NSF Hazard Communication Program or GHS Safety Program

Chapter 1

Introduction

About 32 million workers are potentially exposed to one or more chemical hazards. There are an estimated 575,000 existing chemical products, and hundreds of new ones are being introduced annually. This poses a serious problem for exposed workers and their employers. Chemical exposure may cause or contribute to many serious health effects such as heart ailments, kidney and lung damage, sterility, cancer, burns, and rashes. Some chemicals may also be safety hazards and have the potential to cause fires and explosions and other serious accidents.

Because of the seriousness of these safety and health problems, and because many employers and employees know little or nothing about them, the Occupational Safety and Health Administration *(OSHA)* issued, in 1983, a rule called "Hazard Communication" that applies to employers in the manufacturing sector industry. The scope of the rule was expanded in 1987 to include employers in the non-manufacturing *(including construction)* sector.

The basic goal of the standard is to ensure that employers and employees know about chemical hazards and how to protect themselves. This knowledge, in turn, should help to reduce the incidence of chemical source illnesses and injuries.

The Hazard Communication Standard establishes uniform requirements to assure that the hazards of all chemicals imported into, produced or used in U.S. workplaces are evaluated, and that the resultant hazard information and associated protective measures are transmitted to affected employers and potentially exposed employees.

Chemical manufacturers and importers must convey the hazard information they learn from their evaluations to downstream employers by means of labels on containers and Safety Data Sheets *(MSDS's)*. In addition, all covered employers must have a Hazard Communication Program to get this information to their employees through labels or containers, from MSDS's, and training.

This program developed for National Fire & Safety ensures that National Fire & Safety receives the information they need to inform and train their employees properly and to design and put in place employee protection programs. It also provides necessary hazard information to employees, so they can participate in, and support, the protective measures in place at their workplaces.

Chapter 1A

Five preliminary steps to come into compliance.

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

1. Read the standard.

- Make sure you understand the provisions of the standard.

- Know your responsibility as an employer.

2. List the hazardous chemicals in the workplace.

- Walk around the workplace, read all container labels, and list the identity of all materials that may be hazardous; the manufacturer's product name, location, and telephone number; and the work area where the product is used. Be sure to include hazardous chemicals that are generated in the work operation but are not in a container *(e.g., welding fumes)*.

- Check with your purchasing department to ensure that all hazardous chemicals purchased are included on your list.

- Review your list and determine whether any substances are exempt.

- Establish a file on hazardous chemicals used in your workplace, and include a copy of the latest SDS, and any other pertinent information.

- Develop procedures to keep your list current. When new chemicals are used, add them to your list.

3. Obtain Safety Data Sheets for all chemical substances.

- If you do not have an SDS for a hazardous substance in your workplace, request a copy from the chemical manufacturer, or distributor as soon as possible. *(See Chapter 4D for a sample letter requesting an SDS.)* An SDS must accompany or precede the shipment and must be used to obtain identifying information such as the chemical name and the hazards of a particular substance.

- Review each SDS to be sure that it is complete and clearly written. The

SDS must contain the following:

- Physical and chemical properties of a substance.
- Physical and health hazards.
- Routes of exposure.
- Precautions for safe handling and use.
- Emergency and first-aid procedures.
- Control measures.

(See Chapter 4 for a sample SDS and other information.)

- If the SDS is incomplete or unclear, contact the manufacturer or distributor to get clarification of the missing information.

- Make sure the SDS is available to employees, designated representatives, and to the Assistant Secretary for Occupational Safety and Health.

4. Make sure that all containers are labeled.

The manufacturer, importer, or distributor is responsible for labeling containers, but National Fire & Safety must adhere to the following:

- Ensure that containers of hazardous substances in the workplace are labeled, tagged or marked and include the identity of the hazardous chemical, and the appropriate hazard warnings. Container labels for purchased chemicals must also include the name and address of the chemical manufacturer, importer, or other responsible party.

- Check all incoming shipments of hazardous chemicals to be sure they are labeled.

- If a container is not labeled, obtain a label or the label information from the manufacturer, importer, or other responsible party or prepare a label using information obtained from these sources. Employers are responsible for ensuring that containers in the workplace are labeled, tagged, or marked.

- Do not remove or deface existing labels on containers unless the container is immediately marked with the required information.

- Instruct employees on the importance of labeling portable containers into which they have poured hazardous substances. If the portable container is for their immediate use, then the container does not have to be labeled.

5. Develop and implement a written hazard communication program.

This program must include the following:

- Container labeling and other forms of warnings.
- Safety Data Sheets.
- Employee training based on the list of chemicals, SDS's, and labeling information.
- Methods for communicating hazards and protective measures to employees and others *(such as other contractors or subcontractors onsite)*.

Chapter 1B

Hazard Compliance Checklist

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

	Yes	No
1. Listed all of the hazardous chemicals in our workplace.	____	____
2. Established a file for information on hazardous chemicals.	____	____
3. Obtained an SDS for each hazardous chemical in use.	____	____
4. Developed a system to ensure that all incoming hazardous chemicals are labeled.	____	____
5. Reviewed each SDS to be sure it is complete.	____	____
6. Made sure that SDS are available where necessary.	____	____
7. Developed a written hazard communication program.	____	____
8. Developed a method to communicate hazards to employees and others *(contractors and subcontractors)*.	____	____
9. Informed employees of protective measures for hazardous chemicals used in the workplace.	____	____
10. Alerted employees to other forms of warning that may be used.	____	____

Chapter 2

Hazard Communication Program

General Policy of National Fire & Safety

The purpose of this notice is to inform you that National Fire & Safety is complying with the OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1910.1200, by the following actions:

- Compiling a hazardous chemicals list.
- By using SDS.
- By ensuring that containers are labeled.
- By providing you, the employee with training.

This program applies to all work operations in National Fire & Safety where you may be exposed to hazardous substances under normal working conditions or during an emergency situation.

The Responsible Safety Manager, Christian Noriega, is the program coordinator who has overall responsibility for the program. Christian Noriega will review and update the program, as necessary. Copies of the written program may be obtained from Christian Noriega.

Under this program, you will be informed of the following items:

- The Hazard Communications Standard.
- The hazardous properties of chemicals with which you work.
- Safe handling procedures.
- Measures to take to protect yourself from these chemicals.
- Hazards associated with non-routine tasks.
- Hazards associated with unlabeled containers.

List of Hazardous Chemicals

The Responsible Safety Manager, Christian Noriega, will make a list of all hazardous chemicals and related work practices used in the facility and on jobsites, and will update the list as necessary. Our master list of chemicals and substances identifies all chemicals and substances used throughout our work areas. SDS for your particular jobsite will be located National Fire & Safety. The master list of chemicals and substances will be maintained by Christian Noriega, and is available for review.

Safety Data Sheets (SDS provide you, the employee with specific information on the chemicals you use. The Responsible Safety Manager, Christian Noriega will maintain a binder with an SDS on every chemical or substance used by National Fire & Safety. The SDS will be a fully completed OSHA Form 174 or equivalent. The Responsible Safety Manager, Christian Noriega, will ensure that the shop and each jobsite maintains the appropriate SDS for that area. SDS will be made readily available to you National Fire & Safety during normal working hours.

The Responsible Safety Manager, Christian Noriega, is responsible for acquiring and updating MSDS's. He will contact the chemical manufacturer or vendor if additional research is necessary or if an SDS has not been supplied with an initial shipment. All new procurements for the company must be cleared by the Responsible Safety Manager. The master list of chemicals and substances is available for review from Christian Noriega.

Labels and Other Forms of Warning

The Responsible Safety Manager, Christian Noriega, will ensure that all hazardous chemicals used in the facility and on jobsites are properly labeled and updated as necessary. Labels shall be legible, and in English, however, for non-English speaking employees, information shall be presented in their language as well. Labels should list at least the following items:

- The chemical identity.
- The appropriate hazard warnings.
- The name and address of the manufacturer, importer, or other responsible party.

The Responsible Safety Manager, Christian Noriega, or your immediate supervisor will refer to the corresponding SDS to assist you in verifying label information. Containers shipped from the shop or central office will be checked to make sure all containers are properly labeled.

If you transfer chemicals from a labeled container to a portable container that is intended for immediate use, no labels are required on the portable container. These portable containers shall not be allowed to remain in any work or storage areas overnight without emptying or labeling to prevent another person from coming in contact with the portable container.

Non-Routine Tasks

When you are required to perform hazardous non-routine tasks *(such as entering confined spaces)*, a special training session will be conducted to inform you regarding the hazardous chemicals to which you might be exposed and the proper precautions to take to reduce or avoid exposure.

Training

Anyone who works with or is potentially exposed to hazardous chemicals will receive initial training on the Hazard Communication Standard and the safe use of those hazardous chemicals by the Responsible Safety Manager, Christian Noriega, or a designated representative. This training shall be performed for present workers and for new hires at the time of their initial assignment.. The training program may use classroom style training materials and/ or audiovisual aids. Whenever a new chemical is introduced, additional training *(informal if appropriate)* will be provided. Regular safety meetings conducted, and the RSO or a designated representative will also be used to review the information presented in the initial training. Foremen and other supervisors will be trained regarding jobsite hazards and appropriate protective measures so they will be able to answer questions from you and/ or other employees and to provide daily monitoring of safe work practices.

The training plan will emphasize these items:

- A summary of the OSHA Standard and details of this written program, including an explanation of the labeling system and SDS and how employees can obtain and use the appropriate hazard information.
- Chemical and physical properties of hazardous materials *(e.g. flash point, reactivity)* and methods that can be used to detect the presence or release of chemicals.
- Physical hazards of chemicals *(e.g. potential for fire, explosion, etc.)*.
- Any operation in their work area where hazardous chemicals are present.
- Physical and health hazards, including signs and symptoms of exposure, associated with exposure to chemicals in the workplace, and any medical condition known to be aggravated by exposure to the chemical.

- Methods and observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance or odor.

- Procedures and appropriate work practices to protect against hazards.

- Personal protective equipment required

- Proper use and maintenance of personal protective equipment

- Work practices, or methods to assure proper use and handling of chemicals

- Procedures for emergency response.

- Work procedures to follow to assure protection when cleaning hazardous chemical spills and leaks, or other emergency procedures.

- Where the Hazard Communication Program, any applicable Lists of Chemicals, and SDS are located, how to read and interpret the information on both labels and MSDS's, and how employees may obtain additional information.

Other Employers

The Responsible Safety Manager, Christian Noriega, upon notification, will either meet with or have a designated agent meet with other contractors, subcontractors, or any other applicable parties on jobsites to discuss the following items:

- Chemical hazards that may be encountered in the normal course of our work on the premises.

- The labeling system that is in use.

- The protective measures to be taken by our employees.

- The safe handling procedures to be used by our employees.

- The location of the SDS's.

In addition, each contractor bringing chemicals on-site must provide National Fire & Safety with the appropriate hazard information on these substances, the labels

used, the precautionary measures to be taken in working with these chemicals, and the location of the MSDS's.

Additional information

All employees, or their designated representatives, can obtain further information on this written program, the Hazard Communication Standard, applicable MSDS's, and chemical information lists from the Responsible Safety Manager, Christian Noriega.

Chapter 3A

Guidelines for Identifying and Listing Hazardous Chemicals

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

How to Identify Hazardous Chemicals

The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer of a chemical. As a user of chemicals, National Fire & Safety may rely on the evaluation received from these suppliers through labels on containers and Safety Data Sheets *(MSDS's)*. To prepare a list of chemicals in our facility that is covered by the rule, walk around and write down the names of chemicals that have a label indicating a potential hazard *(e.g. "flammable", "inflammable", "causes skin irritation")*. Don't limit yourself to chemicals in containers, however. Be aware of substances generated in work operations such as fumes or dust as these may be covered too.

Chemicals Considered to be Hazardous:

- Those regulated by OSHA in 29 CFR Part 1926, Subpart Z, Toxic and Hazardous Substances.

- Those included in the American Conference of Governmental Industrial Hygienists *(ACGIH)* latest edition of **Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment**.

- Those found to be suspected or confirmed carcinogens by the National Toxology Program in the latest edition of the **Annual Report on Carcinogens**.

- Those found to be suspected or confirmed carcinogens by the International Agency for Research on Cancer (IARC) in the latest edition of IARC **Monographs**.

Once you have complete list of chemicals, you'll want to review it to determine if any of the items are exempted. In paragraph (b)(6) of the Hazard Communication Standard, OSHA has listed a number of items that are excluded. For example, rubbing alcohol maintained in a first-aid station would be exempt under paragraph (b)(6)(vi) because it's intended for personal use by employees. To be prudent, some employers include all chemicals even if they are exempted. In general, if there is any question regarding a

chemical, it's best to include that chemical in the Hazard Communication Program.

How to List Chemicals in the Workplace

All hazardous chemicals known to be present in your workplace should be listed using an identity that appears on the appropriate SDS and label for the chemical. The list may also include common or trade names, Chemical Abstract Service *(CAS)* registry numbers, SDS reference numbers, etc. *(See sample form included in Chapter 4.)* The list can be compiled for the entire company's work areas, or for individual shop or jobsites.

The list is to be an inventory of everything for which a SDS must be obtained. It will be part of the written program, and must be available to employees upon request.

Chapter 3B

Guide list of Hazardous Chemicals

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

The following list identifies some types of potentially hazardous chemicals that may be present in the workplace:

Acids
Adhesives
Aerosols
Asbestos
Battery Fluids
Benzene
Catalysts
Caustics
Cleaning Agents
Coal Tar Pitch
Coatings
Degreasing Agents
Detergents
Dusts
Etching Agents
Fiberglass
Flammables
Foaming Resins
Fuels
Fungicides
Gasoline
Glues
Greases
Industrial Oils
Inks
Insecticides
Herbicides
Janitorial Supplies
Kerosene
Lacquers
Lead
Lye
Oxalic Acid
Paints
Pesticides
Plastics
Process Chemicals
Resins
Sealers
Shellacs
Solders
Solvents
Strippers
Surfactants
Thinners
Varnishes
Water Treatments
Wood Preservatives
Zylene

Chapter 3C

Company List of Hazardous Chemicals and SDS Index

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

Hazardous Chemical	Common Name	Product Name	Manufacturer	SDS Rcvd

Hazardous Chemical	Common Name	Product Name	Manufacturer	SDS Rcvd

Chapter 4A *SDS*

Guidelines

Introduction

The Material Safety Data Sheet *(SDS)* is a detailed information bulletin prepared by the manufacturer or importer of a chemical that describes the physical and chemical properties, physical and health hazards, routes of exposure, precautions for safe handling and use, emergency and first-aid procedures, and control measures. Information on an SDS aids in the selection of safe products and helps and prepare National Fire & Safety and you, the employee to respond effectively to daily exposure situations as well as emergency situations.

The SDS are a comprehensive source of information for all types of employers. Therefore there may be information on the SDS that is not particularly useful to you or not important to the safety and health in your operation. Concentrate on the information that is applicable to your situation. Generally, hazard information and protective measures should be the focus of your concern.

This Hazardous Communications Program contains a glossary of terms used on SDS *(see Chapter 7)*. You may find this helpful in reading and understanding MSDS's.

OSHA Requirements

National Fire & Safety maintains a complete and accurate SDS for each hazardous chemical that is used in the shop and on jobsites. All employers are entitled to receive SDS automatically upon purchase of the material. When new and significant information becomes available concerning a product's hazards or ways to protect against the hazards, chemical manufacturers, importers, or distributors must add to their SDS within three months and provide it to their customers with the next shipment of chemical. National Fire & Safety has an SDS for each hazardous chemical used in the workplace. When there are multiple suppliers of the same chemical, only one SDS is retained.

While SDS are not required to be physically attached to a shipment, they must accompany or precede the shipment. When the manufacturer or supplier fails to send an SDS with a shipment labeled as a hazardous chemical, National Fire & Safety will obtain one from the manufacturer or supplier as soon as possible. Similarly, if the SDS is incomplete, or unclear, National Fire & Safety will contact the manufacturer or supplier to get clarification or obtain missing information as soon as possible. See Chapter 4D for an SDS Request Form.

If National Fire & Safety cannot obtain an SDS from a manufacturer or supplier a written complaint shall be sent to the nearest OSHA area office. OSHA will then, at the same time, call and send a certified letter to the manufacturer or supplier to obtain the needed information. If the manufacturer or supplier still fails to respond within a reasonable time, OSHA will inspect the manufacturer or supplier and take appropriate enforcement action.

Sections of an SDS and Their Significance

OSHA specifies the information to be included in an SDS, but does not prescribe the precise format for an SDS. A non-mandatory SDS form *(See Chapter 4C)* that meets the Hazard Communication Standard requirements has been issued and can be used as-is or expanded as needed. The SDS must be in English and must include at least the following information:

Section I. Identification

- The chemical and common name(s) must be provided for chemical substances.
- An identity on the SDS must be cross-referenced to the identity found on the label.
- The manufacturer's name, address, and emergency information telephone number.
- The date prepared and the signature of the preparer.

Section II. Hazardous Ingredients

- For a hazardous chemical mixture that has been tested as a whole to determine its hazards, the chemical and common names of the ingredients that are associated with the hazards, and the common name of the mixture must be listed.
- If the chemical is a mixture that has not been tested as a whole, the chemical and common names of all ingredients determined to be health hazards and comprising one percent *(1%)* or greater of the composition must be listed.
- Chemical and common names of carcinogens must be listed if they are present in the mixture at levels of one-tenth percent *(0.1%)* or greater.
- All components of a mixture that have been determined to present a physical hazard must be listed.

- Chemical and common names of all ingredients determined to be health hazards and comprising less than one percent (one-tenth percent for carcinogens) of the mixture must also be listed if they can still exceed an established Permissible Exposure Limit *(PEL)*- that is, the limit a person may be safely exposed to a chemical, or Threshold Limit Value *(TLV)*- that is the concentration of a chemical that may breathed for a five consecutive 8 hour workday, or present a health risk to exposed employees in these concentrations.

- Any other limits recommended by any agency, scientific group, or organization should be included.

Section III. Physical and Chemical Characteristics

- The physical and chemical characteristics of the hazardous substance must be listed. These may include items such as :

- Boiling, Melting, and Freezing Points *(in degrees)*

- Vapor Density- *(in numerical values)* Values greater than 1.0 are heavier than air, and therefore will collect in low spots, displacing breathable air, and in the case of flammables, collecting in ignitable concentrations. Values less than 1.0 are lighter than air and will tend to rise and dissipate.

- Vapor pressure *(in mm Hg)*- measures a material's ability to evaporate. The higher the value, the faster evaporation will occur.

- Specific Gravity- *(in numerical values)* Values greater than 1.0 are heavier then water, and will sink in water. Values less than 1.0 will float on water- this needs to be considered before extinguishing a material with water, or if washing a material away from an area.

- Solubility- the ability of a substance to mix with water.

- The product's general appearance and odor.

These characteristics provide important information for designing safe and healthful work practices.

Section IV. Fire and Explosion Hazard Data

- The compound's potential for fire and explosion must be described, such as:

- Flash Point *(in Degrees)*

- Lower Explosive Limit *(LEL)* The minimum concentration of a substance in the air which can be ignited.

- Upper Explosive Limit *(UEL)* The maximum concentration of a substance in the air which can continue to support fire.

- Extinguishing Agents- In accordance with the following table:

Type of Fire	***Extinguishing Agent***
Class A- Wood, Paper, Cloth	Water
Class B- Flammable/ Combustible Liquids	Carbon Dioxide, Dry Chem, Foam
Class C- Electrical	Carbon Dioxide, Dry Chem
Class D- Combustible Metals	Special Compounds

- Special Fire or Explosion Characteristics

- Special Fire Extinguishing Methods- such as if substances will re-ignite, etc.

Also, the fire hazards of the chemical and the conditions under which it could ignite or explode must be identified. Recommended extinguishing agents and fire-fighting methods must be described.

Section V. Reactivity Data

This section presents information about other chemicals, substances or conditions with which it reacts such as:

- Hazardous Decomposition- Any gases which may be released when the substance is heated, burned or decomposes.
- Hazardous Polymerization- What, if any different compounds develop when a substance is combined with other substances.
- Incompatibility- Materials the substance should not come in contact with.
- Instability- Conditions which would cause a reaction, such as heat, pressure, shock, etc.

Section VI. Health Hazards

- The acute and chronic health hazards of the chemical, together with signs and symptoms of exposure, must be listed. in addition, any medical conditions that are aggravated by exposure to the compound, must be included. the specific types of chemical health hazards defined in the Standard include carcinogens, corrosives, toxins, irritants, sensitizers, mutations, teratogens, and effects on target organs *(i.e. liver, kidney,*

nervous system, blood, lungs, mucous membranes, reproductive system, skin, eyes, etc.).

- The route of entry section describes the primary pathway by which the chemical enters the body. there are three principal routes of entry: inhalation, skin, and ingestion.

- This section of the SDS supplies OSHA PEL, the ACGIH TLV, and other exposure levels used or recommended by the chemical manufacturer.

- If the compound is listed as a carcinogen *(cancer-causing agent)* by OSHA, the National Toxicology Program *(NTP)*, or the International Agency for Research on Cancer *(IARC)*, this information must be indicated on the SDS.

Section VII. Precautions for Safe Handling and Use

- The Standard requires the preparer to describe the precautions for safe handling and use. These include recommended industrial hygiene practices, precautions to be taken during repair and maintenance of equipment, and for cleaning up spills and leaks. Some manufacturers also use this section to include useful information not specifically required by the standard, such as EPA waste disposal methods and state and local requirements..

Section VIII. Control Measures

The Standard requires the preparer of the SDS to list any generally applicable control measures. These may include the following:

- Engineering Controls
- Safe Handling Procedures
- Personal Protective Equipment
- Ventilation

Employer Responsibilities

National Fire & Safety ensures by training that each employee has a basic knowledge of how to find information on an SDS and how to properly make use of that information. National Fire & Safety also ensures the following:

- Complete and accurate SDS are made available during each work shift to employees when they are at their work areas.

- Information is provided for each hazardous chemical.

Chapter 4B

SDS Checklist

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

National Fire & Safety ensures that each SDS contains the following information:

1. Product or chemical identity used on label. ____
2. Manufacturer's name and address. ____
3. Chemical and common names of each hazardous ingredient. ____
4. Name, address, and phone number for hazardous and emergency information. ____
5. Preparation or revision date. ____
6. The hazardous chemical's physical and chemical characteristics, such as vapor, pressure, and flashpoint. ____
7. Potential physical hazards, *(i.e. fire, explosion, and reactivity)*. ____
8. Known health hazards. ____
9. OSHA Permissible Exposure Limit *(PEL)*, ACGIH Threshold Limit Value *(TLV)* or other exposure limits. ____
10. Emergency and first-aid procedures. ____
11. Whether OSHA, NTP, or IARC lists the ingredient as a carcinogen. ____
12. Precautions for safe handling and use. ____
13. Control measure such as engineering controls, work practices, hygiene practices or personal protective equipment required. ____
14. Primary routes of entry. ____
15. Procedures for spills, leaks, and cleanup. ____

Material Safety Data Sheet

U.S. Department of Labor

Occupational Safety and Health Administration

May be used to comply with OSHA's Hazard Communication Standard, (Non-Mandatory Form) 29 CFR 1910.1200. Standard must be Form Approved consulted for specific requirements. OMB No. 1218-0072

IDENTITY *(As Used on Label and List)*	Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name	Emergency Telephone Number
Address (Number, Street, City, State, ZIP Code)	Telephone Number for Information
	Date Prepared
	Signature of Preparer (Optional)

Section II Hazardous Ingredients/ Identity Information

Hazardous Components (Specific Chemical Identity: Common Name(s))	OSHA PEL	ACHGIH TLV	Other Limits Recommended	*% (optional)*

Section III Physical/ Chemical Characteristics

Boiling Point		Specific Gravity (H_2O = 1.00)	
Vapor Pressure (mm Hg.)		Melting Point	
Vapor Density (Air = 1.00)		Evaporation Rate (Butyl Acetate = 1.00)	
Solubility in Water			
Appearance and Odor			

Section IV Fire and Explosion Hazard Data

Flash Point	Flammable Limits	LEL	UEL
Extinguishing Media			
Special Firefighting Procedures			
Unusual Fire and Explosion Hazards			

Section V Reactivity Data

Stability	Stable	Conditions to Avoid
	Unstable	
Incompatibility *(Materials to Avoid)*		
Hazardous Decomposition or Byproducts		
Hazardous Polymerization	Will Occur	Conditions to Avoid
	Will Not Occur	

Section VI Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
Heath Hazards *(Acute and Chronic)*			
Carcinogenicity:	NTP?	IARC Monographs?	OSHA regulated?
Signs and Symptoms of Exposure			
Medical Conditions Generally Aggravated by Exposure			
Emergency First Aid Procedures			

Section VII Precautions for Safe Handling and Use

Steps to be Taken in Case Material is released or Spilled
Waste Disposal Method
Precautions to be Taken in Handling and Storing
Other Precautions

Section VIII Control Measures

Respiratory Protection *(Specify Type)*		
Ventilation	Local Exhaust	Special
Mechanical/ Other		
Eye Protection/ Goggles/ Faceshield, etc.		
Protective Gloves		
Other Protective Clothing or Equipment		
Work/ Hygiene Practices		

Chapter 4D

SDS Request Form

The Occupational Safety and Health Administration *(OSHA)* Hazard Communication Standard *(29 CFR 1926.59)* requires employers to be provided Safety Data Sheets *(MSDS's)* for all hazardous substances used in their facility, and to make these SDS available to employees potentially exposed to these substances.

We, therefore, request a copy of the SDS for your product listed as:

_____

We did not receive and SDS with the initial shipment. We also request any additional information, supplemental MSDS's, or any other relevant data that your company or supplier has concerning the safety and health aspects of this product.

Please consider this letter as a standing request to your company for any information concerning the safety and health aspects of using this product that may become known in the future.

The SDS and any other relevant information should be sent to us within 10 working days of receipt of this notice. Delays in receiving the SDS information may prevent use of your product. Please send the requested information to the attention of the Responsible Safety Manager Christian Noriega.

Please be advised that if we do not receive the SDS on the above chemical, we may have to notify OSHA or our inability to obtain this information. It is our intent to comply with all provisions of the Hazard Communication Standard *(29 CFR 1926.59)* and the SDS are integral to this effort.

Your cooperation is greatly appreciated. Thank you for your timely response to this request.

Sincerely,

_____

U. S. Department of Labor Occupational Safety and Health Administration

Notice of Alleged Safety or Health Hazards

For the General Public	This form is provided for the assistance of any complainant and is not intended to constitute the exclusive means by which a complaint may be registered with the U.S. Department of Labor.

Sec 8(f)(1) of the Williams-Steiger Occupational Safety and Health Act, 29 U.S.C. 651, provides as follows: Any employees or representative of employees who believe that a violation of a safety or health standard exists that threatens physical harm, or that an imminent danger exists, may request an inspection by giving notice to the Secretary or his authorized representative of such violation or danger. Any such notice shall be reduced to writing, shall set forth with reasonable particularity the grounds for the notice, and shall be signed by the employee or representative of employees, and a copy shall be provided the employer or his agent no later than at the time of inspection, except that, upon request of the person giving such notice, his name and the names of individual employees referred to therein shall not appear in such copy or on any record published, released, or made available pursuant to subsection (g) of this section. If upon receipt of such notification the Secretary determines there are reasonable grounds to believe that such violation or danger exists, he shall make a special inspection in accordance with the provisions of this section as soon as practicable to determine if such violation or danger exists. If the Secretary determines there are no reasonable grounds to believe that a violation or danger exists, he shall notify the employees or representative of the employees in writing of such determination.

NOTE: Section 11(c) of the Act provides explicit protection for employees exercising their rights, including making safety and health complaints.

For Federal Employees:

This report format is provided to assist Federal employees or authorized representatives in registering a report of unsafe or unhealthful working conditions with the U.S. Department of Labor. The Secretary of Labor may conduct unannounced inspection of agency workplaces when deemed necessary if an agency does not have occupational safety and health committees established in accordance with Subpart F, 29 CFR 1960; or in response to the reports of unsafe or unhealthful working conditions upon request of such agency committees under Sec. 1-3, Executive Order 12196; or in the case of a report of imminent danger when such a committee has not responded to the report as required in Sec. 1-201(h).

Instructions:

Open the form and complete the front page as accurately and completely as possible. Describe each hazard you think exists in as much detail as you can. If the hazards described in your complaint are not all in the same area, please identify where each hazard can be found at the worksite. If there is any particular evidence that supports your suspicion that a hazard exists (for instance, a recent accident or physical symptoms of employees at your site) include the information in your description. If you need more space than is provided on the form, continue on any other sheet of paper. After you have completed the form, return it to your local OSHA office.

NOTE: It is unlawful to make any false statement, representation or certification in any document filed pursuant to the Occupational Safety and Health Act of 1970. Violations can be punished by a fine of not more than $10,000. or by imprisonment of not more than six months, or by both. (Section 17(g))

Public reporting burden for this collection of information is estimated to vary from 15 to 25 minutes per response with an average of 17 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of IRM Policy, Department of Labor, Room N- 3101, 200 Constitution Avenue, N.W., Wash., D.C. 20210; and to the Office of Management and Budget, Paperwork Reduction Project (1218-0064), Wash., D.C. 20503.

DO NOT SEND THE COMPLETED FORM TO EITHER OF THESE OFFICES

U. S. Department of Labor Occupational Safety and Health Administration

Notice of Alleged Safety or Health Hazards

	Complaint Number	
Establishment Name		
Site Address	Site Phone	Site Fax
Mailing Address	Mail Phone	Mail Fax
Management Official:	Telephone	
Type of Business		
HAZARD DESCRIPTION/LOCATION. Describe briefly the hazard(s) which you believe exist. Include the approximate number of employees exposed to or threatened by each hazard. Specify the particular building or worksite where the alleged violation exists.		
Has this condition been brought to the attention of	❑ Employer ❑ Other Government Agency	
Please indicate your desire:	❑ Do NOT reveal my name to my Employer ❑ My name may be revealed to my Employer	
The Undersigned believes that a violation of an Occupational Safety or Health standard exists which is a job safety or health hazard at the establishment named on this form.	(Mark "X" in ONE box) ❑ Employee ❑ Federal Safety and Health Committee ❑ Representative of Employees ❑ Other (specify)	
Complainant Name	Telephone Number	
Address		
Signature	Date	
If you are an authorized representative of employees affected by this complaint, please state the name of the organization that you represent and your title:		
Organization Name:	Your Title:	

Chapter 5A

Training Program Guidelines

I. Introduction

The Occupational Safety and Health Act of 1970 does not address specifically the responsibility of employers to provide health and safety information and instruction to employees, although Section 5(a)(2) does require that each employer "...shall comply with occupational safety and health standards promulgated under this Act." However, more than 100 of the Act's current standards do contain training requirements

Therefore, the Occupational Safety and Health Administration has developed voluntary training guidelines to assist employers in providing the safety and health information and instruction needed for their employees to work at minimal risk to themselves, to fellow employees, and to the public.

The guidelines are designed to help employers to:

(1) Determine whether a worksite problem can be solved by training
(2) Determine what training, if any, is needed
(3) Identify goals and objectives for the training
(4) Design learning activities
(5) Conduct training
(6) Determine the effectiveness of the training
(7) Revise the training program based on feedback from employees, supervisors, and others.

The development of the guidelines is part of an agency-wide objective to encourage cooperative, voluntary safety and health activities among OSHA, the business community, and workers. These voluntary programs include training and education, consultation, voluntary protection programs, and abatement assistance.

A. Training Model

The guidelines provide employers with a model for designing, conducting, evaluating, and revising training programs. The training model can be used to develop training programs for a variety of occupational safety and health hazards identified at the workplace. Additionally, it can assist employers in their efforts to meet the training requirements in current or future occupational safety and health standards.

A training program designed in accordance with these guidelines can be used to supplement and enhance the employer's other education and training activities. The

guidelines afford employers significant flexibility in the selection of content and training program design. OSHA encourages a personalized approach to the informational and instructional programs at individual worksites, thereby enabling employers to provide the training that is most needed and applicable to local working conditions. Assistance with training programs or the identification of resources for training is available through such organizations as OSHA full-service Area Offices, State agencies which have their own OSHA-approved occupational safety and health programs, OSHA-funded State onsite consultation programs for employers, local safety councils, the OSHA Office of Training and Education, and OSHA-funded New Directions grantees.

B. Review Commission Implications

OSHA does not intend to make the guidelines mandatory. And they should not be used by employers as a total or complete guide in training and education matters which can result in enforcement proceedings before the Occupational Safety and Health Review Commission. However, employee training programs are always an issue in Review Commission cases which involve alleged violations of training requirements contained in OSHA standards.

The adequacy of employee training may also become an issue in contested cases where the affirmative defense of unpreventable employee misconduct is raised. Under case law well established in the Commission and the courts, an employer may successfully defend against an otherwise valid citation by demonstrating that all feasible steps were taken to avoid the occurrence of the hazard, and that actions of the employee involved in the violation were a departure from a uniformly and effectively enforced work rule of which the employee had either actual or constructive knowledge.

In either type of case, the adequacy of the training given to employees in connection with a specific hazard is a factual matter which can be decided only by considering all the facts and circumstances surrounding the alleged violation. The general guidelines presented here are not intended, and cannot be used, as evidence of the appropriate level of training in litigation involving either the training requirements of OSHA standards or affirmative defenses based upon employer training programs.

II. Training Guidelines

OSHA's training guidelines follow a model that consists of:

A. Determining if Training is Needed
B. Identifying Training Needs
C. Identifying Goals and Objectives
D. Developing Learning Activities
E. Conducting the Training
F. Evaluating Program Effectiveness
G. Improving the Program

The model is designed to be one that even the owner of a business with very few employees can use without having to hire a professional trainer or purchase expensive training materials. Using this model, employers or supervisors can develop and administer safety and health training programs that address problems specific to their own business, fulfill the learning needs of their own employees, and strengthen the overall safety and health program of the workplace.

A. Determining if Training is Needed

The first step in the training process is a basic one: to determine whether a problem can be solved by training. Whenever employees are not performing their jobs properly, it is often assumed that training will bring them up to standard. However, it is possible that other actions *(such as hazard abatement or the implementation of engineering controls)* would enable employees to perform their jobs properly.

Ideally, safety and health training should be provided before problems or accidents occur. This training would cover both general safety and health rules and work procedures, and would be repeated if an accident or near-miss incident occurred.

Problems that can be addressed effectively by training include those that arise from lack of knowledge of a work process, unfamiliarity with equipment, or incorrect execution of a task. Training is less effective *(but still can be used)* for problems arising from an employee's lack of motivation or lack of attention to the job. Whatever its purpose, training is most effective when designed in relation to the goals of the employer's total safety and health program.

B. Identifying Training Needs

If the problem is one that can be solved, in whole or in part, by training, then the next step is to determine what training is needed. For this, it is necessary to identify what the employee is expected to do and in what ways, if any, the employee's performance is deficient. This information can be obtained by conducting a job analysis which pinpoints what an employee needs to know in order to perform a job.

When designing a new training program, or preparing to instruct an employee in an unfamiliar procedure or system, a job analysis can be developed by examining engineering data on new equipment or the safety data sheets on unfamiliar substances. The content of the specific Federal or State OSHA standards applicable to a business can also provide direction in developing training content. Another option is to conduct a Job Hazard Analysis *(see OSHA 3071, same title, 1987).* This is a procedure for studying and recording each step of a job, identifying existing or potential hazards, and determining the best way to perform the job in order to reduce or eliminate the risks. Information obtained from a Job Hazard Analysis can be used as the content for the training activity.

If an employee's learning needs can be met by revising an existing training program rather than developing a new one, or if the employee already has some knowledge of the process or system to be used, appropriate training content can be developed through such means as:

1. Using company accident and injury records to identify how accidents occur and what can be done to prevent them from recurring.

2. Requesting employees to provide, in writing and in their own words, descriptions of their jobs. These should include the tasks performed and the tools, materials and equipment used.

3. Observing employees at the worksite as they perform tasks, asking about the work, and recording their answers.

4. Examining similar training programs offered by other companies in the same industry, or obtaining suggestions from such organizations as the National Safety Council (which can provide information on Job Hazard Analysis, the Bureau of Labor Statistics, OSHA-approved State programs, OSHA full-service Area Offices, OSHA-funded State consultation programs, or the OSHA Office of Training and Education.

The employees themselves can provide valuable information on the training they need. Safety and health hazards can be identified through the employees' responses to such questions as whether anything about their jobs frightens them, if they have had any near-miss incidents, if they feel they are taking risks, or if they believe that their jobs involve hazardous operations or substances.

Once the kind of training that is needed has been determined, it is equally important to determine what kind of training is not needed. Employees should be made aware of all the steps involved in a task or procedure, but training should focus on those steps on which improved performance is needed. This avoids unnecessary training and tailors the training to meet the needs of the employees.

C. Identifying Goals and Objectives

Once the employees' training needs have been identified, employers can then prepare objectives for the training. Instructional objectives, if clearly stated, will tell employers what they want their employees to do, to do better, or to stop doing.

Learning objectives do not necessarily have to be written, but in order for the training to be as successful as possible, clear and measurable objectives should be thought-out before the training begins. For an objective to be effective it should identify as precisely as possible what the individuals will do to demonstrate that they have learned, or that the objective has been reached. They should also describe the important conditions

under which the individual will demonstrate competence and define what constitutes acceptable performance.

Using specific, action-oriented language, the instructional objectives should describe the preferred practice or skill and its observable behavior. For example, rather than using the statement: "The employee will understand how to use a respirator" as an instructional objective, it would be better to say: "The employee will be able to describe how a respirator works and when it should be used." Objectives are most effective when worded in sufficient detail that other qualified persons can recognize when the desired behavior is exhibited.

D. Developing Learning Activities

Once employers have stated precisely what the objectives for the training program are, then learning activities can be identified and described. Learning activities enable employees to demonstrate that they have acquired the desired skills and knowledge. To ensure that employees transfer the skills or knowledge from the learning activity to the job, the learning situation should simulate the actual job as closely as possible. Thus, employers may want to arrange the objectives and activities in a sequence which corresponds to the order in which the tasks are to be performed on the job, if a specific process is to be learned. For instance, if an employee must learn the beginning processes of using a machine, the sequence might be

(1) To check that the power source is connected
(2) To ensure that the safety devices are in place and are operative
(3) To know when and how to throw the switch, and so on.

A few factors will help to determine the type of learning activity to be incorporated into the training. One aspect is the training resources available to the employer. Can a group training program that uses an outside trainer and film be organized, or should the employer personally train the employees on a one-to-one basis? Another factor is the kind of skills or knowledge to be learned. Is the learning oriented toward physical skills *(such as the use of special tools)* or toward mental processes and attitudes? Such factors will influence the type of learning activity designed by employers. The training activity can be group-oriented, with lectures, role play, and demonstrations; or designed for the individual as with self-paced instruction.

The determination of methods and materials for the learning activity can be as varied as the employer's imagination arid available resources will allow. The employer may want to use charts, diagrams, manuals, slides, films, viewgraphs *(overhead transparencies),* videotapes, audiotapes, or simply blackboard and chalk, or any combination of these and other instructional aids. Whatever the method of instruction, the learning activities should be developed in such a way that the employees can clearly demonstrate that they have acquired the desired skills or knowledge.

E. Conducting the Training

With the completion of the steps outlined above, the employer is ready to begin conducting the training. To the extent possible, the training should be presented so that its organization and meaning are clear to the employees. To do so, employers or supervisors should:

(1) Provide overviews of the material to be learned
(2) Relate, wherever possible, the new information or skills to the employees goals, interests, or experience
(3) Reinforce what the employees learned by summarizing the program's objectives and the key points of information covered.

These steps will assist employers in presenting the training in a clear, unambiguous manner.

In addition to organizing the content, employers must also develop the structure and format of the training. The content developed for the program, the nature of the workplace or other training site, and the resources available for training will help employers determine for themselves the frequency of training activities, the length of the sessions, the instructional techniques, and the individual(s) best qualified to present the information.

In order to be motivated to pay attention and learn the material that the employer or supervisor is presenting, employees must be convinced of the importance and relevance of the material. Among the ways of developing motivation are

(1) Explaining the goals and objectives of instruction
(2) Relating the training to the interests, skills, and experiences of the employees
(3) Outlining the main points to be presented during the training session(s)
(4) Pointing out the benefits of training *(e.g., the employee will be better informed, more skilled, and thus more valuable both on the job and on the labor market; or the employee will, if he or she applies the skills and knowledge learned, be able to work at reduced risk).*

An effective training program allows employees to participate in the training process and to practice their skills or knowledge. This will help to ensure that they are learning the required knowledge or skills and permit correction if necessary. Employees can become involved in the training process by participating in discussions, asking questions, contributing their knowledge and expertise, learning through hands-on experiences, and through role-playing exercises.

F. Evaluating Program Effectiveness

To make sure that the training program is accomplishing its goals, an evaluation of the training can be valuable. Training should have, as one of its critical components, a method of measuring the effectiveness of the training. A plan for evaluating the training session(s) should be developed when the course objectives and content are developed. It should not be delayed until the training has been completed. Evaluation will help employers or supervisors determine the amount of learning achieved and whether an employee's performance has improved on the job. Among the methods of evaluating training are:

(1) Student opinion Questionnaires or informal discussions with employees can help employers determine the relevance and appropriateness of the training program
(2) Supervisors' observations. Supervisors are in good positions to observe an employee's performance both before and after the training and note improvements or changes
(3) Workplace improvements. The ultimate success of a training program may be changes throughout the workplace that result in reduced injury or accident rates.

However it is conducted, an evaluation of training can give employers the information necessary to decide whether or not the employees achieved the desired results, and whether the training session should be offered again at some future date.

G. Improving the Program

If, after evaluation, it is clear that the training did not give the employees the level of knowledge and skill that was expected, then it may be necessary to revise the training program or provide periodic retraining. At this point, asking questions of employees and of those who conducted the training may be of some help. Among the questions that could be asked are:

(1) Were parts of the content already known and, therefore, Unnecessary?
(2) What material was confusing or distracting?
(3) Was anything missing from the program?
(4) What did the employees learn, and what did they fail to learn?

It may be necessary to repeat steps in the training process, that is, to return to the first steps and retrace one's way through the training process. As the program is evaluated, the employer should ask:

(1) If a job analysis was conducted, was it accurate?
(2) Was any critical feature of the job overlooked?
(3) Were the important gaps in knowledge and skill included?
(4) Was material already known by the employees intentionally omitted?
(5) Were the instructional objectives presented clearly and concretely?
(6) Did the objectives state the level of acceptable performance that was expected of employees?
(7) Did the learning activity simulate the actual job?
(8) Was the learning activity appropriate for the kinds of knowledge and skills required on the job?
(9) When the training was presented, was the organization of the material and its meanings made clear?
(10) Were the employees motivated to learn?
(11) Were the employees allowed to participate actively in the training process?
(12) Was the employer's evaluation of the program thorough?

A critical examination of the steps in the training process will help employers to determine where course revision is necessary.

III. Matching Training to Employees

While all employees are entitled to know as much as possible about the safety and health hazards to which they are exposed, and employers should attempt to provide all relevant information and instruction to all employees, the resources for such an effort frequently are not, or are not believed to be, available. Thus, employers are often faced with the problem of deciding who is in the greatest need of information and instruction.

One way to differentiate between employees who have priority needs for training and those who do not is to identify employee populations which are at higher levels of risk. The nature of the work will provide an indication that such groups should receive priority for information on occupational safety and health rules.

A. Identifying Employees at Risk

One method of identifying employee populations at high levels of occupational risk *(and thus in greater need of safety and health training)* is to pinpoint hazardous occupations. Even within industries which are hazardous in general, there are some employees who operate at greater risk than others. In other cases the hazardousness of an occupation is influenced by the conditions under which it is performed, such as noise, heat or cold, or safety or health hazards in the surrounding area. In these situations, employees should be trained not only on how to perform their job safely but also on how to operate within a hazardous environment.

A second method of identifying employee populations at high levels of risk is to examine the incidence of accidents and injuries, both within the company and within the industry. If employees in certain occupational categories are experiencing higher accident and injury rates than other employees, training may be one way to reduce that rate. In addition, thorough accident investigation can identify not only specific employees who could benefit from training but also identify company-wide training needs.

Research has identified the following variables as being related to a disproportionate share of injuries and illnesses at the worksite on the part of employees:

(1) The age of the employee (younger employees have higher Incidence rates).
(2) The length of time on the job (new employees have higher incidence rates).
(3) The size of the firm (in general terms, medium-size firms have higher incidence rates than smaller or larger firms).
(4) The type of work performed (incidence and severity rates vary significantly by Standard Industrial Classification, or SIC, Code).
(5) The use of hazardous substances (by SIC Code).

These variables should be considered when identifying employee groups for training in occupational safety and health.

In summary, information is readily available to help employers identify which employees should receive safety and health information, education and training, and who should receive it before others. Employers can request assistance in obtaining information by contacting such organizations as OSHA Area Offices, the Bureau of Labor Statistics, OSHA-approved State programs, State onsite consultation programs, the OSHA Office of Training and Education, or local safety councils.

B. Training Employees at Risk

Determining the content of training for employee populations at higher levels of risk is similar to determining what any employee needs to know, but more emphasis is placed on the requirements of the job and the possibility of injury. One useful tool for determining training content from job requirements is the Job Hazard Analysis described earlier. This procedure examines each step of a job, identifies existing or potential hazards, and determines the best way to perform the job in order to reduce or eliminate the hazards. Its key elements are:

(1) Job description
(2) Job location
(3) Key steps preferably in the order in which they are performed
(4) Tools, machines and materials used
(5) Actual and potential safety and health hazards associated with these key job steps
(6) Safe and healthful practices, apparel, and equipment required for each job step.

Safety Data Sheets *(SDS)* can also provide information for training employees in the safe use of materials. These data sheets, developed by chemical manufacturers and importers, are supplied with manufacturing or construction materials and describe the ingredients of a product, its hazards, protective equipment to be used, safe handling procedures, and emergency first-aid responses. The information contained in these sheets can help employers identify employees in need of training

(i.e., workers handling substances described in the sheets) and train employees in safe use of the substances. Safety Data Sheets are generally available from suppliers, manufacturers of the substance, large employers who use the substance on a regular basis, or they can be developed by employers or trade associations. SDS are particularly useful for those employers who are developing training on chemical use as required by OSHA's Hazard Communication Standard.

IV. Conclusion

In an attempt to assist employers with their occupational health and safety training activities, OSHA has developed a set of training guidelines in the form of a model. This model is designed to help employers develop instructional programs as part of their total education and training effort. The model addresses the questions of who should be trained, on what topics, and for what purposes. It also helps employers determine how effective the program has been and enables them to identify employees who are in greatest need of education and training. The model is general enough to be used in any area of occupational safety and health training, and allows employers to determine for themselves the content and format of training. Use of this model in training activities is just one of many ways that employers can comply with the OSHA standards that relate to training and enhance the safety and health of their employees.

Chapter 5B

Training Program Checklist

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

	Complete	Incomplete
1. Established a thorough training program.	_____	_____
2. Identified employees who need training.	_____	_____
3. Training program ensures that new employees are trained before their first assignment.	_____	_____
4. Informed employees of the specific information and training requirements of the Hazard Communication Standard.	_____	_____
5. Informed employees of the requirements of the Standard, and their rights under the law.	_____	_____
6. Informed employees of our written program and training requirements.	_____	_____
7. Informed employees of the different types of chemicals and the hazards associated with them.	_____	_____
8. Informed employees of specific hazards of the chemicals and processes they work with and their proper use and handling.	_____	_____
9. Informed employees of the hazards associated with performing non-routine tasks.	_____	_____
10. Employees know how to detect the presence or release of hazardous chemicals in the workplace.	_____	_____
11. Trained employees in the use of proper work practices, personal protective equipment and clothing, and other controls to reduce or eliminate their exposure to the chemicals in their work areas.	_____	_____

12. Trained employees in emergency and first-aid procedures and signs of exposure. _____ _____

13. Listed all hazardous chemicals in our workplace. _____ _____

14. Employees know when and how to update our hazardous chemical list. _____ _____

15. Obtained or developed a Material Safety Data Sheet for each hazardous chemical in our workplace. _____ _____

16. Explained how to use an SDS. _____ _____

17. Informed employees of the list of hazardous chemicals & SDS and where they are located. _____ _____

18. Explained labels and their warnings to employees. _____ _____

19. Developed a system to ensure that all incoming hazardous chemicals are checked for proper labels and data sheets. _____ _____

20. Established procedures to ensure proper labeling or warning signs for containers that hold hazardous chemicals. _____ _____

21. Developed a way to identify and inform employees of new hazardous chemicals before they are introduced into a work area. _____ _____

22. Established a way to inform employees of new hazards associated with the chemicals they already use. _____ _____

23. Developed a way to evaluate the effectiveness of the training program and to keep track of who has received training. _____ _____

Chapter 5C

Company Training Program

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

Introduction

Training is an integral part of your hazard communication program, as identified in Chapter 2. Under the Hazard Communication Standard, National Fire & Safety is required to inform and train employees at the time of their initial assignment to a work area where hazardous chemicals are present and whenever a new hazard is introduced into the work area.

While the outline of topics to be presented in employee information and training programs is the same for all employers, the actual information presented must be based on the specific hazard information conveyed by labels and SDS for our particular workplace or work area.

These are the topics to be covered in our information and training programs:

(1) The provisions of the Hazard Communication Standard.

(2) Any operations in employees' work areas where hazardous chemicals are present.

(3) The location and availability of the written hazard communication program, including the required list of hazardous chemicals and SDS required by the Hazard Communication Standard.

(4) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area.

(5) The physical and health hazards of the chemicals in the work area.

(6) The measures employees can take to protect themselves from these hazards, including information on work practices, emergency procedures and personal protective equipment required by the employer.

(7) The details of the written hazard communication program, including an explanation of the labeling system used by National Fire & Safety, MSDS's, and how employees can obtain and use the appropriate hazard information on the labels and in the MSDS’s.

Identify Employees to be Trained

(1) Assess actual and potential employee exposure to hazardous chemicals.

(2) Determine training needs based on this exposure during both normal use of hazardous chemicals and during emergencies.

(3) Determine appropriate way in which to train new employees and supervisors.

(4) Train employees and supervisors on the specific chemicals in our workplace and their hazards.

Provisions of the Hazard Communication Standard

(1) Show the requirements of the standard.

(2) Show NFS responsibilities under the law.

(3) Inform our employees of the law and their rights under the law.

Hazardous Chemicals in Our Workplace

(1) Define hazardous chemicals: Any chemical that is a physical or health hazard.

(2) `Physical hazard" is one for which there is scientifically valid evidence that the chemical is a combustible liquid, a compressed gas, an explosive, a flammable substance, an organic peroxide, an oxidizer, a pyrophoric, or an unstable *(reactive)* or water-reactive substance.

(3) Health hazard" is one that includes cancer-causing, toxic, or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes. *(Include additional information from Appendices A and B of the standard; see Chapter 6 for further explanations.)*

List of Hazardous Chemicals in Our Workplace

(1) Show that the list includes the names of the chemicals, their hazards, any protective measures to be taken, and emergency and first-aid procedures.

(2) Identify the process or operation where the chemicals are used, and the name and address of the manufacturer.

(3) Show there is a material safety data sheet *(SDS)* for each chemical and that

the list references the corresponding SDS for each chemical.

(4) Make the list readily available to our employees *(or to other employers, contractors, or subcontractors at our worksite at their request).*

(5) Make sure our employees understand the information regarding the chemicals listed in the workplace.

Instruct Employees on How to Use and interpret SDS

(1) Show you have an SDS for each hazardous chemical product you package, handle, or transfer. *(See Chapter 10B)*

(2) Show how to check each SDS you receive to ensure that it contains all the information required by the standard. *(See checklist Chapter 4B).*

(3) Show how to obtain SDS or information where necessary *(i.e., when SDS not received from manufacturer, importer or supplier, or when SDS is incomplete. See Chapter 4D for sample letter requesting SDS information.)*

Instruct Employees on Labeling Requirements

(1) Show how to check each container entering the workplace for appropriate labeling *(i.e., identity of chemicals, hazard warnings; name and address of manufacturer/ importer/ responsible party).*

(2) Explain the importance of reading labels and of following directions for the safe handling of chemicals.

(3) Show how to label, tag, or mark containers into which hazardous chemicals are transferred with the chemical identity and hazard warnings.

(4) Show how a hazard warning must convey specific physical and health hazards of the chemicals. Explain that words such as "caution," "danger," "harmful if absorbed by skin," etc. are precautionary statements and do not identify specific hazards.

(5) Explain the labeling exemptions for portable containers.

(6) Show how to label portable containers when they are not for "immediate use." *(Note: Portable containers require no labels when chemicals are transferred into them from labeled containers and when the chemicals will be used immediately by the employee transferring the chemicals.)*

(7) Show how in lieu of labels: process sheets, batch tickets, standard operating

procedures, or other written materials may be used on stationary process equipment if they contain the same information as a label and are readily available to employees in the work area or station.

(8) Show how to cross-reference chemical identifiers on labels to SDS and the lists of hazardous chemicals.

(9) Ensure that our employees are aware of other hazardous chemicals that may have specific labeling requirements under other standards (e.g., asbestos, lead, etc.).

Review & Demonstrate Existing Methods of Controlling Workplace Exposures

(1) Review and demonstrate any engineering controls: changes in machinery, work operations, or shop layout that reduce or eliminate the hazard *(e.g., ventilation controls process enclosures/hoods, isolation, etc.).*

(2) Review and demonstrate any administrative controls: good housekeeping procedures, safe work practices, personal and medical monitoring, shortened shifts, or changed work schedules.

(3) Show how to use Personal Protective Equipment: safety glasses, goggles, face shields, earplugs, respirators, gloves, hoods, boots, and full body suits.

Review Our Current Procedures for Handling Chemicals and Compare with Recommended Practices Identified on SDS and Labels

Written Emergency Action Plan

(1) Train in any applicable procedures such as:
emergency controls and phone numbers
evacuation plans, alarm systems
reporting and shut-down procedures
first-aid
personal protection.

(2) Show how and when to report leaks and spills.

Record of Employee/ Supervisor Training

(1) Follow-up and evaluate your training program to make sure employees know how to handle the chemicals they are using and are applying the training you have given them.

Chapter 5D

Hazard Communication Training Record

(To be performed by the Responsible Safety Manager, Christian Noriega, or designated agents(s).)

Employee Name: _____ Date: _____

Discussed and Trained in the Following Items:

☐ Discussed the Hazard Communication Standard, including NSF rights and employees' rights under the law.

☐ Discussed definitions of Physical and Health hazards of chemicals in our workplace.

☐ Reviewed Hazard Chemicals List, including availability and use.

☐ Use, availability and interpretation of MSDS's.

☐ Reviewed labeling requirements including how-to, when, importance, checking-in materials, and cross-referencing.

☐ Reviewed methods of controlling workplace exposures.

☐ Reviewed hazardous chemical handling procedures.

☐ Reviewed Emergency Action Plan

☐ Employee agrees to cooperate fully with the safety efforts of the employer, follow all safety rules and use good judgment concerning safe work behavior.

Remarks: _____

_____

_____

Signed: _____ Signed: _____

Supervisor Employee

Regulations (Standards - 29 CFR)

Hazard Communication. - 1910.1200

- **Standard Number:** 1910.1200
- **Standard Title:** Hazard Communication.
- **SubPart Number:** Z
- **SubPart Title:** Toxic and Hazardous Substances

(a)

"Purpose."

(a(1

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, Safety Data Sheets and employee training.

..1910.1200(a)(2)

(a(2

This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of Safety Data Sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b)

"Scope and application."

(b(1

This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, Safety Data Sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule.)

(b(2

This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(b(3

This section applies to laboratories only as follows:

(b(3(i

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

..1910.1200(b)(3)(ii)

(b)(3)(ii)

Employers shall maintain any Safety Data Sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible during each workshift to laboratory employees when they are in their work areas;

(b(3(iii

Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,

(b(3(iv

Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f)(1) of this section, and that a material safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

(b(4

In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

(b(4(i

Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

..1910.1200(b)(4)(ii)

(b)(4)(ii)

Employers shall maintain copies of any Safety Data Sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a material safety data sheet as soon as possible for sealed containers of hazardous chemicals received without a material safety data sheet if an employee requests the material safety data sheet, and shall ensure that the Safety Data Sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(b(4(iii

Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(b(5

This section does not require labeling of the following chemicals:

(b(5(i

Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b(5(ii

Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

..1910.1200(b)(5)(iii)

(b(5(iii

Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or

product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

(b)(5)(iv)

Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, and Firearms;

(b)(5)(v)

Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

(b)(5)(vi)

Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

..1910.1200(b)(6)

(b)(6)

This section does not apply to:

(b)(6)(i)

Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

(b)(6)(ii)

Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability ACT (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with the Environmental Protection Agency regulations.

(b)(6)(iii)

Tobacco or tobacco products;

(b)(6)(iv)

Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

(b)(6)(v)

Articles (as that term is defined in paragraph (c) of this section);

(b)(6)(vi)

Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

..1910.1200(b)(6)(vii)

(b)(6)(vii)

Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

(b)(6)(viii)

Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

(b)(6)(ix)

Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

(b)(6)(x)

Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

(b)(6)(xi)

Ionizing and nonionizing radiation; and,

(b)(6)(xii)

Biological hazards.

(c)

"Definitions."

"Article" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"Chemical" means any element, chemical compound or mixture of elements and/or compounds.

"Chemical manufacturer" means an employer with a workplace where chemical(s) are produced for use or distribution.

"Chemical name" means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

"Combustible liquid" means any liquid having a flashpoint at or above 100 deg. F (37.8 deg. C), but below 200 deg. F (93.3 deg. C), except any mixture having components with flashpoints of 200 deg. F (93.3 deg. C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

"Commercial account" means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

"Common name" means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

"Compressed gas" means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg. C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.

"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

"Designated representative" means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

"Director" means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"Distributor" means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

"Employee" means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

"Employer" means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

"Explosive" means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

"Exposure or exposed" means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption.)

"Flammable" means a chemical that falls into one of the following categories:

(i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;

(iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher,

the total of which make up 99 percent or more of the total volume of the mixture.

(iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

"Flashpoint" means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).

Organic peroxides, which undergo autoaccelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.

"Foreseeable emergency" means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

"Hazardous chemical" means any chemical which is a physical hazard or a health hazard.

"Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for "physical hazard" and "health hazard" to determine the hazards which must be covered.)

"Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered

by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.

"Identity" means any chemical or common name which is indicated on the material safety data sheet (SDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the SDS.

"Immediate use" means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

"Label" means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

"Material safety data sheet (SDS)" means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.

"Mixture" means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

"Organic peroxide" means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

"Physical hazard" means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

"Produce" means to manufacture, process, formulate, blend, extract, generate, emit, or repackage.

"Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 deg. F (54.4 deg. C) or below.

"Responsible party" means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

"Specific chemical identity" means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

"Trade secret" means any confidential formula, pattern, process, device, information or

compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.

"Unstable (reactive)" means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature.

"Use" means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

"Water-reactive" means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

"Work area" means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

"Workplace" means an establishment, job site, or project, at one geographical location containing one or more work areas.

..1910.1200(d)

(d)

"Hazard determination."

(d)(1)

Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(d)(2)

Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section. Appendix A shall be consulted for the scope of health hazards covered, and Appendix B shall be consulted for the criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.

(d)(3)

The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:

(d)(3)(i)

29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

..1910.1200(d)(3)(ii)

(d)(3)(ii)

"Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.

(d)(4)

Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:

(d)(4)(i)

National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition);

(d)(4)(ii)

International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or

(d)(4)(iii)

29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

Note: The "Registry of Toxic Effects of Chemical Substances" published by the National Institute for Occupational Safety and Health indicates whether a chemical has been found by NTP or IARC to be a potential carcinogen.

(d)(5)

The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:

(d)(5)(i)

If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;

..1910.1200(d)(5)(ii)

(d)(5)(ii)

If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;

(d(5(iii

If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and,

(d(5(iv

If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard.

(d(6

Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.

..1910.1200(e)

(e

"Written hazard communication program."

(e(1

Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, Safety Data Sheets, and employee information and training will be met, and which also includes the following:

(e(1(i

A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

(e(1(ii

The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(e(2

"Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(e)(2)(i)

The methods the employer will use to provide the other employer(s) on-site access to Safety Data Sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

..1910.1200(e)(2)(ii)

(e)(2)(ii)

The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(e)(2)(iii)

The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(e)(3)

The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(e)(4)

The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(e)(5)

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

(f)

"Labels and other forms of warning."

(f)(1)

The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:

..1910.1200(f)(1)(i)

(f)(1)(i)

Identity of the hazardous chemical(s);

(f)(1)(ii)

Appropriate hazard warnings; and

(f)(1)(iii)

Name and address of the chemical manufacturer, importer, or other responsible party.

(f)(2)

(f)(2)(i)

For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

(f)(2)(ii)

The label may be transmitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment; and,

(f)(2)(iii)

This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

..1910.1200(f)(3)

(f)(3)

Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in

a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

(f)(4)

If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.

(f)(5)

Except as provided in paragraphs (f)(6) and (f)(7) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:

(f)(5)(i)

Identity of the hazardous chemical(s) contained therein; and,

(f)(5)(ii)

Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

..1910.1200(f)(6)

(f)(6)

The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(5) of this section to be on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.

(f)(7)

The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer. For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

(f)(8)

The employer shall not remove or deface existing labels on incoming containers of hazardous

chemicals, unless the container is immediately marked with the required information.

(f(9

The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(f(10

The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.

..1910.1200(f)(11)

(f(11

Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time shall contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importers, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

(g)

"Safety Data Sheets."

(g(1

Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.

(g(2

Each material safety data sheet shall be in English (although the employer may maintain copies in other languages as well), and shall contain at least the following information:

(g(2(i

The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:

(g(2(i(A

If the hazardous chemical is a single substance, its chemical and common name(s);

(g)(2)(i)(B)

If the hazardous chemical 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, and the common name(s) of the mixture itself; or,

(g)(2)(i)(C)

If the hazardous chemical is a mixture which has not been tested as a whole:

..1910.1200(g)(2)(i)(C)(1)

(g)(2)(i)(C)(1)

The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater; and,

(g)(2)(i)(C)(2)

The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees; and,

(g)(2)(i)(C)(3)

The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;

(g)(2)(ii)

Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

(g)(2)(iii)

The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;

(g)(2)(iv)

The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;

(g)(2)(v)

The primary route(s) of entry;

..1910.1200(g)(2)(vi)

(g)(2)(vi)

The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

(g)(2)(vii)

Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;

(g)(2)(viii)

Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

(g)(2)(ix)

Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

(g)(2)(x)

Emergency and first aid procedures;

(g)(2)(xi)

The date of preparation of the material safety data sheet or the last change to it; and,

..1910.1200(g)(2)(xii)

(g)(2)(xii)

The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

(g)(3)

If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark

it to indicate that no applicable information was found.

(g(4

Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

(g(5

The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.

..1910.1200(g)(6)

(g(6

(g(6(i

Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated;

(g)(6)(ii)

The chemical manufacturer or importer shall either provide Safety Data Sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;

(g)(6)(iii)

If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

(g)(6)(iv)

The chemical manufacturer or importer shall also provide distributors or employers with a material safety data sheet upon request.

(g)(7)

(g)(7)(i)

Distributors shall ensure that Safety Data Sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a material safety data sheet is updated;

(g)(7)(ii)

The distributor shall either provide Safety Data Sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

..1910.1200(g)(7)(iii)

(g(7(iii

Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a material safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a material safety data sheet is available;

(g(7(iv

Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide Safety Data Sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a material safety data sheet is available;

(g)(7)(v)

If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have Safety Data Sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a material safety data sheet can be obtained;

(g)(7)(vi)

Wholesale distributors shall also provide Safety Data Sheets to employers or other distributors upon request; and,

(g)(7)(vii)

Chemical manufacturers, importers, and distributors need not provide Safety Data Sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

..1910.1200(g)(8)

(g)(8)

The employer shall maintain in the workplace copies of the required Safety Data Sheets

for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access, microfiche, and other alternatives to maintaining paper copies of the Safety Data Sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

(g(9

Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the Safety Data Sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(g)(10)

Safety Data Sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in in their work area(s).

(g)(11)

Safety Data Sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.1020(e). The Director shall also be given access to Safety Data Sheets in the same manner.

..1910.1200(h)

(h)

"Employee information and training."

(h)(1)

Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and Safety Data Sheets.

(h)(2)

"Information." Employees shall be informed of:

(h)(2)(i)

The requirements of this section;

(h(2(ii

Any operations in their work area where hazardous chemicals are present; and,

(h(2(iii

The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and Safety Data Sheets required by this section.

(h(3

"Training." Employee training shall include at least:

(h(3(i

Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(h(3(ii

The physical and health hazards of the chemicals in the work area;

..1910.1200(h)(3)(iii)

(h(3(iii

The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(h(3(iv

The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i

"Trade secrets."

(i(1

The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that:

(i)(1)(i)

The claim that the information withheld is a trade secret can be supported;

(i)(1)(ii)

Information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;

(i)(1)(iii)

The material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and,

(i)(1)(iv)

The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.

..1910.1200(i)(2)

(i)(2)

Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

(i)(3)

In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

(i)(3)(i)

The request is in writing;

(i)(3)(ii)

The request describes with reasonable detail one or more of the following occupational health needs for the information:

(i)(3)(ii)(A)

To assess the hazards of the chemicals to which employees will be exposed;

(i)(3)(ii)(B)

To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

(i)(3)(ii)(C)

To conduct pre-assignment or periodic medical surveillance of exposed employees;

(i)(3)(ii)(D)

To provide medical treatment to exposed employees;

..1910.1200(i)(3)(ii)(E)

(i)(3)(ii)(E)

To select or assess appropriate personal protective equipment for exposed employees;

(i)(3)(ii)(F)

To design or assess engineering controls or other protective measures for exposed employees; and,

(i)(3)(ii)(G)

To conduct studies to determine the health effects of exposure.

(i)(3)(iii)

The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information to the health professional, employee, or designated representative, would not satisfy the purposes described in paragraph (i)(3)(ii) of this section:

(i)(3)(iii)(A)

The properties and effects of the chemical;

(i)(3)(iii)(B)

Measures for controlling workers' exposure to the chemical;

(i)(3)(iii)(C)

Methods of monitoring and analyzing worker exposure to the chemical; and,

(i)(3)(iii)(D)

Methods of diagnosing and treating harmful exposures to the chemical;

(i)(3)(iv)

The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

..1910.1200(i)(3)(v)

(i)(3)(v)

The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

(i)(4)

The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

(i)(4)(i)

May restrict the use of the information to the health purposes indicated in the written statement of need;

(i)(4)(ii)

May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(i)(4)(iii)

May not include requirements for the posting of a penalty bond.

(i)(5)

Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(i)(6)

If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

..1910.1200(i)(7)

(i)(7)

If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:

(i)(7)(i)

Be provided to the health professional, employee, or designated representative, within thirty days of the request;

(i)(7)(ii)

Be in writing;

(i)(7)(iii)

Include evidence to support the claim that the specific chemical identity is a trade secret;

(i)(7)(iv)

State the specific reasons why the request is being denied; and,

(i)(7)(v)

Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.

(i)(8)

The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(i)(9)

When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

..1910.1200(i)(9)(i)

(i)(9)(i)

The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;

(i)(9)(ii)

The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

(i)(9)(iii)

The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(i)(10)

(i)(10)(i)

If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.

..1910.1200(i)(10)(ii)

(i)(10)(ii)

If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(i)(11)

If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

(i)(12)

Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(i)(13)

Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

..1910.1200(j)

(j)

"Effective dates." Chemical manufacturers, importers, distributors, and employers shall be in compliance with all provisions of this section by March 11, 1994.

Note: The effective date of the clarification that the exemption of wood and wood products from the Hazard Communication standard in paragraph (b)(6)(iv) only applies to wood and wood products including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility, and that the exemption does not apply to wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut generating dust has been stayed from March 11, 1994 to August 11, 1994.

[59 FR 17479, April 13, 1994; 59 FR 65947, Dec. 22, 1994; 61 FR 5507, Feb. 13, 1996]

SDS GLOSSARY

The following glossary presents brief explanations of acronyms and common terms frequently used by chemical manufacturers in their SDS

ACGIH American Conference of Governmental Industrial Hygienists if an organization of professional personnel in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH establishes recommended occupational exposure limits for chemical substances and physical agents. See TLV.

Acid Any chemical that undergoes dissociation in water with the formation of hydrogen ions. Acids have a sour taste and may cause severe skin burns. Acids turn litmus paper red and have pH values of 0 to 6.

Acute Effect Adverse effect on a human or animal that has severe symptoms developing rapidly and coming quickly to a crisis.

Acute Toxicity Acute effects resulting from a single dose of, or exposure to, a substance. Ordinarily used to denote effects in experimental animals.

Adenocarcinoma A tumor with glandular (secreting) elements.

Adenosis Any disease of a gland.

Adhesion A union of two surfaces that are normally separate.

Aerosol A fine aerial suspension of particles sufficiently small in size to confer some degree of stability from sedimentation (e.g., smoke or fog).

Air-Line Respirator A respirator that is connected to a compressed breathable air source by a hose of small inside diameter. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements.

Air-Purifying Respirator A respirator that uses chemicals to remove specific gases and vapors from the air or that uses a mechanical filter to remove particulate matter. An air-purifying respirator must only be used when there is sufficient oxygen to sustain life and the air contaminant level is below the concentration limits of the device.

Alkali Any chemical substance that forms soluble soaps with fatty acids. Alkalis are also referred to as bases. They may cause severe burns to the skin. Alkalis turn litmus paper blue and have pH values from 8 to 14.

Allergic Reaction An abnormal physiological response to chemical or physical stimuli. Amenorrhea Absence of menstruation.

Anesthetic A chemical that causes a total or partial loss of sensation. Overexposure to anesthetics can cause impaired judgment, dizziness, drowsiness, headache, unconsciousness, and even death. Examples include alcohol, paint remover, and

degreasers.

ANSI American National Standards Institute is a privately funded, voluntary membership organization that identifies industrial and public needs for national consensus standards and coordinates development of such standards.

Antidote A remedy to relieve, prevent, or counteract the effects of a poison. API American Petroleum Institute is an organization of the petroleum industry.

Appearance A description of a substance at normal room temperature and normal atmospheric conditions. Appearance includes the color, size, and consistency of the material.

Aquatic Toxicity The adverse effect to marine life that result from being exposed to a toxic substance.

Asphyxiant A vapor or gas that can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce the oxygen in the air (normally about 21 percent) to dangerous levels (18 percent or lower). Asphyxiation is one of the principle potential hazards of working in confined and enclosed spaces.

ASTM American Society for Testing and Materials is the world's largest source of voluntary consensus Standards for materials, products, systems, and services. ASTM is a resource for sampling and testing methods, health and safety aspects of materials, safe performance guidelines, and the effects of physical and biological and chemical agents.

Asymptomatic Showing no symptoms.

Atm Atmosphere, a unit of pressure equal to 760 mmHg (mercury) at sea level.

Atmosphere-Supplying Respirator A respirator that provides breathable air from a source independent of the surrounding atmosphere. There are two types: air-line and self-contained breathing apparatus.

Auto-Ignition Temperature The temperature to which a closed, or nearly closed container must be heated in order that the flammable liquid, when introduced into the container, will ignite spontaneously or burn.

BAL British Anti-Lewisite - A name for the drug dimecaprol-a treatment for toxic inhalations.

Base A substance that (1) liberate hydroxide (OH) ions when dissolved in water, (2) receives hydrogen ions from a strong acid to form a weaker acid, and (3) neutralizes in acid. Bases react with acids to form salts and water. Bases have a pH greater than 7 and turn litmus paper blue. See Alkali.

BCM Blood-clotting mechanism effects.

Benign Not recurrent or not tending to progress. Not cancerous.

Biodegradable Capable of being broken down into innocuous products by the action of living things.

Biopsy Removal and examination of tissue from the living effects.

BLD Blood effects.

Boiling Points-BP The temperature at which a liquid changes to a vapor state at a given pressure. The boiling point usually expressed in degrees Fahrenheit at sea level pressure (760 mmHg, or one atmosphere). For mixtures, the initial boiling point or the boiling range may be given.

Flammable materials with low boiling points generally present special fire hazards. Some approximate boiling points:

Propane -44 °F

Anhydrous Ammonia -28 °F

Butane 31 °F

Gasoline 100 °F

Allyl Chloride 113 °F

Ethylene Glycol 387 °F

BOM, or BuMines Bureau of Mines, U.S. Department of Interior.

Bonding The interconnecting of two objects by means of a clamp and bare wire. Its purpose it to equalize the electrical potential between the objects to prevent a static discharge when transferring a flammable liquid from one container to another. The conductive path is provided by clamps that make contact with the charged object and a low resistance flexible cable which allows the charge to equalize. See Grounding.

Bulk Density Mass of powdered or granulated solid material per unit of volume. C Centigrade, a unit of temperature.

Ceiling Limit (PEL or TLV) The maximum allowable human exposure limit for an airborne substance which is not to be exceeded even momentarily. Also see PEL and TLV.

ca Approximately.

CAA Clean Air Act was enacted to regulate/reduce air pollution. CAA is administered by the U.S. Environmental Protection Agency.

Carcinogen A substance or agent capable of causing or producing cancer in mammals,

including humans. A chemical is considered to be a carcinogen if

(a) It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen; or

(b) It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or

(c) It is regulated by OSHA as a carcinogen.

Carcinogenicity The ability to produce cancer.

Carcinoma A malignant tumor. A form of cancer.

CAS Chemical Abstracts Service is an organization under the American Chemical Society. CAS abstracts and indexes chemical literature from all over the world in "Chemical Abstracts." "CAS Numbers" are used to identify specific chemicals or mixtures.

Caustic See Alkali.

cc Cubic centimeter is a volume measurement in the metric system that is equal in capacity to one milliliter (ml). One quart is about 946 cubic centimeters.

Central Nervous System The brain and spinal cord. These organs supervise and coordinate the activity of the entire nervous system. Sensory impulses are transmitted into the central nervous system, and motor impulses are transmitted out.

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act of 1980. The Act requires that the Coast Guard National Response Center be notified in the event of a hazardous substance release. The Act also provides for a fund (the Superfund) to be used for the cleanup of abandoned hazardous waste disposal sites.

CFR Code of Federal Regulations. A collection of regulations that have been promulgated under United States Law.

Chemical An element (e.g., chlorine) or a compound (e.g., sodium bicarbonate) produced by chemical reaction.

Chemical Cartridge Respirator A respirator that uses various chemical substances to purify inhaled air of certain gases and vapors. This type of respirator is effective for concentrations no more than ten times the TLV of the contaminant, if the contaminant has warning properties (odor or irritation) below the TLV.

Chemical Family A group of single elements or compounds with a common general name. Example: acetone, methyl ethyl ketone (MEK), and methyl isobutyl ketone (MIBK) are of the "Ketone" family; acrolein, furfural, and acetaldehyde are of the "aldehyde" family.

Chemical Name The name given to a chemical in the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS). The scientific designation of a chemical or a name that will clearly identify the chemical for hazard evaluation purposes.

Chemical Pneumonitis Inflammation of the lungs caused by accumulation of fluids due to chemical irritation.

CHEMTREC Chemical Transportation Emergency Center is a national center established by the Chemical Manufacturers Association to relay pertinent emergency information concerning specific chemicals on requests from individuals. CHEMTREC has a 24-hour toll-free telephone number (800-424-9300) to help respond to chemical transportation emergencies.

Chronic Effect An adverse effect on a human or animal body, with symptoms that develop slowly over a long period of time or that recur frequently. Also see Acute.

Chronic Exposure Long-term contact with a substance.

Chronic Toxicity Adverse (chronic) effects resulting from repeated doses of or exposures to a substance over a relatively prolonged period of time. Ordinarily used to denote effects in experimental animals.

Clean Air Act See CAA

Clean Water Act Federal law enacted to regulate/reduce water pollution. CWA is administered by EPA.

CMA Chemical Manufacturers Association. See CHEMTREC

CO Carbon monoxide is a colorless, odorless, flammable, and very toxic gas produced by the incomplete combustion of carbon. It is also a by-product of many chemical processes. A chemical asphyxiant; it reduces the blood's ability to carry oxygen. Hemoglobin absorbs CO two hundred times more readily than it does oxygen.

$C0_2$ Carbon dioxide is a heavy, colorless gas that is produced by the combustion and decomposition of organic substances and as a by-product of many chemical processes. $C0_2$ will not burn and is relatively nontoxic (although high concentrations, especially in confined spaces, can create hazardous oxygen-deficient environments).

COC Cleveland Open Cup is a flash point test method.

Combustible A term used by NFPA, DOT, and others to classify certain liquids that will burn, on the basis of flash points. Both NFPA and DOT generally define "combustible liquids" as having a flash point of 100 °F (37.8 °C), but below 200 °F (93.3 °C). Also see "flammable." Non-liquid substances such as wood and paper are classified as "ordinary combustibles" by NFPA.

Combustible Liquid Any liquid having a flash point at or above 100 °F (37.8 °C), but below 200 °F (93.3 °C), except any mixture having components with flashpoints of 200 °F (93.3 °C) or higher, the total volume of which makes up ninety-nine (99) percent or more of the total volume of the mixture.

Common Name Any means used to identify a chemical other than its chemical name (e.g., code name, code number, trade name, brand name, or generic name). See Generic.

Compressed Gas:

(a) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70 °F (21.1 °C); or

(b) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 °F (54.4 °C) regardless of the pressure at 70 °F (21.1 °C); or

(c) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °C) as determined by ASTM D-323-72.

Conc See Concentration.

Concentration The relative amount of a substance when combined or mixed with other substances. Examples: 2 ppm hydrogen sulfide in air, or a 50 percent caustic solution.

Conditions to Avoid Conditions encountered during handling or storage that could cause a substance to become unstable.

Confined Space Any area that has limited openings for entry and exit that would make escape difficult in an emergency, has a lack of ventilation, contains known and potential hazards, and is not intended nor designated for continuous human occupancy.

Conjunctivitis Inflammation of the conjunctiva, the delicate membrane that lines the eyelids and covers the eyeball.

Container Any bag, barrel, bottle, can, cylinder, drum, reactions a hazardous chemical. For the purposes of SDS or HCS, pipes or piping systems are not considered to be containers.

Corrosive A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the DOT in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.

CPSC Consumer Products Safety Commission has responsibility for regulating hazardous materials when they appear in consumer goods. For CPSC purposes, hazards are defined in the Hazardous Substances ACT and the Poison Prevention Packaging Act

of 1970.

Curettage Cleansing of a diseased surface. Cutaneous Toxicity See "Dermal Toxicity."

CWA Clean Water ACT was enacted to regulate/reduce water pollution. It is administered by EPA.

Cyst A sac containing a liquid. Most cysts are harmless. Cytology The scientific study of cells.

Decomposition Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay, or other processes) into parts or elements or simpler compounds. Density The mass (weight) per unit volume of a substance. For example, lead is much more dense than aluminum.

Depressant A substance that reduces a bodily functional activity or an instinctive desire, such as appetite.

Dermal Relating to the skin.

Dermal Toxicity Adverse effects resulting from skin exposure to a substance. Ordinarily used to denote effects in experimental animals.

DHHS U.S. Department of Health and Human Services (replaced U.S. Department of Health, Education and Welfare). NIOSH and the Public Health Service (PHS) are part of DHHS.

Dike A barrier constructed to control or confine hazardous substances and prevent them from entering sewers, ditches, streams, or other flowing waters.

Dilution Ventilation Air flow designed to dilute contaminants to acceptable levels. Also see general ventilation or exhaust.

DOL U.S. Department of Labor. OSHA and MSHA are part of DOL.

DOT U.S. Department of Transportation regulates transportation of chemicals and other substances.

Dry Chemical A powered fire-extinguishing agent usually composed of sodium bicarbonate, potassium bicarbonate, etc.

Dysmenorrhea Painful menstruation.

Dysplasia An abnormality of development.

Dyspnia A sense of difficulty in breathing; shortness of breath.

Ectopic Pregnancy The fertilized ovum becomes implanted outside of the uterus.

Edema An abnormal accumulation of clear watery fluid in the tissues.

Endocrine Glands Glands that regulate body activity by secreting hormones.

Endometrium The mucous membrane lining the uterus.

Environmental Toxicity Information obtained as a result of conducting environmental testing designed to study the effects on aquatic and plant life.

EPA U.S. Environmental Protection Agency.

Epidemiology Science concerned with the study of disease in a general population. Determination of the incidence (rate of occurrence) and distribution of a particular disease (as by age, sex, or occupation) which may provide information about the cause of the disease.

Epithelium The covering of internal and external surfaces of the body. Estrogen Principal female sex hormone.

Evaporation Rate The rate at which a material will vaporize (evaporate) when compared to the known rate of vaporization of a standard material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The designated standard material is usually normal butyl acetate (NBUAC or n-Bu-Ac), with a vaporization rate designated as 1.0. Vaporization rates of other solvents or materials are then classified as:

- FAST evaporating if greater than 3.0. Examples: Methyl Ethyl Ketone = 3.8, Acetone = 5.6, Hexane = 8.3.
- MEDIUM evaporating if 0.8 to 3.0. Examples: 190 proof (95%) Ethyl Alcohol = 1.4, VM&P Naphtha = 1.4, MIBK =1.6.
- SLOW evaporating if less than 0.8. Examples: Xylene = 0.6, Normal Butyl Alcohol = 0.4, Water = 0.3, Mineral Spirits = 0.1.

Explosive A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

Exposure or Exposed State of being open and vulnerable to a hazardous chemical by inhalation, ingestion, skin contact, absorption, or any other course; includes potential (accidental or possible) exposure.

Extinguishing Media The firefighting substance to be used to control a material in the event of a fire. It is usually identified by its generic name, such as fog, foam, water, etc.

Eye Protection Recommended safety glasses, chemical splash goggles, face shield, etc. to be utilized when handling a hazardous material.

F Fahrenheit is a scale for measuring temperature. On the Fahrenheit scale, water boils at 212 °F and freezes at 32 °F.

f/cc Fibers per cubic centimeter of air.

FDA U.S. Food and Drug Administration.

Fetal Pertaining to the fetus.

Fetus The developing young in the uterus from the seventh week of gestation until birth.

Fibrosis An abnormal thickening of fibrous connective tissue, usually in the lungs.

FIFRA Federal Insecticide, Fungicide, and Rodenticide Act requires that certain useful poisons, such as chemical pesticides, sold to the public contain labels that carry health hazard warnings to protect users. It is administered by EPA.

First Aid Emergency measures to be taken when a person is suffering from overexposure to a hazardous material, before regular medical help can be obtained.

Flammable A chemical that includes one of the following categories:

(a) "Aerosol, flammable." An aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of the valve opening;

(b) 'Gas, flammable." (1) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less; or (2) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit;

(c) "Liquid, flammable." Any liquid having a flashpoint below 100 °F (37.8 °C), except any mixture having components with flashpoints of 100 0C (37.8 °C) or higher, the total of which make up 99 percent or more of the total volume of the mixture;

(d) "Solid, flammable." A solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A substance is a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self- sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

Flashback Occurs when flame from a torch burns back into the tip, the torch, or the hose. It is often accompanied by a hissing or squealing sound with a smoky or sharp-pointed flame.

Flashpoint The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested by the following methods:

(a) Tagliabue Closed Tester (see American National Standard Method of Test for

Flash Point by Closed Tag Tester, Z11.24-1979 [ASTM D 56-79]).

(b) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 [ASTM D 93-79]).

(c) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester [ASTM D 3278-78]).

Foreseeable Emergency Any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

Formula The scientific expression of the chemical composition of a material (e.g., water is H_2O, sulfuric acid is H_2SO_4, sulfur dioxide is SO_2).

Fume A solid condensation of particle of extremely small diameter, commonly generated from molten metal as metal fume.

g Gram is a metric unit of weight. One ounce U.S. (avoirdupois) is about 28.4 grams.

General Exhaust A system for exhausting air containing contaminants from a general work area. Also see Local Exhaust.

Generic Name A designation or identification used to identify a chemical by other than its chemical name (e.g., code name, code number, trade name, and brand name). Genetic Pertaining to or carried by genes. Hereditary.

Gestation The development of the fetus in the uterus from conception to birth; pregnancy.

g/kg Grams per kilogram is an expression of dose used in oral and dermal toxicology testing to denote grams of a substance dosed per kilogram of animal body weight. Also see "kg" (kilogram).

Grounding The procedure used to carry an electrical charge to ground through a conductive path. A typical ground may be connected directly to a conductive water pipe or to a grounding bus and ground rod. See Bonding.

Gynecology The study of the reproductive organs in women.

Hand Protection Specific type of gloves or other hand protection required to prevent harmful exposure to hazardous materials.

Hazardous Chemical Any chemical whose presence or use is a physical hazard or a health hazard.

Hazard Warning Words, pictures, symbols, or combination thereof presented on a label or other appropriate form to inform of the presence of various materials.

HCS Hazardous Communication Standard is an OSHA regulation issued under 29 CFR Part 1910.1200.

Health Hazard A chemical for which there is significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.

Hemoglobin An iron-containing conjugated protein or respiratory pigment occurring in the red blood cells of vertebrates.

Hematoma A blood clot under the surface of the skin.

Hematopoietic System The blood-forming mechanism of the human body.

Hematuria The presence of blood in the urine.

Hepatotoxin A substance that causes injury to the liver.

Highly Toxic A chemical in any of the following categories:

(a) A chemical with a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical with a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbit weighing between 2 and 3 kilograms each.

(c) A chemical with a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Hormones Act as chemical messengers to body organs.

Hyperplasia Increase in volume of tissue or organ caused by the growth of new cells.

IARC International Agency for Research on Cancer.

Ignitable Capable of being set on fire.

Impervious A material that does not allow another substance to pass through or penetrate it.

Incompatible Materials that could cause dangerous reactions by direct contact with one another.

Ingestion Taking in by the mouth.

Inhal See Inhalation.

Inhalation Breathing in of a substance in the form of a gas, vapor, fume, mist, or dust.

Inhibitor A chemical added to another substance to prevent an unwanted chemical change.

Insol See Insoluble.

Insoluble Incapable of being dissolved in a liquid.

Intrauterine Within the uterus.

Irritant A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for 4 hours exposure or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

Irritating As define by DOT, a property of a liquid or solid substance which, upon contact with fire or exposed to air, gives off dangerous or intensely irritating fumes (not including poisonous materials). See Poison, Class A and Poison, Class B.

kg Kilogram is a metric unit of weight, about 2.2 U.S. pounds. Also see "g/kg", "g", and "mg".

L Liter is a metric unit of capacity. A U.S. quart is about 9/10 of a liter.

Lacrimation Secretion and discharge of tears.

Label Notice attached to a container, bearing information concerning its contents.

Lactation The secretion of milk by the breasts.

LC Lethal concentration is the concentration of a substance being tested that will kill.

LCL Lethal concentration, low, lowest concentration of a gas or vapor capable of killing a specified species over a specified time.

LC_{50} The concentration of a material in air that will kill 50 percent of a group of test animals with a single exposure (usually 1 to 4 hours). The LC50 is expressed as parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (g/l) or milligrams of material per cubic meter of air (mg/m3)

for dusts and mists, as well as for gases and vapors.

LD Lethal dose is the quantity of a substance being tested the will kill.

LDL Lethal dose low, lowest administered dose of a material capable of killing a specified test species.

LD_{50} A single dose of material expected to kill 50 percent of a group of test animals. The LD_{50} dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg/kg or g/kg). The material may be administered by mouth or applied to the skin.

LEL or LFL Lower explosive limit, or lower flammable limit, of a vapor or gas; the lowest concentration (lowest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At concentrations lower than the LEL, the mixture is too "lean" to burn. Also see "UEL".

Lesion Any damage to a tissue.

Lfm Linear feet per minute, a unit of air velocity.

Local Exhaust A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (welding, grinding, sanding, other processes or operations). Also see General Exhaust.

M Meter is a unit of length in the metric system. One meter is about 39 inches.

M^3 Cubic meter is a metric measure of volume, approximately 35.3 cubic feet or 1.3 cubic yards.

Malaise A feeling of general discomfort, distress, or uneasiness, an out-of-sorts feeling.

Malignant Tending to become progressively worse and to result in death.

Mammary Pertaining to the breast.

Mechanical Exhaust A powered device, such as a motor-driven fan or air stream venturi tube, for exhausting contaminants from a workplace, vessel, or enclosure.

Mechanical Filter Respirator A respirator used to protect against airborne particulate matter like dusts, mists, metal fume, and smoke. Mechanical filter respirators do not provide protection against gases, vapors, or oxygen deficient atmospheres.

Melting Point The temperature at which a solid substance changes to a liquid state.

Menorrhagia Excessive menstruation.

Menstruation Periodic discharge of blood from the vagina of a nonpregnant uterus.

Metabolism Physical and chemical processes taking place among the ions, atoms, and molecules of the body.

Metastasis The transfer of disease from one organ or part to another not directly connected with it.

Meter A unit of length; equivalent to 39.37 inches.

mg Milligram is a metric unit of weight that is one-thousandth of a gram.

mg/kg Milligrams of a substance per kilogram of body weight is an expression of toxicological dose.

mg/m^3 Milligrams per cubic meter is a unit for expressing concentrations of dusts, gases, or mists in air.

Micron (Micrometer) A unit of length equal to one-millionth of a meter; approximately 0.000039 of an inch.

Mist Suspended liquid droplets generated by condensation from the gaseous to the liquid state, or by breaking up a liquid into a dispersed state, such as splashing, foaming or atomizing. Mist is formed when finely divided liquid is suspended in air.

Mixture Any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

MId Mild.

ml Milliliter is a metric unit of capacity, equal in volume to 1 cubic centimeter (cc), or approximately one-sixteenth of a cubic inch. One-thousandth of a liter.

mmHg Millimeters of mercury (Hg) is a unit of measurement for low pressures or partial vacuums.

Molecular Weight Weight (mass) of a molecule based on the sum of the atomic weights of the atoms that make up the molecule.

mppcf Million particles per cubic foot is a unit for expressing concentration of particles of a substance suspended in air. Exposure limits for mineral dusts (silica, graphite, Portland cement, nuisance dusts, and others), formerly expressed as mppcf, are now more commonly expressed as mg/m^3.

SDS Material Safety Data Sheet.

MSHA Mine Safety and Health Administration, U.S. Department of Labor.

Mutagen A substance or agent capable of altering the genetic material in a living cell.

MW See Molecular Weight.

N_2 Nitrogen is a colorless, odorless, and tasteless gas that will not burn and will not support combustion. The earth's atmosphere (air) is about 78 percent nitrogen. At higher concentrations, nitrogen can displace oxygen and become a lethal asphyxiant. See Asphyxiant.

Narcosis A state of stupor, unconsciousness, or arrested activity produced by the influence of narcotics or other chemicals.

Nausea Tendency to vomit, feeling of sickness at the stomach.

NCI National Cancer Institute is that part of the National Institutes of Health that studies cancer causes and prevention as well as diagnosis, treatment, and rehabilitation of cancer patients.

NFPA National Fire Protection Association is an international membership organization which promotes/improves fire protection and prevention and establishes safeguards against loss of life and property by fire. Best known on the industrial scene for the National Fire Codes - 16 volumes of codes, standards, recommended practices and manuals developed (and periodically updated) by NFPA technical committees. Among these is NFPA 704M, the code for showing hazards of materials as they might be encountered under fire or related emergency conditions, using the familiar diamond-shaped label or placard with appropriate numbers or symbols.

Neo See Neoplasia.

Neonatal The first four weeks alter birth.

Neoplasia A condition characterized by the presence of new growths (tumors).

Nephrotoxin A substance that causes injury to the kidneys.

Neurotoxin A material that affects the nerve cells and may produce emotional or behavioral abnormalities.

Neutralize To eliminate potential hazards by inactivating strong acids, caustics, and oxidizers. For example, acids can be neutralized by adding an appropriate amount of caustic substance to the spill.

ng nanogram, one-billionth of a gram.

NIOSH National Institute for Occupational Safety and Health, U.S. Public Health Service, U.S. Department of Health and Human Services (DHHS), among other activities, tests and certifies respiratory protective devices and air sampling detector tubes, recommends occupational exposure limits for various substances, and assists OSHA and MSHA in occupational safety and health investigations and research.

Nonflammable Not easily ignited, or if ignited, not burning rapidly.

Non-Sparking Tools Tools made from beryllium-copper or aluminum-bronze greatly

reduce the possibility of igniting dusts, gases, or flammable vapors. Although these tools may emit some sparks when striking metal, the sparks have a low heat content and are not likely to ignite most flammable liquids.

NO_x Oxides of nitrogen which are undesirable air pollutants. NO emissions are regulated by EPA under the Clean Air Act.

NPIRS National Pesticide Information Retrieval System is an automated data base operated by Purdue University containing information on EPA registered pesticides, including reference file MSDS's.

NRC National Response Center is a notification center that must be called when significant oil or chemical spills or other environment-related accidents occur. The toll-free number is 1-800-424-8802.

NTP National Toxicology Program. The NTP publishes an Annual Report on Carcinogens. Odor A description of the smell of the substance.

Odor Threshold The lowest concentration of a substance's vapor, in air, that can be smelled.

Olfactory Relating to the sense of smell.

Oral Used in or taken into the body through the mouth.

Oral Toxicity Adverse effects resulting from taking a substance into the body by mouth. Ordinarily used to denote effects in experimental animals.

Organic Peroxide An organic compound that contains the bivalent -0-0 structure and may be considered a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

Organogenesis The formation of organs during development.

OSHA Occupational Safety and Health Administration, U.S. Department of Labor.

Ovary The female sex gland in which ova are formed.

Overexposure Exposure to a hazardous material beyond the allowable exposure limits.

Oxidation In a literal sense, oxidation is a reaction in which a substance combines with oxygen provided by an oxidizer or oxidizing agent. See Oxidizing Agent.

Oxidizing Agent A chemical or substance that brings about an oxidation reaction. The Agent may:

1) Provide the oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen); or

2) It may receive electrons being transferred from the substance undergoing oxidation (chlorine is a good oxidizing agent for electron-transfer purposes, even though it contains no oxygen).

Pathologic Pertaining to or caused by disease. Pathology Scientific study of alterations produced by disease.

PEL Permissible Exposure Limit is an occupational exposure limit established by OSHA's regulatory authority. It may be a time-weighted average (TWA) limit or a maximum concentration exposure limit.

Percent Volatile Percent volatile by volume is the percentage of a liquid or solid (by volume) that will evaporate at an ambient temperature of 70 F (unless some other temperature is specified). Examples: butane, gasoline, and paint thinner (mineral spirits) are 100 percent volatile; their individual evaporation rates vary, but in time, each will evaporate completely.

pH The symbol relating to the hydrogen ion (H^+) concentration to that of a given standard solution. A pH of 7 is neutral. Numbers increasing from 7 to 14 indicate greater alkalinity. Numbers decreasing from 7 to 0 indicate greater acidity.

Physical Hazard Means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Placenta A structure that grows on the wall of the uterus during pregnancy, through which the fetus is nourished.

PMCC Pensky-Martens Closed Cup. See Flashpoint.

Pneumoconiosis A condition of the lung in which there is permanent disposition of particulate matter and the tissue reaction to its presence. It may range from relatively harmless forms of iron oxide deposition to destructive forms of silicosis.

Poison, Class A A DOT term for extremely dangerous poisons-poisonous gases or liquids that, in very small amounts, either as gas or as vapor of the liquid, mixed with air, are dangerous to life. Examples: phosgene, cyanogen, hydrocyanic acid, nitrogen peroxide.

Poison, Class B A DOT term for liquid, solid, paste or semisolid substance-other than Class A poisons or irritating materials-that are known (or presumed on the basis of animal tests) to be so toxic to humans that they are a hazard to health during transportation.

Polymerization A chemical reaction in which one or more small molecules combine to form larger molecules. A hazardous polymerization is such a reaction that takes place at a rate that releases large amounts of energy. If hazardous polymerization can occur with a given material, the SDS usually will list conditions that could start the reaction and since the material usually contains a polymerization inhibitor-the length of time during

which the inhibitor will be effective.

ppb Parts per billion is the concentration of a gas or vapor in air-parts (by volume) of the gas or vapor in a billion parts of air. Usually used to express extremely low concentrations of unusually toxic gases or vapors; also the concentration of a particular substance in a liquid or solid.

ppm Parts per million is the concentration of a gas or vapor in air-parts (by volume) of the gas or vapor in a million parts of air; also the concentration of a particulate in a liquid or solid.

Prenatal Preceding birth.

psi Pounds per square inch (for SDS purposes) is the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (pounds per square inch absolute; that is, gauge pressure plus sea level atmospheric pressure, or psig plus approximately 14.7 pounds per square inch). Also see mmHg.

Pul See Pulmonary.

Pulmonary Relating to, or associated with, the lungs.

Pulmonary Edema Fluid in the lungs.

Pyrophoric A chemical that will ignite spontaneously in air at a temperature of 13 °F (54.4 °C) or below.

Reaction A chemical transformation or change. The interaction of two or more substances to form new substances.

Reactive See Unstable.

Reactivity Chemical reaction with the release of energy. Undesirable effects-such as pressure buildup, temperature increase, formation of noxious, toxic, or corrosive byproducts-may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or storage.

Reducing Agent In a reduction reaction (which always occurs simultaneously with an oxidation reaction) the reducing agent is the chemical or substance which (1) combines with oxygen or (2) loses electrons to the reaction. See Oxidation.

REL The NIOSH REL (Recommended Exposure Limit) is the highest allowable airborne concentration which is not expected to injure the workers. It may be expressed as a ceiling limit or as a time-weighted average (TWA).

Reproductive Toxin Substances that affect either male or female reproductive systems and may impair the ability to have children.

Respiratory Protection Devices that will protect the wearer's respiratory system from overexposure by inhalation to airborne contaminants. Respiratory protection is used when a worker must work in an area where he/she might be exposed to concentration in excess of the allowable exposure limit.

Respiratory System The breathing system that includes the lungs and the air passages (trachea or windpipe, larynx, mouth, and nose) to the air outside the body, plus the associated nervous and circulatory supply.

Routes of Entry The means by which material may gain access to the body, for example, inhalation, ingestion, and skin contact.

RCRA Resource Conservation and Recovery Act is environmental legislation aimed at controlling the generation, treating, storage, transportation, and disposal of hazardous wastes. It is administered by EPA.

Sarcoma A tumor that is often malignant.

Self-Contained Breathing Apparatus A respiratory protection device that consists of a supply or a means of respirable air, oxygen, or oxygen-generating material, carried by the wearer.

Sensitizer A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

SETA Setaflash Closed Tester. See Flashpoint.

Silicosis A disease of the lungs (fibrosis) caused by the inhalation of silica dust.

Skn Skin.

"Skin" A notation (sometimes used with PEL or TLV exposure data) that indicates the stated substance may be absorbed by the skin, mucous membranes, and eyes-either airborne or by direct contact-and that this additional exposure must be considered part of the total exposure to avoid exceeding the PEL or TLV for the substance.

Skin Absorption Ability of some hazardous chemicals to pass directly through the skin and enter the bloodstream.

Skin Sensitizer See Sensitizer.

Skin Toxicity See Dermal Toxicity.

Solubility in Water A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information can be useful in determining spill cleanup methods and reextinguishing agents and methods for materials.

Solvent A substance, usually a liquid, in which other substances are dissolved. The most common solvent is water.

SO_x Oxides of sulfur.

Species On the MSDS's, species refers to the test animals-usually rats, mice, or rabbits-used to obtain the toxicity test data reported.

Specific Chemical Identity The chemical name, Chemical Abstracts Service (CAS) Registry Number, or any precise chemical designation of a substance.

Specific Gravity The weight of a material compared to the weight of an equal volume of water is an expression of the density (or heaviness) of a material. Insoluble materials with specific gravity of less than 1.0 will float in (or on) water. Insoluble materials with specific gravity greater than 1.0 will sink in water. Most (but not all) flammable liquids have a specific gravity less than 1.0 and, if not soluble, will float on water-an important consideration for fire suppression.

Spill or Leak Procedures The methods, equipment, and precautions that should be used to control or clean up a leak or spill.

Splash-Proof Goggles Eye protection made of a noncorrosive material that fits snugly against the face, and has indirect ventilation ports.

Spontaneously Combustible A material that ignites as a result of retained heat from processing, or that will oxidize to generate heat and ignite, or that absorbs moisture to generate heat and ignite.

Squamous Scaly or platelike.

Stability The ability of a material to remain unchanged. For SDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of storage or use. Conditions that may cause instability (dangerous change) are stated; for example, temperatures above 150 °F; shock from dropping.

STEL Short-Term Exposure Limit (ACGIH terminology). See TLV.

Stenosis Narrowing of a body passage or opening.

Steroid A complex molecule among which are the male and female sex hormones.

Subcutaneous Beneath the layers of the skin.

Supplied-Air Respirators Air line respirators of self-contained breathing apparatus.

Sys System or systemic.

Systemic Poison A poison that spreads throughout the body, affecting all body Systems and organs. Its adverse effect is not localized in one spot or area.

Systemic Toxicity Adverse effects caused by a substance that affects the body in a general rather than local manner.

Synonym Another name or names by which a material is known. Methyl alcohol, for example, is known as methanol or wood alcohol.

Target Organ Effects The following is a target organ categorization of effects that may occur, including examples of signs and symptoms and chemicals that have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but they are not intended to be all inclusive.

(a) Hepatotoxins
Chemicals that produce liver damage.

Signs and Symptoms Jaundice; liver enlargement.

Chemicals Carbon tetrachloride; nitrosamines.

(b) Nephrotoxins Chemicals that produce kidney damage.

Signs and Symptoms Edema; proteinuria.

Chemicals Halogenated hydrocarbons; uranium.

(c) Neurotoxins Chemicals that produce their primary toxic effects on the nervous system.

Signs and Symptoms Narcosis; behavioral changes; decrease in motor functions.

Chemicals Mercury; carbon disulfide.

(d) Agents that act on blood
hematopoietic system Decrease in hemoglobin function; deprive the body tissues of oxygen.

Signs and Symptoms Cyanosis; loss of consciousness.

Chemicals Carbon monoxide; cyanides.

(e) Agents that damage the lung Chemicals that irritate or damage the pulmonary tissue.

Signs and Symptoms Cough; tightness in chest; shortness of breath.

Chemicals Silica; asbestos.

(f) Reproductive toxins Chemicals that adversely affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

Signs and Symptoms Birth defects; sterility.

Chemicals Lead; DBCP.

(g) Cutaneous hazards Chemicals that affect the dermal layer of the body.

Signs and Symptoms Defatting of the skin; rashes, irritation

Chemicals Ketones; chlorinated compounds.

(h) Eye hazards Chemicals that effect the eye or visual capacity.

Signs and Symptoms Conjunctivitis; corneal damage.

Chemicals Organic solvents; acids.

Target Organ Toxin A toxic substance that attacks a specific organ of the body. For example, overexposure to carbon tetrachloride can cause liver damage.

TCC Tag (Tagliabue) Closed Cup. See Flashpoint.

TCL Toxic concentration low, the lowest concentration of a gas or vapor capable of producing a defined toxic effect in a specified test species over a specified time.

TDL Toxic dose low, lowest administered dose of a material capable of producing a defined toxic effect in a specified test species.

Temp Temperature.

Ter See Teratogen.

Teratogen A substance or agent, exposure to which by a pregnant female can result in malformations in the fetus.

Tfx Toxic effect(s).

TLV Threshold Limit Value is a term used by ACGIH to express the airborne concentration of material to which nearly all persons can be exposed day after day without adverse effects. ACGIH expresses TLV's in three different ways:

- TLV-TWA: The allowable Time-Weighted Average concentration for a normal 8 hour workday or 80-hour workweek.
- TLV-STEL: The Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period (maximum of four such periods per day, with at least 60 minutes between exposure periods, and provided the daily TLV-TWA is not exceeded).

- TLV-C: The ceiling exposure limit-the concentration that should not be exceeded even instantaneously.

TOC Tag Open Cup. See Flashpoint.

Torr A unit of pressure, equal to 1/760 atmosphere.

Toxic A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Toxic Substance Any substance that can cause acute or chronic injury to the human body, or which is suspected of being able to cause diseases or injury under some conditions.

Toxicity The sum of adverse effects resulting from exposure to a material, generally, by the mouth, skin, or respiratory tract.

Trade Name The trademark name or commercial trade name for a material or product. transplacental An agent that causes physical defects in the developing embryo.

TSCA Toxic Substances Control Act (Federal Environmental Legislation administered by EPA) regulates the manufacture, handling, and use of materials classified as "toxic substances".

TWA Time-Weighted Average exposure is the airborne concentration of a material to which a person is exposed, averaged over the total exposure time-generally the total workday (8 to 12 hours). Also see TLV.

UEL or UFL Upper explosive limit or upper flammable limit of a vapor or gas; the highest concentration (highest percentage of the substance in air) that will produce a flash of fire when an ignition source (heat, arc, or flame) is present. At higher concentrations, the mixture is too "rich" to burn. Also see LEL.

ug Microgram, one-millionth of a gram.

Unstable Tending toward decomposition or other unwanted chemical change during normal handling or storage.

Unstable Reactive A chemical that, in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or become self-reactive under conditions of shocks, pressure, or temperature.

USDA U.S. Department of Agriculture.

Vapor The gaseous form of a solid or liquid substance as it evaporates.

Vapor Density The weight of a vapor or gas compared to the weight of an equal volume of air is an expression of the density of the vapor or gas. Materials lighter than air have vapor densities less than 1.0 (examples: acetylene, methane, hydrogen). Materials heavier than air (examples: propane, hydrogen sulfide, ethane, butane, chlorine, sulfur dioxide) have vapor densities greater than 1.0. All vapors and gases will mix with air, but the lighter materials will tend to rise and dissipate (unless confined). Heavier vapors and gases are likely to concentrate in low places - along or under floors, in sumps, sewers, and manholes, in trenches and ditches - where they may create health hazards or fires.

Vapor Pressure The pressure exerted by a saturated vapor above its own liquid in a closed container. When quality control tests are performed on products, the test temperature is usually 100 °F, and the vapor pressure is expressed as pounds per square inch (psig or psia), but vapor pressures reported as SDS are in millimeters of mercury (mmHg) at 68 °F (20 °C), unless stated otherwise. Three facts are important to remember:

1. Vapor pressure of a substance at 100 °F will always be higher than the vapor pressure of the substance at 68 °F (20 °C).

2. Vapor pressures reported on SDS in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.

3. The lower the boiling point of a substance, the higher its vapor pressure.
Ventilation See General Exhaust, Local Exhaust, and Mechanical Exhaust.

Vermiculite An expanded mica (hydrated magnesium-aluminum-iron silicate) used as sorbent for spill control and cleanup.

Viscosity The tendency of a fluid to resist internal flow without regard to its density.
Volatility A measure of how quickly a substance forms a vapor at ordinary temperatures.

Water Disposal Methods Proper disposal methods for contaminated material, recovered liquids or solids, and their containers.

Water Reactive A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Work Area A room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

Workplace An establishment at one geographical location containing one or more work areas.

Zinc Fume Fever A condition brought on by inhalation of zinc oxide fume characterized by flu-like symptoms with a metallic taste in the mouth, coughing, weakness, fatigue, muscular pain, and nausea, followed by fever and chills. The onset of symptoms occurs four to twelve hours after exposure.