keep in mind you will need to have the gas company re-light all the pilot lights in your home when the gas is turned back on. **NOTE: REMEMBER ONCE YOU TURN OFF THE GAS, LEAVE IT OFF AND NOTIFY THE GAS COMPANY. ONLY THE GAS COMPANY SHOULD TURN THE GAS BACK ON!!!**

### **Fuel Tanks**

Graphic of a 275 gallon fuel tank demonstrating how the legs should be secured to a cement slab.

A fuel tank should be secured to a cement slab to prevent it from tipping over or floating away during a flood.

If you are in a area of frequent flooding you may want to also elevate your tank to prevent damage to the valves.

### **Fuel Tanks (Cont'd)**

Many people across the country have large 275 gallon tanks of fuel at their homes or farms. Homeowners generally use large quantities of fuel oil or kerosene to heat their homes. However, larger tanks of diesel fuel and gasoline can also be found on farms around sheds, barns, and garages. Spilt fuel from unsecured tanks can cause major problems for homeowners following a disaster.

### **Fuel Tanks (Cont'd)**

Picture of spilt fuel oil floating on top of flood water in a basement. To help prevent spills or releases from occurring during a natural disaster, install flexible gas lines from cylinders or tanks to all gas and fuel appliances in your home including: stoves, hot water heaters, dryers, furnaces, fireplaces, etc... The picture to the right shows spilt fuel oil floating on flood water in the basement of a home.

Also, make sure appliances are secured to the walls in your home to keep them from moving around and damaging the gas lines.

### **Generators**

December 2002

Libertytown, MD - Two men were found dead of carbon monoxide poisoning from a gasoline powered generator that was left running in the basement. The homeowner and friend, who brought over the generator, were trying to provide power to a freezer following an ice storm that disrupted electrical service.

Hurricanes, tornadoes and winter storms and other disasters can leave you without electrical power for long periods of time. Many homeowners invest in generators to supply power to their homes during these times. Generators are usually powered by gasoline or another type of fuel. Fuel burning generators give off carbon monoxide. Carbon monoxide as discussed earlier is silent and deadly.

Plan ahead if you own a generator! Find a spot outside of your house away from any air intakes, flammable products, and well ventilated. Make sure the place where you are going to set your generator up has the proper electrical hook up and the terrain is flat and sturdy. Under no circumstances should a generator be brought inside a home, basement or attached garage. Carbon monoxide can build up quickly in an enclosed area even if you are providing ventilation. Generators are safe when used as recommended by the manufacturer.

### **Doors**

Everyone knows winds from hurricanes and tornadoes can cause severe damage to your home. What about other structures around your home? It is important to reinforce doors and windows to areas

where hazardous materials are stored including a garage, shed or barn. Strong winds can cause doors to blow open and hazardous materials containers to blow over, spill and possibly mix together.

Exterior walls and doors are the protective barrier between the hazardous materials you store and the weather on the outside. Make sure free standing sheds, garages, and small barns are tied down securely to the ground. Structures with double entry doors or garage doors may need special reinforcing. If you can, build your garage, shed or small barn without windows. Before you make alterations contact your local government to check building code requirements in your area. Retrofit kits can usually be found at home improvement stores.

### **Shelves**

Graphic showing a cabinet with a child safety lock on the front and guardrails on the inside shelves where chemicals are stored. If you store hazardous materials on shelves whether they are inside your home or out, you should install guardrails. Guardrails can be installed in cabinets and drawers where you store hazardous materials.

Guardrails will help to prevent containers from tipping over and from falling out onto you when you open the door. They can be particularly helpful in areas at risk for earthquakes but are a great idea for every homeowner.

If you are in an area at risk for natural disasters, you might want to invest in child safety locks in addition to the guardrails. Safety locks come in handy even if you do not have children, because they keep doors and drawers from opening during an earthquakes and floods. These items are inexpensive and can be used on almost any door or drawer.

### **Transportation**

July 2002

Grand Ronde, OR - Two children were killed and three other family members severely burned after the vehicle they were traveling in exploded. The explosion occurred when two chemicals, powdered chlorine (commonly used in home pools) and engine degreaser mixed together in the cargo area of the family's suburban.

You need to pay special attention to chemicals products when moving them from place to place. Most people use their cars or trucks to transport household hazardous materials. However, the same rules apply for proper transportation as they do for storage.

When you transport chemical products ALWAYS:

- \* read the label for special instructions
- \* secure in the upright position
- \* make sure the cap or lid is on tight

- \* keep the product in the original containers
- \* keep reactive chemicals away from each other or transport separately!

## **Airplanes**

In order to keep you safe while flying, the Federal Aviation Administration (FAA) prohibits many household hazardous materials from being packed in luggage or carried onto a plane.

- \* Household hazardous materials, including cleaners, pesticides, and flammable liquids and solids (paints, fuels, solvents, "strike any where" matches, and lighter fluid)

- \* Fireworks of any kind, including sparklers.

- \* Recreational equipment, including scuba tanks, self-inflating rafts, and camping equipment with fuel.

- \* Other items including pressurized containers, wet-cell batteries, and infectious substances are also banned.

There are exceptions for personal care items and for people needing items due to medical reasons. For example:

- \* Flammable items such as perfumes and hairsprays are allowed but each container may not exceed 16 fluid ounces. No more than 75 ounces total can be brought on board.

- \* People who smoke may carry matches and lighters on their person only. Matches and lighters are NOT to be packed in luggage.

- \* Certain medical supplies and equipment including batteries in electric wheelchairs may be allowed. Persons requiring these supplies should contact the airline prior to flying in case special arrangements need to be made.

The airlines reserve the right to impose stricter regulations regarding hazardous materials aboard their aircraft. For this reason, if you are unsure if an item is safe to bring on board contact the airline and check before packing.

## **Chemical Alternatives**

Instead of storing gallons of hazardous materials in and around your home you may want to consider using some less toxic products. Listed below are a few safe alternatives for common household hazardous materials. For additional web sites with suggestions for less toxic alternatives check the resource section at the end of the course.

Drain Cleaner	Plunger followed by 1/2 cup of baking soda, 1/2 cup vinegar, and 2 quarts of boiling water.
Herbicides	Gently wash leaves with soapy water, then rinse.
Oven Cleaner	Sprinkle salt on spills while still warm. Then scrub with baking soda and water.
Spot Remover	Sprinkle club soda on spot.
Air Freshener	Simmer cinnamon and cloves.
Bleach	To brighten clothes add vinegar to clothes.
General Cleaners	1/2 cup vinegar in 1 quart water, or baking soda in hot water.
Furniture Polish	1 tablespoon lemon oil in 1 pint of baby oil.
Laundry Detergent	Use non-detergent natural soap.
Rug and Carpet Cleaner	Club soda.
Toilet Bowl Cleaner	Paste of baking soda and lemon juice.
Window Cleaner	1/2 cup vinegar in 1 gallon warm water.

Adapted from Santa Clara County, "A Consumer Guide to Safer Alternatives to Hazardous Household Products, Part 2", April 1992.

### Summary

Let's review. This unit provided you with some tips to help prevent hazardous materials in and around your home from posing an added danger during a natural disaster.

- \* Chain propane cylinders securely to prevent them from floating away during a flood situation.
- \* Knowing how to shut off the gas outside at the meter can save your life during an emergency. Once you shut off the gas only the gas company should turn it back on!
- \* A fuel tank should be secured to a cement slab to prevent it from tipping over or floating away during a flood. Elevate your tank to prevent damage to the valves if you are prone to frequent flooding.
- \* Install flexible gas lines from cylinders or tanks to all gas and fuel appliances in your home.
- \* Make sure free standing sheds, garages, and small barns where hazardous materials are stored are tied down securely to the ground. Reinforce double entry or garage doors.
- \* Guardrails and safety locks on shelves and cabinets will help to prevent containers from tipping over and from falling out onto you.

\* Pay special attention to chemicals products when moving them from place to place.the same rules apply for proper transportation as they do for storage.

You may also want to consider using less toxic products instead of storing gallons of hazardous materials in and around your home.