Unit 3:
IDENTIFYING HAZARDOUS MATERIALS

OBJECTIVES:

In this unit, you will learn about:

- Clues that indicate the presence of hazardous materials
- How to identify where hazardous materials are located in your community
- Common problems and remedies for hazardous materials sites
- How to use a Material Safety Data Sheet (MSDS) to learn more about acutely toxic substances

How do you know where hazardous materials exist in your community, and whether or not they pose a threat to public health? In some cases, lengthy testing of samples from numerous locations is required to prove that a threat does (or may) exist. In others, the danger is clear and immediate. As a concerned citizen, you need to be aware of where hazards may exist and know how to recognize and report a possible problem.

DETECTING THE PRESENCE OF A HAZARD

The ability to detect a hazard and take corrective action can save lives. In Roseburg, Oregon, a number of years ago, several people observed a truck with an "explosives" placard on it parked by a lumberyard. Later that night, a fire broke out in a dumpster in the lumberyard, igniting the explosives. Eighteen city blocks were destroyed; 13 people were killed, and 125 others were injured. Had someone recognized that this location was a questionable one for a truck with this placard and called the police or fire department, this disaster could have been averted.

Hazardous waste sites knowingly or unknowingly affect thousands of communities across the country.

Sometimes there are ***sensory*** clues that indicate the presence of hazardous materials. However, sensory clues are the least dependable and potentially the most dangerous method of identification. Many materials do not have such warning signals as smell or taste. If you notice that an area has a terrible smell, your eyes water, your skin is irritated, or you begin to cough or feel nauseous, ***leave*** immediately and telephone your local police or fire department. If you encounter a suspicious substance, do ***not*** handle it yourself. You might only add to the problem.

Sometimes no sign reveals that hazardous chemicals exist beneath the surface of the ground, but occasionally unusual circumstances suggest their presence. Water that has an oily appearance, unusual algae growth, or white froth may be contaminated. Discolored soil, bare spots in the

ground where vegetation has died off, dead animals, and the presence of metal drums or other specially designed containers also signal a potential problem. Should you ever actually ***see*** someone dumping what appears to be a hazardous material in a place not designed to receive it, note the identifying features of the person and vehicle and call the police immediately. "Midnight dumping," whether by individuals or corporations, is a growing threat to public health that requires prompt attention.

Some State and local areas offer programs to help the public identify hazardous materials problems. The New Jersey Attorney General's Office, for example, has a program to sensitize people to evidence of illegal waste disposal. You may wish to inquire about similar programs in your area.

Your LEPC should be able to give you precise information about where reportable quantities of extremely hazardous materials are stored or released from fixed sites in your community. (Or, you can use the Toxic Release Inventory database to find this out for yourself.) Remember, however, that ***all*** the hazardous materials that might pose a problem may not be known to the LEPC. Hazardous materials of a type not on the list or stored at levels just below the reportable quantity may still cause a serious incident. Undocumented waste sites or underground storage tanks may exist, or large quantities of toxic materials may be regularly transported through your community.

In identifying where hazardous materials are found in your community, consider the five phases of a hazardous material's "life"—production, transportation, storage, use, and disposal. At ***each*** phase, the possibility exists either for controlled, careful use or for shortsighted mismanagement.

HAZARDOUS MATERIALS PRODUCTION AND STORAGE

Hazardous materials are stored before and after they are transported to their intended use. For example:

- Service stations store gasoline and diesel fuel in underground tanks
- Hospitals store radioactive materials, flammable materials, and other hazardous substances
- Manufacturers, processors, distributors, and recycling plants for chemical industries store a variety of chemicals on site

In addition to the LEPC, your local police and fire departments should maintain specific information on industries in your community that use, store, or generate hazardous materials. Your local codes are critical elements in protecting community health, for they determine what handling, reporting, and emergency preparedness practices are considered "safe." It is usually the local fire department's role to inspect facilities to ensure code compliance. A fire department with a strong prevention emphasis may require businesses to document a hazardous materials management plan that indicates how materials are stored, how compatible substances are separated, where they are disposed of, and other pertinent information. Of particular interest is the existence of underground storage tanks, which can present a significant groundwater contamination hazard. (Old tanks are often overlooked in inspections or not known to exist.) Small volunteer fire departments often lack the personnel and skills required to inspect and

maintain records on hazardous materials stored locally; some train citizen volunteers to assist them in these tasks.

The likelihood of the accidental release of a toxic substance from a fixed site such as a factory can be prevented or minimized by regular local inspections of facilities to ensure compliance with hazardous materials storage and handling regulations. Should a release occur, the cloud would contain areas of greater and lesser concentration.

At the local level, citizens can often express their concern about a local industry's safe manufacture and storage of hazardous materials by conducting a neighborhood inspection. If approached in an atmosphere of cooperation and concern, businesses may respond positively, for they have a great deal to gain by being "good neighbors." Wherever possible, the inspection team should be accompanied by an industrial hygienist or specialist trained in industrial health and safety issues. In one such neighborhood inspection in Massachusetts, a potentially dangerous situation was noted where hundreds of chemicals were stored in alphabetical order. As a result of the inspection, the storage system was altered to separate chemicals that could react with one another. The discovery of this problem may well have prevented a serious accident in which neighborhood residents could have been injured or killed.

READING AND INTERPRETING A MATERIAL SAFETY DATA SHEET (MSDS)

Hazardous materials are common in the modern workplace, and it is clearly important that workers know when they are handling these materials to ensure adequate protection and compliance with the proper safety procedures. Fortunately, the Hazard Communication Standard created by OSHA requires that employers who use hazardous substances must make MSDSs available for employee use and reference, and must provide appropriate warning labels on containers of hazardous substances within the facility.

The manufacturer or distributor of a hazardous substance usually prepares the MSDS. MSDS forms are found in a wide variety of formats, but regardless of the format, they must contain certain key information for employee reference. In many cases, more information is provided on the MSDS than is required by law. The Hazard Communication Standard ***requires*** that the following categories of information be written in English on an MSDS form. (A sample MSDS is found at the end of this unit; refer to it when reading this section.)

The Identity of the Substance

This category features required information on the identity of the material as given on the product label. If the material is a single hazardous substance, its chemical and any common names that it is known by must be given. If the material is a mixture, which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients, which contribute to these known hazards, will be listed. If the product is a mixture and has not been tested as a whole, the hazardous ingredients which comprise 1% or greater of the mixture must be given. If the hazardous ingredient is a carcinogen, those contents which comprise greater than 0.1% must be listed.

A MSDS provides important information on a substance's composition, potential hazards, and specific first aid procedures required in the event of an emergency.

An example of this information can be found in Section I of the sample MSDS at the end of this unit. This MSDS is for hydrofluoric acid—a mixture of hydrogen fluoride gas in water, whose properties vary with its concentration.

Physical and Chemical Characteristics

This category includes the physical and chemical characteristics of the hazardous substance—such as whether it is a liquid, gas, or solid, and data pertaining to characteristics such as vapor pressure and flash point.

The physical data may provide information on how the product will act under a variety of temperatures and conditions. You may learn from this category of information if the material has an odor (and at what level the odor becomes noticeable), the color of the material, and other items about the material's behavior.

This information can be found in Sections III, IV, and VI of the sample MSDS at the end of this unit.

Physical Hazards

The physical hazards of the material must be noted on the MSDS, including the potential for fire, explosions, or reactions, and the conditions under which they may occur. The recommended extinguishing media (water, foam, dry chemical, carbon dioxide, graphite, etc.) for fires can be found here—this information is of great value to community emergency responders.

Some chemicals are ***stable*** by nature—that is, they are unlikely to undergo a chemical reaction or change that may result in a dangerous situation, such as an explosion, fire, or toxic release. On the other hand, some chemicals are ***unstable*** and are likely to react either alone or in combination with other chemicals and substances. This knowledge can be of great value when selecting storage locations for the product.

This information can be found in Sections IV and V of the sample MSDS form at the end of this unit.

Health Hazards

The health hazards of the hazardous substance must be given, including the signs and symptoms of exposure (such as a rash or burning of the eyes and throat) and any medical conditions which are generally recognized as being aggravated by exposure to the material. For example, people with respiratory problems should avoid the inhalation of solvent vapors from paint since these vapors may bring on breathing difficulties.

This information can be found in Section VI of the sample MSDS form at the end of this unit.

Routes of Entry

Potential routes of entry into the body for a hazardous substance must be noted on its MSDS. For example, our sample MSDS indicates that the routes of exposure for hydrofluoric acid include eye contact, skin contact, inhalation, and ingestion.

This information can be found in Section VI of the sample MSDS form at the end of this unit.

Permissible Exposure Limits

The OSHA Permissible Exposure Limit (PEL), Threshold Limit Value (TLV), and any other exposure limit recommended by the manufacturer, distributor, or employer preparing the MSDS must be given if such values are available.

If such values are listed, they may indicate the maximum exposure a worker should have to the substance during an 8-hour working day, as expressed in parts per million (ppm) in air. The PEL is set by OSHA and is a mandated exposure level. However, some PELs have not been updated recently and a number of employers follow exposure limits based on TLVs.

The TLV is the recommended level set by the American Conference of Governmental Industrial Hygienists (ACGIH). TLVs are advisory guidelines that are revised each year as more information becomes available for different chemicals. TLVs are airborne concentrations of hazardous substances and their values vary from one substance to another.

This information can be found in Section II of the sample MSDS form at the end of this unit.

Carcinogens

If the material is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens or has been found to be a potential carcinogen by OSHA or the International Agency for Research on Cancer, this information must be noted on the MSDS.

The product used for the sample MSDS at the end of this unit is not a carcinogen. Had it been, this information might have been found in Sections II or VII.

Safe Handling

This category of required information includes any generally applicable precautions for safe handling and use of the product which are known to the preparer of the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for spills and leaks of the material.

This information can be found in Section VII of the sample MSDS form at the end of this unit.

Control Measures

Any generally applicable control measures which are known to the preparer of the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment (PPE) that is needed to safely handle the material, are included in this category.

This information can be found in Section IX of the sample MSDS form at the end of this unit.

First Aid Procedures

The first aid procedures that are to be used on a person who is exposed to the product must be listed for the various routes of exposure and noted on the MSDS.

On some MSDS forms, this category may be expanded to include procedures that should be followed by medical authorities treating those who have been exposed to the material. In all cases of suspected overexposure, medical advice should be sought.

This information can be found in Section VI of the sample MSDS form at the end of this unit.

Date of Preparation

The date that the MSDS was prepared, and the date that the information was last updated, if applicable, must be noted on the MSDS.

This lets you know exactly how current an MSDS is. Some MSDS forms may be updated once or twice a year, while others, such as those for steel, do not require frequent updating. A call to the manufacturer or supplier can determine if you have the most recent update of the MSDS form that is available.

This information can be found in the header of the sample MSDS form at the end of this unit.

Manufacturer Information

The name, address, and telephone number of the chemical manufacturer or responsible party who prepared the MSDS and can provide additional information on the hazardous chemicals and appropriate emergency procedures to be followed, if necessary, must be listed on the form.

This information can be found in the header of the sample MSDS form at the end of this unit.

If no relevant information can be located for a required category, the MSDS will be marked to indicate that no applicable information has been found for that entry.

HAZARDOUS WASTE SITES

Hazardous waste sites affect thousands of communities across the country. These include abandoned dumpsites, municipal landfills, industrial ponds, storage piles, military base waste sites, and similarly designated areas. Sites that are ***inactive*** (not receiving hazardous waste) are generally listed and ranked for cleanup under the Federal Superfund legislation or State cleanup programs, while ***active*** sites are regulated under RCRA.

Only the most dangerous sites are eligible for Superfund, which ranks qualified sites on the ***National Priorities List (NPL).*** A site is placed on the NPL after a ***preliminary assessment*** and a more thorough ***site investigation*** demonstrate that a potentially serious health threat exists. While approximately 22,000 hazardous waste sites are identified in EPA's inclusive Emergency Response and Remedial Information System (ERRIS), ***less than 1% of this number is included on the NPL.***

A score assigned to the site by the State and reviewed by EPA usually determines the NPL ranking. The score reflects the severity of the contamination, and the vulnerability of residents and the environment to damage from any of the pathways of exposure. Careful testing is required to establish concentrations of pollutants at various points.

State and local officials have been taking an active role in the hazardous waste discovery process. Many local officials have actively sought out these sites with the aid of local citizens. Ideally, the "responsible party" who left the waste assists in cleanup, but in some cases, the polluting company no longer exists or responsibility cannot be proven. The State or local area may be left with extremely large cleanup costs in such cases—which is why ***prevention*** of poor waste disposal practices is by far the best option.

Unfortunately, "cleanup" is not as "clean" a process as the name implies. There are basically three approaches to cleaning contaminated soil:

1. ***Containment.*** The objective of this approach is to leave the waste in place and try to keep it from moving into the soil, air, or groundwater. Unfortunately, natural forces have triumphed in many landfills to date, and systems expected to last decades have made it only a few years before leaking.

2. ***Off-Site Disposal.*** Under this approach, hazardous materials are removed to a RCRA site. Often, risks are transferred rather than eliminated; a number of RCRA landfills have begun to leak and have been added to the NPL for cleanup.

3. ***Treatment.*** Numerous technologies are available or are currently being explored to chemically treat waste so that it is no longer harmful. The best method varies according to the waste. Some waste can be ***biodegraded*** by adding microorganisms specifically bred to "eat up" the chemicals; organic chemicals can sometimes be forced to break down when high temperatures are applied.

Decontaminating groundwater is an even lengthier process. Since groundwater moves slowly through the soil, as long as 20 years may be needed to complete decontamination once pollution has occurred. Three water treatment approaches are currently in use:

1. ***Air Stripping/Aeration.*** Water is brought to the surface and agitated or sprayed into the air to accelerate the evaporation of organic compounds. Citizens near a site using this method need to ask questions about the rate at which toxic elements are released into the atmosphere, particularly if residential areas are located near the stripping tower.

2. ***Activated Carbon.*** This treatment passes water through columns containing activated carbon, leaving many chemicals attached to the carbon particles. A sensitive issue in this type of treatment is how to dispose of the contaminated carbon.

3. ***Chemical Precipitation.*** In this approach, primarily used to remove metals such as lead and arsenic, chemicals are added which can convert metals to insoluble particles. These particles then settle out of the water as sludge. The controversial issue with this method is the disposal of the toxic sludge.

HAZARDOUS MATERIALS IN RURAL AREAS

Even rural areas face hazardous materials problems. In addition to the ever-present possibility of a hazardous materials transportation accident, or storage problems associated with small businesses such as agricultural chemical dealers, threats exist which are unique to the rural environment.

Since wells are a primary water supply in most rural areas, a major concern is the introduction of contaminants into groundwater. A serious, and fortunately infrequent, hazard is that of flammable gas in wells. Small volumes of naturally occurring methane gas can enter wells that are drilled into carbonate or shale rock, causing explosions and fire. Venting the wellhead and other areas of the house where gas can be trapped may lessen this hazard. Another source of concern is the common farming practice of applying fertilizers and pesticides to crops next to a barnyard or farmyard, where many can be drawn into a well—a problem that can be reduced by decreasing the use of pesticides in that general area.

Groundwater contamination is a major concern in rural areas, which must deal with pollutants such as livestock waste and pesticide runoff in addition to the problems found in more heavily populated environments.

Farmers sometimes use sewage sludge as a source of plant nutrients. However, some industrial sludge contains heavy metals that may be toxic to crops, humans, and other animals. Because tolerance levels for heavy metals depend on the soil's physical and chemical characteristics, farmers should work with a professional to determine their soil's tolerance and stay within its limits.

Phosphate fertilizer can also cause problems. If you notice that fish are dying in an area where phosphates can reach the water from farm runoff, it is possible that phosphates are promoting the growth of algae and other aquatic plants that deplete oxygen. Reduced use of phosphates and

runoff control can reduce this problem. Similarly, excessive use of nitrogen can contaminate groundwater and surface water, particularly when fertilizer is applied far in advance of the crop or to improve poor soils.

Accidents involving excessive use of pesticides have resulted in fish kills, human illness, and even death. Pesticides have been known to contaminate groundwater, particularly in very permeable soils or at sinkholes in limestone; once these substances are introduced into the groundwater supply, they can also be carried to surface waters. Developing other pest control procedures to reduce pesticide use and avoiding applications to permeable soils can reduce contamination. Protective clothing is also important whenever pesticides are applied.

Agricultural runoff can carry soil particles, pesticides, bacteria, and other pollutants directly into estuaries and coastal waters, or into rivers that flow into these waters. Control of runoff by each farmer is extremely important in limiting the spread of harmful products.

SUMMARY

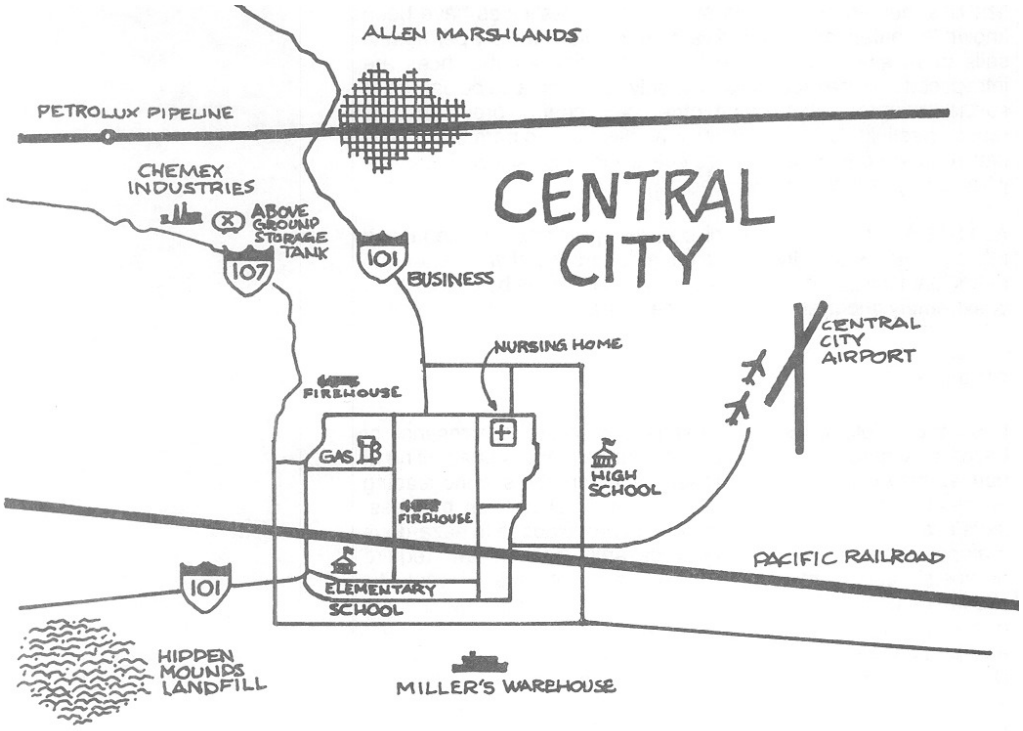
It is not possible to rely on the senses to detect the presence of hazardous materials—such clues as pungent odors or a feeling of nausea may or may not be present. (Radon, the second leading cause of lung cancer in the United States, is a colorless, odorless, tasteless gas.) To find out whether you are exposed to hazardous materials is, therefore, a matter of research. Federal laws require disclosure and identification of hazardous materials in specific circumstances. For example, hazardous materials shipments crossing State lines, and many hazardous materials used in the workplace, must be labeled. For such substances a MSDS is often available that provides detailed information on the material's attributes and required self-protection. State laws often "close loopholes" in Federal legislation (such as transportation of hazardous materials within State lines) to provide further citizen protection.

To identify the presence of hazardous materials in your community, consider all five phases of the material's "life"—production, transportation, storage, use, and disposal. Thoughtful policies are needed at each phase to protect local residents from unnecessary health risks.

HAZMAT TEASER

(Answers are on page C-2)

Consider the five phases of the life cycle of a hazardous material—production, transportation, storage, use, and disposal. Based on the map shown below, where in this community do you see a potential for a hazard to develop? A map is needed for this exercise. If you are visually impaired, please have a sighted person assist with this exercise.



1. During production?

2. During transportation?

3. During storage?

4. During use?

5. During disposal?

A Material Safety Data Sheet is needed for the following exercise. If you are visually impaired, please have a sighted person assist with this exercise.

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
1145 CATALYN STREET
SCHENECTADY, NY 12303-1836 USA
(518) 377-8855

No. 6A

HYDROFLUORIC ACID
AQUEOUS (47-70%)
Revision B

Date May 1981

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: HYDROFLUORIC ACID, AQUEOUS (47-70%)
DESCRIPTION: A solution hydrogen fluoride gas in water. Properties vary with concentration.
OTHER DESIGNATIONS: GE Material D4A7, CAS #007 664 393
MANUFACTURER: Available from many suppliers, including Harshaw Chemical Company, and E.I. Dupont de Nemours Co., Inc.

SECTION II. INGREDIENTS AND HAZARDS	%	HAZARD DATA
Hydrogen fluoride (HF)	47-70	8-hr TWA 2mg/m^3 or 3 ppm*
Water	Balance	

*Current OSHA Standard and ACGIH (1980) TLV (as HF). NIOSH has recommended 10-hr TWA of 2.5 mg (as F)/m^3 and a ceiling level of 5.0 mg/m^3 (15 min. sample). TLV set at level to minimize irritation of eyes and nose and to prevent fluorosis. DuPont recommends that this level be treated as a ceiling limit.

SECTION III. PHYSICAL DATA

	48% acid	70% acid	
Boiling point, 1 atm	225 F (107 C)	152 F (66C)	Volatiles, % -- ca 100
Weight % HF in vapor at BP	ca 80	ca 98	Water Solubility-Complete
Vapor pressure at 20 C, mm Hg	ca 25	ca 125	pH <2
Specific gravity (0/4 C)	1.18	1.27	
Freezing point	ca -35 F	ca - 95 F	

Appearance & Odor: Colorless, or nearly colorless, fuming liquid with a pungent, irritating odor above 5 ppm.

SECTION IV. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temp.	Flammability Limits In Air	LOWER	UPPER
N/A	N/A	N/A	N/A	N/A

Extinguishing Media: Water or carbon dioxide. Keep upwind of fire.
This material is nonflammable; however, flammable and explosive hydrogen gas may be formed when HF reacts with certain metals.
Dangerous when heated; emits toxic corrosive fumes. Avoid getting water into tanks or drums, can cause generation of heat and possible spattering.
Firefighters should wear self-contained breathing-apparatus, eye protection, and complete body protection equipment when fighting an HF fire.

SECTION V. REACTIVITY DATA

Hydrofluoric acid is a stable chemical when used and stored under proper conditions. This acidic material will attack glass, concrete, certain metals, silica-containing materials, natural rubber, leather, and many organics. It reacts with silica to produce SiF_4, a hazardous colorless gas. Reaction with cyanides or sulfides may cause release of poisonous cyanide or hydrogen sulfide gas.

Keep 50% acid in tightly closed polyethylene, TEFLON, lead, wax, or paraffin coated containers. >60% HF concentrations can be handled in passivated steel containers and piping of appropriate design.

GENIUM PUBLISHING

SECTION VI. HEALTH HAZARD INFORMATION

TLV 3 ppm or 2 mg/m^3 (as HF)

HF is not detected by smell at 3 ppm but is immediately irritating to mucous membranes at over 5 ppm. Inhalation of vapors can cause extreme irritation of respiratory tract, pulmonary edema, congestion, and fluorosis. Breathing 50 ppm for 30-60 min. may be fatal. Eye contact can cause permanent damage. Skin contact causes severe burns, which may not be immediately painful or visible; concentrations below 50% may not produce symptoms for 8 hours or longer. Ingestion can cause throat burns and severe swelling of windpipe.

FIRST AID:

Eye Contact: Immediately flush with water for 15 min. or more, including under eyelids.*

Skin Contact: Wash acid from the skin. Remove contaminated clothing. Continue washing 2-4 hours with water; or preferably if available, soak in iced zephiran (0.13%), Epsom salt, or 70% denatured ethyl alcohol solution for 1-4 hours, depending on severity of burns.*

Inhalation: Immediately remove to fresh air. Admin. 100% 0_2 and repeat ½ hr intervals.*

Ingestion: Do not induce vomiting. Give large quantities of milk or water with milk of magnesia.*

*Get medical attention promptly for all affected persons. First aid procedures should be planned before beginning work with HF. Consider hospitalization

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

Notify safety personnel, provide adequate ventilation, and remove ignition sources since hydrogen may be generated by reactions with metals. Use protective clothing & equipment. HF vapor should be passed through a packed tower scrubber. Spills should be covered with lime to form a slurry. Do not flush to sewers or waterways.

DISPOSAL: The neutralized slurry can be scraped up for disposal in an approved landfill. Liquid wastes may be neutralized in a trench with lime in a remote location away from buildings and people. Then fill the trench with earth and cover with lumber or sheet metal until the earth settles. Follow Federal, State, and local regulations.

NOTE: Porous materials (concrete, wood, plastic, etc.) will absorb HF and become a hazard for an indefinite time. Such spills to be cleaned and neutralized immediately.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Exhaust hoods should be a noncorroding construction, with a face velocity minimum of 100 lfm. Respirators should be available for nonroutine and emergency use above the TLV. An air-supplied respirator or a self-contained breathing apparatus with full facepiece is recommended when vapors/fumes are above exposure limits, up to 20 ppm.

Wear protective clothing, including boots or safety shoes with polyvinyl chloride (PVC), neoprene or composition soles; chemical goggles and/or a full-face shield; coveralls with long sleeves; gauntlets and gloves of PVC or neoprene. A high degree of protection obtained with an air-inflated suit with mask and safety belt. Protective clothing not to be worn or carried beyond operation areas. Use protection suitable for conditions.

Chemical showers and eyewash stations to be readily available to areas of use. Immediately shower with copious amounts of water within seconds after contact, and completely remove all clothing while in shower.

Contact with dilute HF solutions (below 20% in water) may not produce immediate pain or visible damage; but after several hours, the burns will manifest.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Maintain adequate ventilation. Use forced draft ventilation and scrubbers for fume control. Keep containers tightly closed. Storage facilities to be constructed for containment and dilution/neutralization of spills.

Use nonsparking tools around tanks & pipes where hydrogen gas may collect.

Handling and storage of HF requires special materials technology for containers, pipes, valves, gaskets, etc., which is available from suppliers. TEFLON TFE or FEP fluorocarbon resins are resistant to all conc. Of HF up to 500 F and 400 F respectively.

Do not inhale HF mists or vapors! Preclude from exposure workers with kidney disease, osteofluorosis, or impaired pulmonary function.

DOT Classification - CORROSIVE MATERIAL I.D. No. UN1790

1-11, 17, 20, 26, 31, 37, 38,

DATA SOURCE(s) CODE: 43, MSDS #6

APPROVALS: MIS

CRD

Industrial Hygiene and Safety 5-5-81

MEDICAL REVIEW: 14 May 1981

CHECK YOUR MEMORY

(Answers are on page C-4)

1. The _____ usually prepares the MSDS of a hazardous substance:

   a. The manufacturer or distributor
   b. The supplier or the shipper
   c. The end user or the buyer
   d. The shipper or the receiver

2. To inform workers of hazards a chemical may pose, OSHA requires employers to develop a:

   a. Hazardous Materials Program
   b. Hazardous Waste Program
   c. Hazard Communication Program
   d. Worker Right to Know Program

3. Health hazards of a given chemical would be found in what section of the MSDS?

   a. Section II
   b. Section IV
   c. Section VI
   d. Section VIII

4. Personal protective clothing and equipment for safe handling of the chemical would be discussed in what section of the MSDS?

   a. Section II
   b. Section IV
   c. Section VI
   d. Section VIII

5. Permissible exposure limits are levels of exposures mandated by:

   a. USCG
   b. OSHA
   c. ACGIH
   d. EPA

6. OSHA's PEL for hydrogen fluoride (HF) is?

   a. 1.0 mg/m³
   b. 2.0 mg/m³
   c. 1.5 ppm
   d. 3.0 ppm

7. National Priorities List (NPL) are dangerous sites targeted for cleanup under:

    a. Resource Conservation and Recovery Act
    b. Environmental Protection Act
    c. Superfund Act
    d. Hazardous Materials Transportation Act