

Hazard Communications A Guide for the Construction Industry

Meeting the Occupational
Safety and Health
Administration's Mandate



American Subcontractors
Association, Inc.



Associated Builders
and Contractors, Inc.



National Association
of Home Builders

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Foreword

The associations participating in publication of this guide to compliance with the Hazard Communication Standard are indebted to Terence J. Burke and Lois Phillips of the law firm, Herzog, Engstrom, Burke, Koplovitz, Cavalier & Lyman in Albany, N.Y. This firm serves as chapter attorney for the Northeastern Subcontractors Association, a chapter affiliated with the American Subcontractors Association. Burke and Phillips did the original research and writing. The generous contribution of their professional expertise helped make this manual possible.

U.S. Department of Labor

Assistant Secretary for
Occupational Safety and Health
Washington, D.C. 20210

AUG 22 1989

AUG 16 1989

Mr. Gary Komarow
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Dear Mr. Komarow:

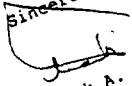
This is in response to your letter of July 25, concerning your "Hazard Communication Interim Guide" for the Construction Industry.

Our compliance staff have made a cursory review of the trade associations' "Hazard Communication: An Interim Guide for the Construction Industry." The compliance manual seems well-written and comprehensive and, if used correctly, hazard communication programs implemented under its guidance should be in compliance with the standard's requirements.

Any assistance the Trade Associations can give OSHA in preparing new standards and/or revising existing standards is welcome; whether it is by developing your own compliance manual or just keeping us informed of your problems, concerns, and/or possible solutions.

If I may be of any further assistance, please contact me.

Sincerely,


Frank A. White
Deputy Assistant Secretary

At the time of publication, several of the sponsoring associations were engaged in a court challenge to the OSHA Hazard Communication Standard as it applies to the construction industry. One of the contentions in this litigation is that compliance with the Hazard Communication Standard, as presently written, is infeasible in the construction industry. While this manual represents our best possible advice as to how a construction company should attempt to comply with the standard, contractors should consult with appropriate counsel for advice as to their compliance obligations under the standard.

CHAPTER ONE

Introduction to the OSHA Hazard Communication Standard

The U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) has issued a new standard which affects every single contractor and builder in the construction industry. The rule is called the Hazard Communication Standard (or "HazCom" for short), and it requires all contractors to educate their employees about the hazardous chemicals they are exposed to in the workplace and the methods necessary to protect themselves.

Many contractors are under the mistaken impression that they don't have many hazardous chemicals in the workplace, but the term "hazardous chemical" applies to everything from paint to concrete to wood dust. Contractors also will be very unused to complying with a "performance-based" regulation such as HazCom. Unlike other OSHA standards which generally require contractors to follow certain guidelines to ensure a safe workplace, HazCom will require contractors to inventory the chemicals used by their own employees and then train them about the dangers associated with those chemicals.

While it is natural for most business owners to put off dealing with government regulations, the time has come for hazard communication. Considering the construction industry's past problems with such substances as asbestos, hazard communication—done properly—could save you thousands of dollars in fines and protect you from possible liability suits from your employees. Compliance with HazCom will not be a simple task and will require a commitment of your time. Above all, you must make a good faith effort to comply and be prepared to document it.

This manual has been designed with the construction contractor in mind, and the sample programs and forms have been designed for the average construction firm. Don't let the subject matter intimidate you. While HazCom was designed to protect your employees, this manual was designed to help you comply with as few headaches as possible.

What am I required to do?

You will need to train all employees who may be exposed to hazardous chemicals about the dangers associated with those chemicals and the protective measures they need to take. Under HazCom, there are four major elements of compliance:

1. Material Safety Data Sheets (MSDSs)
2. Labels
3. Employee Training
4. A Written Hazard Communication Program

Material Safety Data Sheets (MSDSs)

Your first step toward compliance is to make sure you have an MSDS for every hazardous substance you use. Since September 1987, you should have been receiving MSDSs with every shipment of hazardous substances. (See the chapter entitled "Common Hazards on Construction Sites.") It is the responsibility of suppliers/distributors to provide MSDSs with the products they are selling. Nonetheless, you still may have trouble getting the MSDSs from suppliers who are unaware of their responsibilities. If you don't receive an MSDS with a shipment, it's your responsibility to ask for one.

How do you know if a product requires an MSDS? If it is tagged or labeled with any key words such as "danger," "caution," "flammable," "warning," etc., that is a signal to you to get an MSDS from the supplier. Put any requests to a supplier for an MSDS in writing. This will be part of your good faith effort to comply should you get inspected by OSHA. (See the chapter entitled "Sample Forms and Letters.")

In order to simplify this process, you may want to designate one employee to coordinate your compliance efforts. That person should set up a system to collect all incoming MSDSs and set up an easily understood filing and retrieval system. Without an organized system, you could easily be overwhelmed with paper. The MSDSs will vary in length from two to twenty pages, depending on the make-up of the substance. These documents should give you a complete breakdown on the hazards associated with the products you are using and will be a key to effective employee training. (See the chapter entitled "How to Read and Understand an MSDS.")

One note of caution if your supplier tends to be a retail outlet, such as a hardware store or a lumber yard: retailers only have to supply MSDSs to customers who have commercial accounts. For all other customers, the retailer must supply the address and telephone number of the manufacturer from which an MSDS can be obtained. It will be a smart move to get into the habit of automatically asking for MSDSs with your purchases if you have a commercial account or the address and telephone number if you don't have an account. Once you have an MSDS on a product, though, it's not necessary to get one with every shipment of that product. You only need to obtain another one if the chemical make-up of the product changes.

OSHA does urge all employers who have difficulty obtaining MSDSs from suppliers and/or manufacturers to

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contact their local OSHA office for assistance. Again, keep careful documentation of all correspondence with suppliers and manufacturers, as well as correspondence with your local OSHA office.

Once all of your MSDSs have been assembled, you must keep copies of them at a central location on all jobsites, such as trailers or trucks. All employees must be made aware of the location and be given access to the MSDSs upon request. They are for their benefit as well as yours.

Labels

You will also need to make sure that every incoming hazardous product has a label identifying the chemical with appropriate hazard warnings. You will be able to use the MSDSs and the labels as a check on one another. If a product has a warning label, but no MSDS or vice versa, you will need to request either the label or MSDS from the supplier. As with MSDSs, make sure all requests for labels are carefully documented.

Labels on the products must be in English, easily understandable, and not defaced. The product labels will essentially be a synopsis of the MSDSs, but they should never be considered to be a substitute for MSDSs. The label will be the employee's immediate source of information, with the MSDS as a backup.

If a hazardous substance is transferred into a portable container to be used by several employees or on several shifts, each portable container must be appropriately labeled with the hazard information from its source. For instance, if paint is transferred from a large drum into smaller containers which are not labeled, then you must label those containers with the hazard warnings from the drum. However, if the person making the transfer is going to use the substance immediately, no labeling is required on the portable container.

When you review the labels, determine whether your employees will understand the symbols and terminology used. You will need to provide an explanation of the labeling system to your employees during training. It's a good bet if you can't figure it out, then your employees won't be able to either, so contact the supplier or manufacturer for assistance. Should an emergency occur, the label will be the first thing the employee looks at, so it should say what to do in an emergency. The word "danger" on the label, without more explanation, won't help after an accident occurs.

Employee Training

Once you have your MSDS and labeling system in place, you'll need to transmit this information to your employees.

Who has to be trained? Remember, you must inform and train not only those employees actually exposed to hazardous substances during their routine job duties, but also any employee who could potentially be exposed from unexpected releases or emergency situations. For example, an employee who only handles sealed containers of chemi-

cals and normally would not be exposed, may become exposed to a hazard if the container leaks or spills. Likewise, an office worker may not be exposed to hazards in the office, but may be exposed if he or she routinely goes on site to deliver messages, etc.

Generally, office personnel will not be required to be trained, since office products are not classified as hazardous substances. However, if there is an employee who is principally responsible for the copying machine and handles the chemicals associated with it, then they would have to be trained about the dangers.

To actually train your employees about the hazards of every site they are working on may seem like a monumental task, particularly if you have hundreds of chemicals. You are allowed to train your employees by chemical categories (See the chapter entitled "Employee Training.") You are not expected to have a chemist's knowledge about hazardous substances. Your task is to make your employees aware of what they are working with. That means telling them:

1. How to spot hazards;
2. What the physical and health hazards are of that chemical (See the chapter "Common Hazards on Construction Sites.");
3. What they need to do to protect themselves;
4. What they need to do in an emergency;
5. The location and content of your company's written hazard communication program (to be discussed next).

You or your designated representative must train employees before they are exposed to a hazardous substance. Even if an employee says he was trained already on the substance by another employer, you should do it again since he is now your employee and your responsibility. You should also stress to your employees that they have an important role in making this program work. It may be wise to conduct the training right after an employee has completed his tax and immigration forms, and then have him "sign-off" that he has received the hazard communication training. (See the chapter entitled "Sample Forms and Letters.")

Written Hazard Communication Program

Under HazCom, you are also required to have a written hazard communication program for your company. This is also very important because during an OSHA inspection, it is likely to be one of the first things the inspector is going to ask to see. Essentially, the written program is a description of everything you are doing to comply with HazCom. It must also be made available to employees and employee representatives should they ask to see it. The written program has to be maintained at all of your jobsites.

Basically, the written program must outline how you are going to meet your MSDS, labeling and training responsibilities. (See chapter entitled "Sample Written Hazard Communication Program.") Your written program must also contain your inventory list of chemicals used on your jobsites. You need to reference them as they appear on the MSDS, but, for your own understanding, you may want to

list the chemical and common names of the substances. This will help with any updating you will eventually need to do. The program must also deal with how you will meet your responsibilities on multi-employer jobsites, i.e. most construction sites.

What are my responsibilities to other contractors on site?

Probably the most difficult part of compliance for contractors will be the multi-employer worksite requirements of HazCom. This provision requires you to inform your employees about the hazards they may be exposed to by other contractors working on the same site.

Under the multi-employer requirements, you must obtain from other contractors working in the same area of the site at the same time as your employees:

1. The MSDSs for the products the other contractors are using around your employees or find out the location of their MSDSs on site;
2. An explanation of the labeling system other contractors are using;
3. Information about the precautionary measures your employees need to take to protect themselves during normal operating conditions and in emergencies.

The coordination of this process will be left to the individual contractors, but it may be wise to try and find out who the other contractors will be on a jobsite before work begins. You should then contact those other contractors and ask them for the appropriate information. It will probably be easier to make contact before a job begins because employees of different contractors are always coming and going once the job

begins. In addition, you must include this information in your own training of your employees, and the steps you take to comply with the multi-employer requirements must be outlined in your written hazard communication program. (See the chapter entitled "Sample Written Hazard Communication Program.")

Is that all?

Hazard communication isn't a one-shot deal. This is going to be an ongoing process as long as you are in business. Considering the number of employees who pass through this industry, you will probably be conducting employee training fairly frequently. In addition, every time a new hazard is introduced in the workplace, you will also need to do training on that substance. The same is true if a product's chemical make-up changes. You'll know when that happens because your supplier should send a new MSDS on the product.

All contractors will be relying on one another to get the appropriate information to train their own employees. If you don't prepare your own company, you'll run the risk of forcing other contractors into non-compliance.

The following chapters will help you develop your hazard communication program by discussing each of the main elements in more detail. In addition, there will be helpful hints and answers to the many questions that will no doubt come to mind. Once you have gone through the manual, you'll then want to read the "What If..." chapter, which will help you anticipate problems on the jobsite.

CHAPTER TWO

Common Hazards on Construction Sites

One of the most time-consuming tasks you will face in getting your company ready for HazCom will be trying to inventory all the chemicals that you use. Trades that use fewer hazardous substances will find the process easier. Since no contractor, even one in the same trade, will be using the same products as another, there is no standard method or shortcut for doing the inventory.

How Do I Know What Hazardous Chemicals I Use?

Builders and contractors are not required to determine which of their products are covered by HazCom. Hazard determination is the responsibility of the product's manufacturer, distributor or importer. If a product is accompanied by a Material Safety Data Sheet (MSDS), then you are on notice that it is made up of one or more hazardous chemicals. Another clue is if the label contains any of the key "danger" words such as "caution," "flammable," "warning," "corrosive," "irritant," "toxic," etc. If you spot such words, you should already have an MSDS for the product. If not, contact the supplier or manufacturer for one.

For each one of these products, you will need to identify:

1. How to spot the presence or release of the chemical(s);
2. Any physical or health hazards associated with it;
3. Any protective measures an employee needs to take while working with the product;
4. Emergency procedures necessary in case of an accident.

All of this information can be found on the MSDS accompanying the product. However, since some MSDSs can be quite lengthy, you may have to sort through some of the excess information that manufacturers may supply on the forms. When you review the hazards of the products you are using, you should note the difference between a physical and a health hazard. A substance presents a physical hazard if it is flammable, explosive or reactive. A substance presents a health hazard if exposure to it can cause acute (immediate) or chronic (long-term) health problems in a person exposed to it. This may seem like an enormous amount of information if you're dealing with hundreds of products that can be potentially classified as "hazardous." Indeed, it will be a time-consuming task, but it won't be necessary to go through all of this information on each substance when you train your employees. OSHA does allow you to train in categories and most of your products will fall into a few categories. In other words, many products will be handled in the same manner. However, many products will also fall into more than one

category, so you need to make sure you include it in each discussion of every category it fits in.

Once you have identified which of the products you use are hazardous, you should be able to classify them in categories. Generally, most hazardous substances used on construction sites will fall into one or more of the following categories:

1. Flammables and combustibles
2. Compressed gases
3. Toxins (Systemic poisons, dusts, fumes, corrosives, irritants)

Flammables and Combustibles

Obviously the main physical hazards posed by products in this category are their ability to cause fires and/or explosions. Some of the most obvious examples are kerosene, gasoline and alcohol, but there are also unfamiliar chemicals which also fall into this category, such as heptane, benzene and acetone. Many times these unfamiliar names are present in common products such as paints, glues and sealants. These products could also present health hazards as well, if there is prolonged exposure.

When you discuss the flammable nature of products in this category while training your employees, you should particularly discuss which ones present bigger threats. In addition, you should warn them about tools or actions that may ignite flammable products such as welding tools, torches or cigarette smoking.

It is also important to instruct employees about the proper ventilation necessary when using these products and the importance of cleaning up spills quickly. You should also note that some flammables give off invisible vapors which can accumulate and/or travel (example: certain types of glues). These vapors can be ignited by sparks or heat, such as from power tools, and can cause serious injury and damage.

Compressed Gases

Of all the hazardous substances present on construction sites, compressed gases are the easiest to spot because they are packaged in steel cylinders. Generally, products such as oxygen, LP gas, freon and hydrogen are packaged as compressed gases. One of the biggest dangers of compressed gases involves damage to those cylinders. If the valve stem of a cylinder breaks or is sheared off, the cylinder could literally take off like a rocket or a torpedo. In addition, some compressed gases may present a fire hazard if their cylinders leak. Others may actually remove oxygen from the air. It is important to read the individual labels and

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MSDSs on compressed gases. When training employees on compressed gases, they should be informed about the potential hazards and the proper storage, handling and emergency procedures associated with these gases.

Toxins

Toxins are a general class of substances which can pose a health hazard to those using them. However, just because a substance is toxic, this does not automatically mean it is a significant health threat. A toxin is any substance which may harm the body, but it is important to consider the concentration of the chemical and the length of exposure. The MSDS accompanying toxins should tell you the acceptable limits of exposure, and that is the key to proper usage without harm to the employee.

Toxins should not be grouped into one massive category, because of the sheer number of them present on construction sites and their wide variety. Your particular trade may require additional categories for products unique to your trade, but toxins can usually be grouped in the following classes:

1. Systemic Poisons
2. Corrosives
3. Irritants, Dusts and Fumes

Systemic Poisons

A systemic poison is a chemical which can cause serious damage to an organ or system of the body, such as the liver or nervous system. Exposure to these substances is usually through breathing, but they can also be swallowed or absorbed through the skin.

Systemic poisons are often in the form of harmful vapors and gases and, when they are breathed in by an employee, can pass through the lungs and into the blood stream, thereby attacking an organ or system of the body. The most deadly aspect about many of these poisons is that it may take years for the employee to experience the side effects. That is why it is important for employees to take precautionary measures when working with them.

Systemic poisons can have more immediate and noticeable effects if an employee should accidentally get them on his skin. This can occur with many solvents used on construction sites. The poison may pass through the skin and into the body. In addition, you should also caution employees about the effects of swallowing these poisons. This can happen if employees don't carefully wash themselves before eating, drinking or smoking.

Corrosives

A product is a corrosive if it falls into the group of chemicals which damage the body on contact. The most obvious example for construction is the assortment of acids used in many trades, but simple items such as cleaning products and paint remover can also be corrosives. Wet concrete also is a skin corrosive.

The most important points to stress when training employees about corrosives are how to eliminate exposures and how to wear protective gear which guards the skin,

lung, nasal passages, and the eyes. Emergency procedures should also be emphasized because of the immediate effects of corrosives should there be an accident. These precautions should also be stated on the labels of the products.

Irritants, Dusts and Fumes

Of all of the toxins, irritants are the least harmful but damaging nonetheless. Like systemic poisons, irritants can have a harmful effect on the lungs and other organs. Like corrosives, they also can have a harmful effect on skin and eyes. Generally, a product is an irritant instead of a poison or corrosive if it is in a smaller quantity or concentration.

Employees should take the same precautions against irritants as they do with poisons and corrosives, and training should stress proper protective gear and adequate ventilation. As with all toxins, employees should stop work immediately if they feel ill when they are working with these products. They should then check the label of the product they are working with for first aid information.

Wood dust, sand and cement give off deadly dusts which can then accumulate in the lungs and nose and damage the eyes. These are nuisance dusts, but some can cause chronic health problems. It is important that employees know of protective gear they should wear when performing operations such as sanding, grinding and mixing. In some cases involving systemic poisons, gloves and/or respirators may be necessary. As always, the best reference will be the MSDS. In addition, you will need to include these dusts and fumes in your inventory list of hazardous products attached to your written HazCom program.

Are There Any Substances I Can Exclude from Training?

In general, there are two classes of products which don't have to be included in your hazard communication training: articles and consumer products. However, these exemptions have been carefully and narrowly crafted by OSHA. So before you assume anything is exempted from the standard, take careful note of the following definitions of these exemptions.

Articles

An article is generally a solid product which is already in its end form when it is used on a construction site and doesn't release hazardous substances under normal conditions of use. Pipes, wood, glass, tools and insulation are all articles. One problem with the article exemption is what happens when you cut or form those products during the course of work. The wood will give off wood dust, the glass will give off fragments, insulation can give off fibers, etc. Another problem is with materials such as particleboard, which gives off molecular amounts of formaldehyde even when they are not cut.

If there is a hazard associated with these products, then your distributor should send an MSDS with it when you purchase it. When you receive a lumber shipment, you should get an MSDS on the dangers associated with wood dust. You don't need to train your employees about the

dangers of wood, just wood dust. Don't overreact to this by including everything under the sun in your training program. Items such as doors, tables, saws and drills are articles, period.

Consumer Products

Many common consumer products also do not have to be included in your hazard communication program, but a great deal depends on **how you use them in the workplace**. Many products found at local hardware stores and retail outlets that are used by contractors can be considered consumer products. However, you may exempt them from your program **only** if they are packaged in the same form and concentration as Joe Consumer can purchase them, and **only** if you use the products for the same duration and frequency as Joe Consumer uses them.

In other words, if you purchase products at a hardware store but they are marked "for industrial use only," then you would still have to include the products in your HazCom program. Also, if you buy large quantities of a hazardous product at a retail outlet, then these would have to be included. Just because you bought them at a retail

establishment does not automatically mean the products are exempt.

If there is any doubt that you may not be using these products as a consumer uses them, then you would be wise to include them in your HazCom program.

Can Anyone Just Tell Me What Hazardous Substances I'm Using?

A word of warning: Be wary of anyone who claims to have a standard list of everything you are using. No two construction companies will be alike, and unfortunately there are no shortcuts. Remember, OSHA designed HazCom to be a performance standard and that means you'll need to assess your own company. No one else will be able to do it for you. Watch your labels and look for MSDSs.

The following is a list of common hazardous substances often found on construction sites. *It is by no means a complete list, so it should only be used as a guide.* You also can use it as a model when you inventory your own company.

HAZARD CATEGORIES

Hazard Categories for Common Construction Products

Substance	Physical Hazards		Health Hazards		
	Flammable/ Combustible	Compressed Gas	Systemic Poison	Irritant/ Dust	Corrosive
Acetylene	X	X			
Acetone	X		X	X	
Alcohol Solvents	X		X		
Asbestos			X		
Babbitt Metal			X		
Benzene			X		
Cadmium Fumes			X		
Carbon Dioxide		X			
Carbon Monoxide	X	X	X		
Chromium			X	X	X
Cleaners	X			X	
Coal Tar				X	
Compressed Air	X			X	
Copper Fumes			X		
Diesel Fuel	X		X	X	
Epoxy Resins	X		X	X	X
Fiberglass			X	X	
Firebrick			X		
Formaldehyde			X	X	
Form Oil				X	
Freon (refrigerant)	X	X	X		
Gasoline	X		X	X	
Glass Fibers				X	
Gloss	X		X		
Heptane	X		X		
Hexane	X		X		
Hydrochloric Acid					X
Insulation				X	
Kerosene	X		X	X	
Lead Dust			X	X	
Lime					X
L.P. Gas	X	X			
Lubricants	X				
Lye				X	X
Magnesium	X	X	X		
Mastics/Adhesives	X		X	X	
Methanol	X		X		
Methyl Ethyl Ketone (MEK)	X		X	X	
Mineral Spirits				X	
Muriatic Acid					X
Nickel			X	X	
Nitrogen	X	X			
Paint	X		X	X	
Paint Stripper	X		X	X	
Pesticides	X		X		
Pipe Joint Compound	X		X	X	
Portland Cement				X	
Propane	X	X			
Sand/Silica			X	X	
Sealants	X		X	X	
Sulfuric Acid					X
Talc			X		
Turpentine	X		X		
Varnish	X			X	
Vinyl Chloride			X		
Waterproofing			X	X	
Water Treatments					X
Welding Rods			X		
Wood Dust				X	
Wood Preservatives			X		
Zinc			X		

WRITTEN HAZARD
COMMUNICATION

CHAPTER THREE

Your Written Hazard Communication Program

As part of HazCom, all construction employers are required to have a written hazard communication program for their companies. This written document will be the key to complying with HazCom and will provide the framework for managing your hazard communication program. You can think of your written program as your company's policy or operating procedure on hazardous substances.

Your written program will most likely be one of the first documents that the OSHA compliance officer will want to review during an inspection of your worksite. It must be complete, accurate, current and understandable. It also must contain specific information:

1. A list of the hazardous chemicals on your worksite. (The list may be developed for the workplace as a whole, or for individual work areas. A sample inventory sheet can be found after the sample program.)
2. A statement describing how you, as an employer, will meet your obligations under HazCom for labeling, MSDSs and employee training.
3. A description of how you, as an employer, will inform

employees of the hazards they might encounter when they perform non-routine tasks.

4. An explanation of how you, as an employer on a multi-employer worksite, will inform other employers about the hazardous chemicals you bring on site which are used around their employees. Your written program must state:

- how copies of MSDSs will be made available to other employers;
- how you will inform other employers of the precautionary measures that need to be taken to protect employees under normal working conditions and in emergencies; and
- how you will inform other employers of the labeling system you're using on the worksite.

The following few pages set out a sample written hazard communication program. It can be adopted for use by your company. Simply retype it and add the appropriate information, or tailor it to your individual company.

Sample Written Hazard Communication Program

Introduction

(Name of Company) is firmly committed to providing all of its employees with a safe and healthy work environment. It is a matter of company policy to provide our employees with information about hazardous chemicals on the worksite through our hazard communication program, which includes container labeling, Material Safety Data Sheets (MSDSs) and employee information/training.

(Name of person or position) will have the overall responsibility for coordinating the hazard communication program for _____
(Name of company) _____
(Name of person or position) will make our written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary of Labor for Occupational Safety and Health and the Director of the National Institute for Occupational Safety and Health.

List of Hazardous Chemicals

(Name of person or position) will compile a list of all hazardous chemicals that will be used on the worksite by reviewing container labels and Material Safety Data Sheets. The list will be updated as necessary. It will be kept _____
(location) _____ (See the attached list of hazardous chemicals.)

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Labeling

It is the policy of this company to ensure that each container of hazardous chemicals on a jobsite is properly labeled. The labels will list:

- the contents of the container
- appropriate hazard warnings; and
- the name and address of the manufacturer, importer or other responsible party

To further ensure that employees are aware of the chemical hazards of materials used in their work areas, it is our policy to label all secondary containers. Secondary containers will be labeled with either an extra copy of the manufacturer's label, or with a sign or generic label that lists the container's contents and appropriate hazard warnings.

This responsibility has been assigned to _____ (person)

Material Safety Data Sheets

Copies of Material Safety Data Sheets for all hazardous chemicals to which employees may be exposed are kept _____ (location) and are readily accessible to employees in the work area during each work shift. _____ (Name of position or person) is responsible for obtaining, maintaining and updating the file of Material Safety Data Sheets.

Employee Training

Employees are to attend a training session on hazardous chemicals in their work area at the time of their initial work assignment. The training session will cover the following:

- An overview of the hazard communication requirements.
- A review of the chemicals present in their workplace operations.
- The location and availability of our written hazard communication program, a list of hazardous chemicals and Material Safety Data Sheets.
- Methods and observation techniques that may be used to detect the presence or release of hazardous chemicals in the work area.
- The physical hazards of the chemicals in the work area.
- The health hazards of the chemicals in the work area, including signs and symptoms of exposure and any medical condition known to be aggravated by exposure to the chemical.
- How to lessen or prevent exposure to hazardous workplace chemicals by using good work practices, personal protective equipment, etc.
- Emergency procedures to follow if employees are exposed to hazardous chemicals.
- An explanation of our hazard communication program, including how to read labels and Material Safety Data Sheets to obtain appropriate hazard information.

When a new type of product is introduced into a work area or the chemical composition of a product changes, _____ (person or position) will review the above items as they are related to the new chemicals.

Non-Routine Tasks

Periodically employees are required to perform non-routine tasks. Prior to starting work on such projects, each affected employee will be informed by _____ (person or position) about hazards to which they may be exposed and appropriate protective and safety measures.

Informing Other Employers

To ensure that the employees of other contractors have access to information on the hazardous chemicals at a jobsite, it is the responsibility of _____ (person or position) to provide the other contractors the following information:

- where the MSDSs are available;
- the name and location of the hazardous chemicals to which their employees may be exposed and any appropriate protective measures required to minimize their exposure; and
- an explanation of the labeling system used at the jobsite.

Each contractor bringing chemicals onto a jobsite must provide us with the appropriate hazard information on those substances to which our own employees may be exposed to on a jobsite.

INVENTORY OF HAZARDOUS
CHEMICALS

[illegible]

[illegible]

[illegible]

MSDS

CHAPTER FIVE

How to Read and Understand an MSDS

Manufacturers, importers, distributors and suppliers are required to provide you with Material Safety Data Sheets (MSDSs) for each of their hazardous chemicals. As a contractor, you are required to maintain a file of MSDSs for the hazardous chemicals you use. According to OSHA, you will be able to determine a hazardous substance by referring to the MSDS and the label. The OSHA standard specifies the information required on each data sheet, and all information must be written in English.

An MSDS must precede or accompany the initial shipment but does not have to be physically attached to it. If you receive subsequent shipments of the same item, a new MSDS is not required to be sent to you unless the chemical make-up of the product changes.

Review the MSDSs you receive for accuracy and completeness, and make sure you have the latest version on file. When an MSDS includes new information on a substance you use or a new compound has been added to it, additional employee training will be required.

To ensure proper recordkeeping and maintenance of MSDSs, you should:

1. Make sure any employee who purchases supplies for your company is on the lookout for MSDSs.
2. Include a request for an MSDS and a label that meets the requirements of the Hazard Communication Standard on all purchase orders.
3. Ask for an MSDS for any material bearing a label indicating it is a hazard unless an MSDS is already on file. (See the sample letters in Chapter Ten.)
4. To deal with the multi-employer situation, you may request information from other contractors on the site about hazardous substances and chemicals known to be at the site.

While MSDSs will appear in many different formats, they will contain essentially the same information. The information on an MSDS is extremely technical in nature and should be used as a reference or as a backup to information contained on a label. An MSDS tracking OSHA Form 174 (see sample, page 16) would offer the following information:

Section I - Identification

1. Chemical name, as it appears on the label.
2. Manufacturer's name and address.
3. Emergency telephone number in the event of an emergency involving the substance.
4. Date prepared and the signature of the preparer.

Section II - Hazardous Ingredients/Identity Information

1. Hazardous Components: Contains the specific chemical identity, its formula, and any common names it is known by.
2. OSHA Permissible Exposure Limits (PEL): PEL is the permissible maximum amount of the chemical a person may be safely exposed to without harm.
3. American Conference of Governmental Industrial Hygienists Threshold Limit Value (TLV): TLV is the concentration of a chemical in the air that can be breathed for five consecutive eight-hour workdays by most persons without harmful effects. It is generally expressed in parts per million.
4. Other limits recommended: Any other recommended limitation on the use of the chemical by any agency, scientific group, or organization should be included.

Section III - Physical/Chemical Characteristics

1. Boiling Point: The temperature at which a liquid boils.
2. Vapor Pressure (mm Hg): Vapor pressure measures a liquid's tendency to evaporate. The higher the pressure, the faster it will evaporate.
3. Vapor Density: Indicates the weight of the vapor compared with the weight of an equal volume of air. If a vapor is heavier than air (vapor density greater than 1), it will sink to the ground. If it is lighter than air (vapor density less than 1), it will rise. For example, with flammable materials, when the vapor density is greater than 1, vapors tend to collect in the lowest spot. A contractor must be alert to vapors traveling to an ignition source, then flashing back to the vapor source. Care must also be taken to ensure that vapors do not displace oxygen.
4. Solubility in Water: Indicates whether the chemical can mix with water in any ratio without separating.
5. Appearance and Odor: A brief description of the chemical's color and smell.
6. Specific Gravity: Ratio of the weight of the material to the weight of an equal volume of water. The specific gravity determines whether the material floats or sinks in water. Specific gravity values less than or equal to 1 indicate that water should not be used to extinguish a fire involving the substance unless the water comes from automatic sprinklers.
7. Melting Point: Indicates the temperature at which a solid changes to a liquid.
8. Evaporation Rate (Butyl Acetate = 1): Indicates the temperature at which a substance evaporates.

As noted in the foreword to this manual, the participating associations are presently involved in a legal challenge to the Hazard Communication Standard. Pending the resolution of this litigation, the participating associations make no warranty that the information contained herein will necessarily be accepted by OSHA.

Section IV - Fire and Explosion Hazard Data

1. **Flash Point:** Indicates the lowest temperature at which a liquid gives off enough vapor to ignite in air when exposed to a flame. When the flash point is between 100 and 110 degrees Fahrenheit, extra care must be taken in hot environments. The liquid's temperature could be high enough to be ignitable if an ignition source is introduced. Such sources might be cigarette smoking, electrical equipment and wiring, cutting and welding, or static electricity. A red diamond is required on all liquids classified by OSHA as flammable (flash point values of 99.9 degrees F or below).
2. **Flammable Limits:** Indicates the range of vapor concentrations which will explode when an ignition source is present. The "Lower Explosive Limit" (LEL) is the minimum amount of vapor in the air that can be ignited. The "Upper Explosive Limit" (UEL) is the maximum amount of vapor in the air that will sustain fire.
3. **Extinguishing Media:** Materials suitable for putting out a fire involving the identified chemical. These fire fighting agents are water fog, foam, alcohol foam, carbon dioxide, and dry chemical.

The four classes of fires are:

- Class A — paper, wood, straw, cloth
- Class B — flammable and combustible liquids
- Class C — fire involving energized electrical equipment
- Class D — combustible metals

Testing laboratories classify fire extinguishers based on the class of fire they are designed to put out. For example:

- Class A fire can be fought with water;
- Class B fires with carbon dioxide, foam or dry chemical;
- Class C fires with carbon dioxide or dry chemicals;
- Class D fires with special extinguishing compounds.

4. **Special Fire Fighting Procedures:** Indicates the chemical's special characteristics when it comes in contact with fire, such as whether it is difficult to put out; whether it will re-ignite spontaneously; whether it is extinguished by water or other firefighting agents. This subsection will also indicate any required protective equipment needed when fighting the fire, as well as evaluate any toxicity of the material on anyone fighting the fire.
5. **Unusual Fire and Explosion Hazards:** Indicates any special types of hazards requiring attention. The description will indicate whether the chemical is difficult to extinguish, will re-ignite spontaneously, and how it reacts with water and other extinguishing agents. For example, if water is applied to a combustible liquid with a flash point above 212 degrees F, it may foam violently or boil over, endangering workers and fire fighters.

Section V - Reactivity Data

1. **Stability:** Indicates conditions that contribute to the stability or instability of a chemical when it is exposed to heat, pressure, or excessive shock during storage, use, misuse or transport. Look to this section to identify specific conditions to be avoided. These warnings, for example, may be "reacts violently with water" or "avoid sudden shock."
2. **Incompatibility (materials to avoid):** Indicates various materials or conditions you must keep the chemical away from to avoid adverse reactions. For example, a substance which ignites or explodes when it comes in contact with the chemical.
3. **Hazardous Decomposition or By-products:** Indicates gases or vapors which are released when the chemical is burned or decomposes. It tells you what hazardous substances your employees may be exposed to as a result of heating, working or burning the chemical.
4. **Hazardous polymerization:** Polymerization is a chemical reaction where molecules of the chemical combine with molecules of another material to form a larger, different material. This reaction is accompanied by the release of large amounts of energy which can produce fire or other hazards. Polymerization can occur when the chemical comes in contact with certain plastics, rubber or coatings. This section of the MSDS will indicate possible storage conditions which could result in polymerization. It will also indicate any inhibitors — chemicals which can be added to prevent or delay polymerization — and the expected time period in which an inhibitor is used up.

Section VI - Health Hazard Data

1. **Route(s) of Entry:** A chemical may enter the body either through inhalation, by contact with the skin or eyes, or by being swallowed.
2. **Health Hazards:** Indicates any long-term (chronic) or short-term (acute) effects of a chemical on the human body.
3. **Carcinogenicity:** Indicates whether the chemical causes cancer. It is important that your employees understand that not all hazardous substances cause cancer when an individual is exposed to them.
4. **Signs and Symptoms of Exposure:** Indicates and describes the effects of exposure to the chemical, such as an employee's appearance, and the most common resulting sensations, for example, headache, dizziness or nausea.
5. **Medical Conditions Severely Aggravated By Exposure:** Indicates how the chemical will affect any pre-existing medical conditions.
6. **Emergency and First Aid Procedures:** Indicates first-aid procedures to use in order to reduce the hazardous effects of the chemical. The techniques covered will deal only with inhalation of the chemical, and skin or eye contact with it. You must emphasize that these are emergency procedures only, and an exposed employee should be examined by a doctor as soon as possible.

Section VII - Precautions for Safe Handling and Use

1. Steps to be Taken in Case Material is Released or Spilled: Indicates precautions such as avoid breathing gases and vapors; avoid contact with liquids and solids; remove ignition sources; use of special equipment for clean ups. This section also gives recommended techniques to use in controlling land or water spills.
2. Waste Disposal Methods: Indicates proper disposal of the chemical and contaminated materials.
3. Precautions to Take in Handling and Storing: Indicates safe handling and storage procedures to be taken to avoid hazardous reactions. This section will emphasize incompatibility or polymerization problems which could occur during storage or handling of the chemical.
4. Other Precautions: Indicates special precautions to use in handling or disposing of the chemical.

Section VIII - Control Measures

The measures indicated in this section should be taken whenever the chemical is handled or disposed of during normal use. They are not measures to be used solely during emergencies or accidental spills.

1. Respiratory Protection: If needed, specifies type of respirators required by OSHA when the chemical is used, even as a precautionary measure in non-emergency situations.
2. Ventilation: Indicates ventilating systems needed to prevent overexposure to the chemical. "Local exhaust" ventilation is a system with high speed and low volume that will capture a chemical quickly after it has been released. The objective is to prevent the substance from reaching the employee's breathing zone. "Mechanical (general) ventilation" is the regular ventilation system used to heat and/or cool an enclosed area in a permanent facility.
3. Protective Gloves: Indicates whether or not gloves must be worn when the chemical is handled. If gloves are required for skin protection, the type of material they should be made of will be indicated.
4. Eye Protection: Indicates appropriate eye protection, such as face shields, safety goggles or glasses.
5. Other Protective Clothing or Equipment: Indicates protective equipment, such as aprons or boots, and the materials they should be made of to effectively prevent skin contact.

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

Occupational Safety and Health Administration
(Non-Mandatory Form)

OMB No. 1218-0072



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.

Manufacturer's Name

Emergency Telephone Number

Address (Number, Street, City, State, and ZIP Code)

Telephone Number for Information

Date Prepared

Signature of Preparer (optional)

[illegible]

Boiling Point		Specific Gravity ($H_2O = 1$)	
Vapor Pressure (mm Hg.)		Melting Point	
Vapor Density (AIR = 1)		Evaporation Rate (Butyl Acetate = 1)	
Solubility in Water			
Appearance and Odor			

Flash Point (Method Used)	Flammable Limits	LEL	UEL
Extinguishing Media			
Special Fire Fighting Procedures			
Unusual Fire and Explosion Hazards			

OSHA 174, Sept. 1985

BRB 0029

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility (Materials to Avoid)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion?

Health Hazards (Acute and Chronic)

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated?

Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and 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 (General)	Other

Protective Gloves Eye Protection

Other Protective Clothing or Equipment

Work/Hygienic Practices

CHAPTER SIX

Contractors' Obligation under EPA's Community Right-to-Know Regulations

Because HazCom has been extended to the construction industry, some contractors will also have to start complying with the Environmental Protection Agency's Community Right-to-Know reporting regulations. These are separate but related requirements. Contractors who must maintain Material Safety Data Sheets (MSDSs) under HazCom may also have to report certain information to state and local emergency planning commissions and their local fire departments.

Will All Contractors Have to Comply with This?

Not every contractor will have to comply with these reporting requirements. As of April 30, 1989, contractors who have a hazardous substance in excess of 10,000 lbs. (approximately 1,250 gallons) must report it to their state and local emergency planning commission and their fire department. A list of the state emergency response commissions can be found at the end of this chapter.

The reporting of hazardous substances must either be in the form of a list of the chemicals or the actual MSDSs. Then, on March 1, 1990, those contractors must submit the Tier One form (attached at the end of the chapter) to those

same three reporting agencies. Should the agencies want more information, they will request that you fill out the Tier Two form (also attached). On each succeeding March 1, you will be required to submit another Tier One form on substances present in the workplace in excess of 10,000 lbs.

Since these quantities are so large, these rules will probably not apply to many chemicals for a typical contractor. However, a large painting contractor may have large amounts of paint, a roofer may have large amounts of tar, or a land developer may have his own diesel fuel or gasoline supply which would have to be reported. You will have to survey your own company to see what you have large amounts of on hand.

If you do have any substances in excess of 10,000 lbs., make sure you do report them because non-compliance could bring about penalties of as much as \$25,000 per day.

EPA has established a Chemical Emergency Preparedness Program Hotline to answer questions regarding the reporting requirements in this chapter. (This is not an information line for OSHA's Hazard Communication Standard.) The number is 1-800-535-0202 (202-479-2449 in Washington, D.C.).

MATERIAL SAFETY DATA SHEET, Version Jan. 1992

Sigma Aldrich Corporation
1001 West Saint Paul Ave., Milwaukee, WI 53233, USA

	Sigma	Aldrich
For Emergency Contact USA/Canada	800-325-5832	800-231-8327
Outside USA/Canada	314-771-5765	414-273-3850

NO STRUCTURE

IDENTIFICATION

PRODUCT #: 11110 NAME: ASBESTOS FIBRES
CAS #: 1332-21-4

ADDITIONAL INFORMATION

MAK VALUE (CH)
0.05 MG/M3 (1987)
MAK VALUE (D)
0.02 MG/M3 (1988)

THIS COMPOUND IS LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN
BY:

NATIONAL TOXICOLOGY PROGRAM

TOXICITY HAZARDS

DATA NOT AVAILABLE

HEALTH HAZARD DATA

CHRONIC EFFECTS

OTHER HEALTH HAZARDS

HARMFUL BY INHALATION AND IN CONTACT WITH SKIN.
DANGER OF CUMULATIVE EFFECTS.
MAY CAUSE CANCER.

FIRST AID

TAKE OFF IMMEDIATELY ALL CONTAMINATED CLOTHING.
AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF SOAP
AND WATER.

IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF
WATER AND SEEK MEDICAL ADVICE.
IF NECESSARY

----- PHYSICAL DATA -----

SOLUBILITY: WATER-INSOLUBLE
APPEARANCE AND ODOR
FORM - FIBRES
COLOR - LIGHT GREY

----- FIRE AND EXPLOSION HAZARD DATA -----

UNUSUAL FIRE AND EXPLOSIONS HAZARDS
HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

ADDITIONAL INFORMATION
NONCOMBUSTIBLE.

----- REACTIVITY DATA -----

DATA NOT AVAILABLE

----- SPILL OR LEAK PROCEDURES -----

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
AVOID RAISING DUST.
PLACE IN APPROPRIATE CONTAINER.
WASH SPILL SITE WITH SOAP SOLUTION.
FLUSH SPILL AREA WITH COPIOUS AMOUNTS OF WATER.

WASTE DISPOSAL METHOD

BURY IN A LANDFILL SITE APPROVED FOR THE DISPOSAL OF CHEMICAL
AND HAZARDOUS WASTES.
THIS MATERIAL AND ITS CONTAINER MUST BE DISPOSED OF IN A SAFE WAY.
OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS.

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

WEAR DUST MASK.
IN CASE OF INSUFFICIENT VENTILATION, WEAR SUITABLE
RESPIRATORY EQUIPMENT.
WEAR SUITABLE GLOVES.
CHEMICAL SAFETY GOGGLES.
WEAR SUITABLE PROTECTIVE CLOTHING.
AVOID CONTACT WITH SKIN AND EYES.
DO NOT BREATHE DUST.
AVOID EXPOSURE- OBTAIN SPECIAL INSTRUCTIONS BEFORE USE.
CONTAINER SHOULD BE OPENED ONLY BY A TECHNICALLY QUALIFIED PERSON.
KEEP CONTAINER TIGHTLY CLOSED.
USE ONLY IN WELL VENTILATED AREAS.

REGULATORY INFORMATION

TRANSPORT

IMDG-CODE 9

2590

9

9

SWISS POISON LIST CLASSIFICATION:

1 *

----- ADDITIONAL PRECAUTIONS AND COMMENTS -----

ADDITIONAL INFORMATION

TRK : 500'000 FIBERS/M3
OCCUPATIONAL EXPOSURE TO THE DUST CAN RESULT IN MESOTHELIOMA
, SQUAMOUS CELL CARCINOMA AND ADENOCARCINOMA OF THE LUNG AFT

ER A LONG LATENT PERIOD.

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. SIGMA ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

2090

MATERIAL SAFETY DATA SHEET

OHS02110

OCCUPATIONAL HEALTH SERVICES, INC.
450 SEVENTH AVENUE, SUITE 2407
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 1332-21-4
RTEC-NUMBER CI6475000

SUBSTANCE: ASBESTOS

RECEIVED

TRADE NAMES/SYNONYMS:

ASBESTOS FIBER: ASBESTOS FIBRE: CHRYSOTILE: CROCIDOLITE:
ACTINOLITE: AMOSITE: ANTHOPHYLITE: TREMOLITE: CALIDREN HMBUS
CALIDRIA R C 244: CHLOROBESTOS 25: FAPM 410-120: FERODO C3C:
OHS02110

JUN 27 1989

CHEMICAL FAMILY:
FIBROUS SILICATES

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ASBESTOS FORMS MAY INCLUDE: PERCENT: 100

COMPONENT: AMOSITE CAS# 12172-73-5

COMPONENT: ACTINOLITE CAS# 77536-66-4

COMPONENT: ANTHOPHYLITE CAS# 77536-67-5

COMPONENT: CHRYSOTILE CAS# 12001-29-5

COMPONENT: CROCIDOLITE CAS# 12001-28-4

COMPONENT: TREMOLITE CAS# 77536-68-6

OTHER CONTAMINANTS: NONE

EXPOSURE LIMIT:

ASBESTOS:

0.2 FIBER (>5.0 MICRONS IN LENGTH)/CC OSHA TWA (ALL FORMS)

1.0 FIBER (>5.0 MICRONS IN LENGTH)/CC OSHA 30 MINUTE EXCURSION LIMIT
(ALL FORMS)

0.5 FIBER (>5.0 MICRONS IN LENGTH)/CC ACGIH TWA (AMOSITE);

ACGIH A1-CONFIRMED HUMAN CARCINOGEN.

2.0 FIBERS (>5.0 MICRONS IN LENGTH)/CC ACGIH TWA (CHRYSOTILE);

ACGIH A1-CONFIRMED HUMAN CARCINOGEN.

0.2 FIBER (>5.0 MICRONS IN LENGTH)/CC ACGIH TWA (CROCIDOLITE);

ACGIH A1-CONFIRMED HUMAN CARCINOGEN.

2.0 FIBERS (>5.0 MICRONS IN LENGTH)/CC ACGIH TWA (OTHER FORMS)

ACGIH A1-CONFIRMED HUMAN CARCINOGEN.

0.1 FIBER (>5.0 MICRONS IN LENGTH)/CC NIOSH RECOMMENDED

8 HOUR TWA (ALL FORMS);

0.5 FIBER (>5.0 MICRONS IN LENGTH)/CC NIOSH RECOMMENDED 15
MINUTE CEILING (ALL FORMS)

1 FOUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (FEBRUARY 27, 1987)

PHYSICAL DATA

DESCRIPTION: COLOR AND COMPOSITION VARY WITH TYPE OF ASBESTOS AND AREA MINED;
MAY BE WHITE, BROWN, OR BLUE FINE, SLENDER, FLAXY FIBERS.

BOILING POINT: 4046 F (2230 C) MELTING POINT: 3134 F (1723 C)

SPECIFIC GRAVITY: 2.5 SOLUBILITY IN WATER: INSOLUBLE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD

IGNITIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:

NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING
VAPORS OR DUSTS; KEEP UPWIND.

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:
ORM-C

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND 501-
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.1090
EXCEPTIONS: 49CFR173.1090

TOXICITY

ASBESTOS:

.2 FIBERS/CC/19 YEARS CONTINUOUS INHALATION-HUMAN TCLO; MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).

ACTINOLITE.

AMOSITE: MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).

ANTHOPHYLITE: MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).

CHRYSTOTILE: 2.8 FIBERS/CC/5 YEARS INHALATION-HUMAN TCLO; 300 MG/KG

INTRAPERITONEAL-RAT LDLO; MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).
CROCIDOLITE: 300 MG/KG INTRAPERITONEAL-RAT MUTAGENIC DATA (RTECS); TUMORIGENIC DATA (RTECS).

TREMOLITE: TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC CLASS-1).

OCCUPATIONAL EXPOSURE TO CHRYSTOTILE, AMOSITE, MIXTURES CONTAINING CROCIDOLITE, AND OTHER FORMS OF ASBESTOS HAS RESULTED IN A HIGH INCIDENCE OF LUNG CANCER, AND PLEURAL AND PERITONEAL MESOTHELIOMAS. GASTROINTESTINAL CANCERS WERE INCREASED IN WORKERS EXPOSED TO AMOSITE, CHRYSTOTILE, OR MIXED FIBERS CONTAINING CROCIDOLITE. AN EXCESS OF LARYNGEAL CANCER HAS ALSO BEEN REPORTED.

ASBESTOS IS AN EYE, SKIN, AND MUCOUS MEMBRANE IRRITANT. SMOKING ENHANCES THE RISK OF LUNG CANCER FROM EXPOSURE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ASBESTOS:

IRRITANT/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE ACUTE IRRITATION AND COUGHING.

CHRONIC EXPOSURE- PROLONGED INTENSE EXPOSURE MAY CAUSE ASBESTOSIS, AN INTERSTITIAL FIBROSIS OF LUNG TISSUE WHICH MAY DEVELOP FULLY WITHIN 7-9 YEARS, BUT ONSET IS TYPICALLY DELAYED 20-40 YEARS AFTER FIRST EXPOSURE. FATAL EXPOSURE MAY BE AS BRIEF AS 3 MONTHS DURING CHILDHOOD. THE INITIAL SYMPTOM IS A PROGRESSIVE EXERTIONAL DYSPNEA, FOLLOWED BY A DRY COUGH AND EXPECTORATION, CHEST PAIN, DECREASED VITAL CAPACITY, TACHYPNEA, PERSISTENT DRY RALES, CYANOSIS, CLUBBING OF THE FINGERS AND TOES, ANOREXIA, WEAKNESS, AND WEIGHT LOSS. RADIOLOGIC STUDIES MAY SHOW A DIFFUSE INCREASE IN LUNG DENSITY AND PLEURAL CALCIFICATION. SPONTANEOUS PLEURAL EFFUSION HAS OCCURRED IN ASBESTOS-EXPOSED WORKERS AS EARLY AS 3-4 YEARS AFTER INITIAL EXPOSURE. ASBESTOS WORKERS SHOW AN INCREASE IN PLEURAL AND PERITONEAL MESOTHELIOMAS, BRONCHOGENIC CARCINOMA, LUNG CANCER, CANCERS OF THE GASTROINTESTINAL TRACT INCLUDING THE ESOPHAGUS, STOMACH, COLON, AND RECTUM, AND CANCER OF THE LARYNX. MESOTHELIAL TUMORS ARE CHARACTERIZED BY BLOODY EFFUSION WITH PAIN, DYSPNEA, COUGH, WEIGHT LOSS, FATIGUE, HYPONATREMIA, AND DEATH. THE LATENT PERIOD FOR MESOTHELIOMA IS 3.5-30 YEARS; FOR LUNG CANCER, 15-30 YEARS. THE INCIDENCE OF LUNG CANCER AND PULMONARY FIBROSIS IN ASBESTOS-EXPOSED WORKERS IS INCREASED BY CIGARETTE SMOKING.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

ASBESTOS:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION. ASBESTOS FIBERS PENETRATE THE SKIN AND RESULT IN "ASBESTOS CORNS", DUE TO THICKENING OF THE SKIN AROUND THE IMPLANTED FIBER. THESE USUALLY OCCUR ON THE HANDS.

AND FOREARMS. THESE CORNS DO NOT LEAD TO SKIN TUMORS AND DISAPPEAR ON REMOVAL OF THE FIBERS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE DERMATITIS AND EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

ASBESTOS:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION WITH REDNESS DUE TO MECHANICAL ACTION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE. OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:

ASBESTOS:

ACUTE EXPOSURE- INGESTION MAY CAUSE GASTROINTESTINAL IRRITATION.
CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION OF ASBESTOS FIBERS MAY BE INVOLVED IN CANCERS OF THE BUCCAL CAVITY AND PHARYNX, ESOPHAGUS, STOMACH, COLON, AND RECTUM. INGESTION OF ASBESTOS-CONTAMINATED RICE HAS BEEN SUGGESTED AS THE CAUSE FOR A HIGH INCIDENCE OF STOMACH CANCER IN JAPAN.

FIRST AID- REMOVE BY GASTRIC LAVAGE OR EMESIS. MAINTAIN BLOOD PRESSURE AND AIRWAY. GIVE OXYGEN IF RESPIRATION IS DEPRESSED. DO NOT PERFORM GASTRIC LAVAGE OR EMESIS IF VICTIM IS UNCONSCIOUS. GET MEDICAL ATTENTION IMMEDIATELY. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) ADMINISTRATION OF GASTRIC LAVAGE OR OXYGEN SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:

ASBESTOS:

TRI-N-BROMOMELAMINE: EXPLOSIVE REACTION.
SODIUM HYDROXIDE: POSSIBLE EXPLOSION.
CARBON TETRACHLORIDE: FORMATION OF EXPLOSIVE DI- AND TRI-CHLORO BUTYLENE EPOXIDE.
CHLOROSULFONIC ACID: EXOTHERMIC REACTION.
NITRIC ACID: EXOTHERMIC REACTION.
OLEUM: EXOTHERMIC REACTION.
SULFURIC ACID: EXOTHERMIC REACTION.
OXIDIZING MATERIALS: VIGOROUS REACTION.
PHOSPHORUS TRICHLORIDE: PREPARATORY HAZARD (EXPLOSIVE) WHILE DISTILLING.
CARBON DIOXIDE STREAM.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE ACRID SMOKE AND IRRITATING FUMES.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

ASBESTOS WASTE, SCRAP, DEBRIS, BAGS, CONTAINERS, EQUIPMENT, AND ASBESTOS-CONTAMINATED CLOTHING, CONSIGNED FOR DISPOSAL, WHICH MAY PRODUCE IN ANY REASONABLY FORESEEABLE USE, HANDLING, STORAGE, PROCESSING, DISPOSAL, OR TRANSPORTATION AIRBORNE CONCENTRATIONS OF ASBESTOS FIBERS IN EXCESS OF THE EXPOSURE LIMITS PRESCRIBED SHALL BE COLLECTED AND DISPOSED OF IN SEALED IMPERMEABLE BAGS, OR OTHER CLOSED, IMPERMEABLE CONTAINERS.

CONDITIONS TO AVOID

ASBESTOS SHALL BE HANDLED, MIXED, APPLIED, REMOVED, CUT, SCORED, OR OTHERWISE WORKED IN A WET STATE SUFFICIENT TO PREVENT THE EMISSION OF AIRBORNE FIBERS IN EXCESS OF THE EXPOSURE LIMITS. 29CFR 1910.1001 (C) (2)

SPILLS AND LEAKS

WATER-SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:

ADEQUATELY WET OR MIX WITH WATER TO FORM A SLURRY. SEAL MATERIAL IN A LEAK-TIGHT CONTAINER WHILE WET. LABEL CONTAINERS AS SPECIFIED IN 29CFR 1910.1001.

REPORTABLE QUANTITY (RQ): 1 POUND

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2600. METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

ASBESTOS:

VENTILATION SHOULD MEET THE REQUIREMENTS IN 29CFR1910.1001(F).

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR1910. SUBPART Z.

REQUIRED RESPIRATORS FOR ASBESTOS

AIRBORNE CONCENTRATION (TWA):

NOT IN EXCESS OF 2 FIBERS/CC

NOT IN EXCESS OF 10 FIBERS/CC

NOT IN EXCESS OF 20 FIBERS/CC

NOT IN EXCESS OF 200 FIBER

GREATER THAN 200 FIBERS/CC
OR UNKNOWN CONCENTRATION.

REQUIRED RESPIRATOR:

HALF-MASK AIR-PURIFYING RESPIRATOR EQUIPPED WITH HIGH EFFICIENCY FILTERS.

FULL FACEPIECE AIR-PURIFYING RESPIRATOR EQUIPPED WITH HIGH EFFICIENCY FILTERS.

ANY POWERED AIR-PURIFYING RESPIRATOR EQUIPPED WITH HIGH-EFFICIENCY FILTERS. ANY SUPPLIED-AIR RESPIRATOR OPERATED IN CONTINUOUS FLOW MODE.

FULL FACEPIECE SUPPLIED-AIR RESPIRATOR OPERATED IN PRESSURE DEMAND MODE.

FULL FACEPIECE SUPPLIED-AIR RESPIRATOR OPERATED IN PRESSURE DEMAND MODE AND EQUIPPED WITH AN AUXILIARY POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS.

NOTE: RESPIRATORS ASSIGNED FOR HIGHER ENVIRONMENTAL CONCENTRATIONS MAY BE USED AT LOWER CONCENTRATIONS.

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS; OR DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

ASBESTOS:

ANY DETECTABLE CONCENTRATION:

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE AND

OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

ASBESTOS:

PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29CFR1910.1001(H).

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

ASBESTOS:

PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29CFR1910.1001(H) AND 29CFR1910.1101(D).

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE. CONTACT LENSES SHOULD NOT BE WORN.

ASBESTOS:

PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29CFR1910.1001(H).

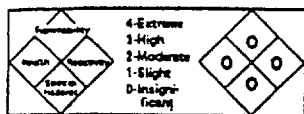
AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 02/08/85

REVISION DATE: 04/12/89

RECEIVED

MAY 4 1988



NFPA FIRE HAZARD SYMBOL
See NFPA 704 for detailed explanation.

MATERIAL SAFETY DATA SHEET

MSDS CENTRAL FILES

Manville

No.: 3141 Rev. No.: 2
Date Prepared: 04/07/87

I. PRODUCT IDENTIFICATION

Trade Name(s): TRANSITE-CORE-PLATE
Generic Name: ASBESTOS CEMENT BOARD
Chemical Name:

CAS #: NA
Formula: MIXTURE

Manufacturer: MANVILLE SPECIALTY PRODUCTS GROUP
Address: P.O. BOX 5108
City: DENVER

State: CO Zip: 80217

Telephone: (303)878-3120
Emergency:

II. PRODUCT INGREDIENTS

INGREDIENT NAME	CAS NUMBER	%	PEL and TLV (except as noted)
CHRYCOTILE ASBESTOS FIBER	1332-21-4	55	2 f/cc
PORTLAND CEMENT	65997-15-1	25	5 mg/m ³
SILICA FLOUR	7631-86-9	24	(RESPIRABLE DUST)

CUTTING, DRILLING, OR OTHERWISE ABRADING THIS PRODUCT WILL
RELEASE ASBESTOS FIBER - SEE HEALTH HAZARD INFORMATION
BELOW.

III. PHYSICAL DATA

Appearance and Odor: SOLID GRAY SHEET - NO. ODOR..

Boiling Point: NA
Vapor Pressure: NA
Water Solubility (%): NEGLIGIBLE
Vapor Density (Air=1): NA

Evaporation Rate (NA = 1): NA
Specific Gravity (water = 1): 1.6
Melting Point: NA
% Volatile by Volume: 0

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): NONFLAMMABLE
Flammable Limits: LEL: NA % UEL: NA %
Extinguishing Media: NA
Unusual Fire or Explosion Hazards: NONE

NFPA Flammable/Combustible Liquid Classification: NA
Auto-ignition Temperature: NA

Special Fire-Fighting Procedures: NONE

V. HEALTH HAZARDS A. Summary/Risks

Summary: EXCESSIVE EXPOSURE TO HIGH CONCENTRATIONS OF AIRBORNE ASBESTOS FIBERS CAN CAUSE CHRONIC
PULMONARY DISEASE.
THIS PRODUCT IS CONSIDERED A KNOWN HUMAN CARCINOGEN BY NTP, IARC AND OSHA.

Medical conditions which may be aggravated: PRE-EXISTING UPPER RESPIRATORY AND LUNG DISEASE SUCH AS BUT
NOT LIMITED TO BRONCHITIS, EMPHYSEMA, AND ASTHMA.

Target Organ(s): RESPIRATORY AND PULMONARY SYSTEM.

Acute Health Effects: THERE ARE NO ACUTE SIGNS OR SYMPTOMS ASSOCIATED WITH ASBESTOS.

Chronic Health Effects: THE DISEASE ASSOCIATED WITH OVEREXPOSURE ARE CHRONIC, GENERALLY TAKING FROM 10 TO
40 YEARS TO BECOME APPARENT.

Primary Entry Route(s): INHALATION.

TRANSITE CORE PLATE

MSDS: 3141

Rev: 2 /Page 2

V. HEALTH HAZARDS B. Signs/Symptoms of Overexposure

Inhalation: EXCESSIVE EXPOSURE TO HIGH CONCENTRATIONS OF AIRBORNE ASBESTOS FIBER CAN CAUSE CHRONIC PULMONARY DISEASE AND CANCER.

Skin Contact: FIBERS CAN BECOME IMBEDDED IN SKIN AND IN SOME CASES RESULT IN ASBESTOS "CORNS".

Skin Absorption: NONE

Ingestion: CURRENT STUDIES ESTABLISH NO RELATIONSHIP BETWEEN GI DISEASES AND THE INGESTION OF ASBESTOS FIBERS AS CURRENTLY FOUND IN ENVIRONMENT AND OCCUPATIONAL SETTINGS.

Eyes: AS WITH ANY DUST, EXCESSIVE EXPOSURES CAN CAUSE TRANSIENT EXPOSURE.

V. HEALTH HAZARDS C. First Aid/Emergency Procedures

Inhalation: REMOVE TO FRESH AIR.

Skin Contact: WASH OR SHOWER THOROUGHLY USING SOAP AND WARM WATER.

Skin Absorption: NA

Ingestion: NA

Eyes: FLUSH WITH COPIOUS QUANTITIES OF WATER.

VI. REACTIVITY DATA

MATERIAL IS STABLE.

HAZARDOUS POLYMERIZATION CANNOT OCCUR.

Chemical Incompatibilities: NONE KNOWN

Conditions to Avoid: NONE IN DESIGNED USE.

Hazardous Decomposition Products: NONE

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak: VACUUM CLEAN SPILLAGE AND DUST CREATED DURING FABRICATION. IF SWEEPING IS NECESSARY WET DOWN SPILLAGE. USE RESPIRATORY PROTECTION AS REQUIRED.

Waste Management: DUST OR SCRAP CREATED DURING FABRICATION OR DEMOLITION MUST BE DISPOSED ACCORDING TO NESHAP (40 CFR 61, SUBPART M). STATE AND LOCAL REGULATIONS MAY ALSO APPLY.

VIII. SPECIAL PROTECTION INFORMATION

Goggles: RECOMMENDED WHEN USING POWER CUTTING TOOLS.

Gloves: NOT NORMALLY REQUIRED.

Respirator: USE APPROVED RESPIRATOR, SUCH AS 3M MODEL 9900 OR EQUIVALENT FOR PROTECTION AGAINST PNEUMOCONIOSIS PRODUCING DUST.

Ventilation: CONTROL WITH MECHANICAL DUST COLLECTION EQUIPMENT TO WITHIN TLV. (SEE AMERICAN NATIONAL STANDARDS INSTITUTE BOOKLET, 29.2, 1971).

Other: USE SPECIAL CLOTHING AS REQUIRED BY OSHA STANDARD FOR EXPOSURE TO ASBESTOS DUST 29 CFR 1910.1001(d).

Special Considerations for repair/maintenance of contaminated equipment: USE ALL PROPER PROTECTIVE EQUIPMENT WHEN POSSIBILITY OF EXPOSURE TO ASBESTOS DUSTS EXISTS.

IX. SPECIAL PRECAUTIONS

Storage Segregation Hazard Classes: CARCINOGEN.

*** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS ***

Special Handling/Storage: STORE FLAT.

Other: SMOKING GREATLY INCREASES THE CHANCE FOR ASBESTOS-RELATED LUNG DISEASE. IF YOU WORK WITH ASBESTOS DO NOT SMOKE.

Prepared/Revised by: KENNETH A. ROBERTS

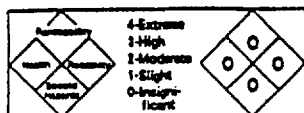
Title: MANAGER, PRODUCT SAFETY

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such

BRB 0043

53735

MAY 4 1988



NFPA FIRE HAZARD SYMBOL
See NFPA 704 for detailed explanation.

MATERIAL SAFETY DATA SHEET

MSDS CENTRAL FILES

Manville

No.: 1108

Rev. No.: 2

Date Revised: 04/07/86

I. PRODUCT IDENTIFICATION

Trade Name(s): TRANSITE
Generic Name: CALCIUM SILICATE BOARD
Chemical Name: MIXTURE

CAS #: NONE ASSIGNED
Formula: MIXTURE

Manufacturer: MANVILLE BUILDING MATERIALS CORP.
Address: P.O. BOX 5108
City: DENVER

State: CO

Zip: 80217

Telephone: (303)978-3120
Emergency:

II. PRODUCT INGREDIENTS

INGREDIENT NAME	CAS NUMBER	%	PEL and TLV (except as noted)
CALCIUM SILICATE	1344-95-2	65-75	REF: 1910.1000
CALCIUM SILICATE REINFORCING FILLER	10101-39-0	15-25	TABLE Z3
MANMADE ORGANIC FIBER	9002-88-4	4-6	10 mg/M ³
NATURAL ORGANIC FIBER	65986-61-4	4-6	----- = PEL
THIS PRODUCT TYPICALLY CONTAINS UP TO 3.0% QUARTZ. THE PEL IS CALCULATED ON THIS BASIS.			%SD: + 2 RESPIRABLE QUARTZ (OSHA) BASED ON 3.0% RESPIRABLE QUARTZ THE PEL = 2.0 mg/M ³

III. PHYSICAL DATA

Appearance and Odor: GRAY SHEET - NO ODOR.

Boiling Point: NA
Vapor Pressure: NA
Water Solubility (%): NIL
Vapor Density (Air=1): NA

Evaporation Rate (= 1): NA
Specific Gravity (water = 1): 1.5
Melting Point: NA
% Volatile by Volume: 0

IV. FIRE AND EXPLOSION DATA

Flash Point (Method): NONFLAMMABLE
Flammable Limits: LEL: NA % UEL: NA %
Extinguishing Media: NA
Unusual Fire or Explosion Hazards: NONE

NFPA Flammable/Combustible Liquid Classification: NA
Auto-ignition Temperature: NA

Special Fire-Fighting Procedures: NONE

V. HEALTH HAZARDS A. Summary/Risks

Summary: DUST CREATED DURING FABRICATION TYPICALLY CONTAINS <3.0% RESPIRABLE QUARTZ. STUDIES USING TYPICAL WORK PRACTICES DEMONSTRATE NO RESPIRABLE QUARTZ LEVEL ABOVE 2.0 mg/M³.

THIS PRODUCT IS NOT CONSIDERED A CARCINOGEN BY NTP, IARC AND OSHA.

Medical conditions which may be aggravated: PRE-EXISTING UPPER RESPIRATORY AND LUNG DISEASE SUCH AS, BUT NOT LIMITED TO BRONCHITIS, EMPHYSEMA AND ASTHMA.
Target Organ(s): EYES AND RESPIRATORY SYSTEM.
Acute Health Effects: NO KNOWN ACUTE HEALTH HAZARDS.

Chronic Health Effects: FAILURE TO FOLLOW SAFE HANDLING PRACTICES WHEN FABRICATING, INSTALLING OR DISMANTLING THIS PRODUCT CAN GENERATE FREE CRYSTALLINE SILICA DUST ABOVE THE PEL. LONG TERM, UNPROTECTED EXPOSURES TO LEVELS ABOVE THE PEL MAY CAUSE LUNG DISEASE (SILICOSIS).

Primary Entry Route(s): INHALATION.

TRANSITE II

MSDS: 1108

Rev. 2 /Page 2

V. HEALTH HAZARDS B. Signs/Symptoms of Overexposure**Inhalation:** CONGESTION & IRRITATION OF THE THROAT, NASAL PASSAGES & UPPER RESPIRATORY SYSTEM.**Skin Contact:** NONE**Skin Absorption:** NONE**Ingestion:** NONE**Eyes:** TEMPORARY IRRITATION OR INFLAMMATION.**V. HEALTH HAZARDS C. First Aid/Emergency Procedures****Inhalation:** REMOVE TO FRESH AIR.**Skin Contact:** NA**Skin Absorption:** NA**Ingestion:** NA**Eyes:** FLUSH WITH COPIOUS QUANTITIES OF WATER.**VI. REACTIVITY DATA****MATERIAL IS STABLE.****HAZARDOUS POLYMERIZATION CANNOT OCCUR.****Chemical Incompatibilities:** STRONG ACIDS.**Conditions to Avoid:** NONE IN DESIGNED USE.**Hazardous Decomposition Products:** NONE**VII. SPILL OR LEAK PROCEDURES****Procedures for Spill/Leak:** VACUUM DUST CREATED DURING FABRICATION. IF SWEEPING IS NECESSARY USE A DUST SUPPRESSANT.**Waste Management:** WASTES GENERATED DURING FABRICATION, DEMOLITION OR BREAKAGE ARE NOT HAZARDOUS WASTES AS DEFINED BY RCRA (40 CFR PART 261). COMPLY WITH FEDERAL, STATE & LOCAL REGULATIONS. METHOD OF DISPOSAL - LANDFILL. RQ - NA.**VIII. SPECIAL PROTECTION INFORMATION****Goggles:** GOGGLES OR FACE SHIELD SHOULD BE USED DURING CUTTING, MILLING OR ABRADING.**Gloves:** NOT NORMALLY REQUIRED.**Respirator:** USE A RESPIRATOR SUCH AS 3M 8900 OR EQUIVALENT FOR PROTECTION AGAINST PNEUMOCONIOSIS PRODUCING DUST.**Ventilation:** USE SUFFICIENT NATURAL OR MECHANICAL VENTILATION TO MAINTAIN DUST CONCENTRATIONS BELOW PEL (TLV).**Other:** MAINTAIN GOOD HOUSEKEEPING PRACTICES TO INSURE MINIMUM DUST LEVELS.**Special Considerations for repair/maintenance of contaminated equipment:** USE RESPIRATORY PROTECTION IF IT IS NECESSARY TO CUT OR ABRASE MATERIAL.**IX. SPECIAL PRECAUTIONS****Storage Segregation Hazard Classes:** NA***** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS *******Special Handling/Storage:****Special Workplace Engineering Controls:** POWER CUTTING EQUIPMENT SHOULD BE EQUIPPED FOR DUST COLLECTION.**Other:****Prepared/Revised by:** KENNETH A. ROBERTS**Title:** MGR., ENVIRONMENTAL SERVICES

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable federal and state law(s). However, no warranty or representation with respect to such information is intended or given.

MSDS FORM REV. 02/03/86

BRB 0045

TIER ONE
TIER TWO

Page ____ of ____ pages
Form Approved OMB No. 2050-0072

Tier One

EMERGENCY AND HAZARDOUS
CHEMICAL INVENTORY
Aggregate Information by Hazard TypeFOR
OFFICIAL
USE
ONLY

E#

Date Received

Important: Read instructions before completing form

Reporting Period From January 1 to December 31, 19__

Facility Identification	
Name	_____
Street Address	_____
City	_____ State _____ Zip _____
SIC Code	____-____
Dun & Brad Number	____-____
Owner/Operator	
Name	_____
Mail Address	_____
Phone	() _____

Emergency Contacts	
Name	_____
Title	_____
Phone	() _____
24 Hour Phone	() _____
Name	_____
Title	_____
Phone	() _____
24 Hour Phone	() _____

Hazard Type	Max Amount*	Average Daily Amount*	Number of Days On-Site	General Location
Physical Hazards	Fire	____	____	_____
	Sudden Release of Pressure	____	____	_____
	Reactivity	____	____	_____

☐ Check if site plan is attached

Health Hazards	Immediate (acute)	____	____	_____
	Delayed (chronic)	____	____	_____

Certification (Read and sign after completing all sections)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate and complete.

Name and official title of owner/operator OR owner/operator's authorized representative

Signature

Date signed

Reporting Ranges	Range Value	Weight Range in Pounds From... To...
00	0	99
01	100	999
02	1000	9,999
03	10,000	99,999
04	100,000	999,999
05	1,000,000	9,999,999
06	10,000,000	49,999,999
07	50,000,000	99,999,999
08	100,000,000	499,999,999
09	500,000,000	999,999,999
10	1 billion	higher than 1 billion

TIER ONE INSTRUCTIONS

GENERAL INFORMATION

Submission of this form is required by Title III of the Superfund Amendments and Reauthorization Act of 1986, Section 312, Public Law 99-499.

The purpose of this form is to provide State and local officials and the public with information on the general types and locations of hazardous chemicals present at your facility during the past year.

YOU MUST PROVIDE ALL INFORMATION REQUESTED ON THIS FORM.

You may substitute the Tier Two form for this Tier One form. (The Tier Two form provides detailed information and must be submitted in response to a specific request from State or local officials.)

WHO MUST SUBMIT THIS FORM

Section 312 of Title III requires that the owner or operator of a facility submit this form if, under regulations implementing the Occupational Safety and Health Act of 1970, the owner or operator is required to prepare or have available Material Safety Data Sheets (MSDS) for hazardous chemicals present at the facility. MSDS requirements are specified in the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, found in Title 29 of the Code of Federal Regulations at §1910.1200.

WHAT CHEMICALS ARE INCLUDED

You must report the information required on this form for every hazardous chemical for which you are required to prepare or have available an MSDS under the Hazard Communication Standard. However, OSHA regulations and Title III exempt some chemicals from reporting.

Section 1910.1200(b) of the OSHA regulations currently provides the following exemptions:

- (i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended (42 U.S.C. 6901 et seq.) when subject to regulations issued under that Act;
- (ii) Tobacco or tobacco products;
- (iii) Wood or wood products;
- (iv) "Articles"—defined under §1910.1200 (b) as a manufactured item:
 - Which is formed to a specific shape or design during manufacture;
 - Which has end use function(s) dependent in whole or in part upon the shape or design during end use; and
 - Which does not release, or otherwise result in exposure to a hazardous chemical under normal conditions of use.
- (v) Food, drugs, cosmetics or alcoholic beverages in a retail establishment which are packaged for sale to consumers;
- (vi) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace;

(vii) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 1251 et seq.) respectively, where the employer can demonstrate it is used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers; and

(viii) 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 (i.e., tablets or pills).

In addition, Section 311(e) of Title III excludes the following substances:

- (i) Any food, food additive, color additive, drug, or cosmetic regulated by the Food and Drug Administration;
- (ii) Any substance present as a solid in any manufactured item to the extent exposure to the substance does not occur under normal conditions of use;
- (iii) Any substance to the extent it is used for personal, family, or household purposes, or is present in the same form and concentration as a product packaged for distribution and use by the general public;
- (iv) Any substance to the extent it is used in a research laboratory or a hospital or other medical facility under the direct supervision of a technically qualified individual;
- (v) Any substance to the extent it is used in routine agricultural operations or as a fertilizer held for sale by a retailer to the ultimate customer.

Also, minimum reporting thresholds have been established under Title III, Section 312. You need to report only those hazardous chemicals that were present at your facility at any time during the preceding calendar year at or above the levels listed below:

- January to December 1987 (or first year of reporting) ...10,000 lbs.
- January to December 1988 (or second year of reporting) ...10,000 lbs.
- January to December 1989 (or third year of reporting) ...zero lbs.*
- * EPA will publish the final threshold, effective in the third year, after additional analysis.
- For extremely hazardous substances...500 lbs. or the threshold planning quantity, whichever is less, from the first year of reporting and thereafter.

WHEN TO SUBMIT THIS FORM

Beginning March 1, 1988, owners or operators must submit the Tier One form (or substitute the Tier Two form) on or before March 1 of every year.

INSTRUCTIONS

Please read these instructions carefully. Print or type all responses.

• WHERE TO SUBMIT THIS FORM

Send one completed inventory form to each of the following organizations:

1. Your State emergency planning commission
2. Your local emergency planning committee
3. The fire department with jurisdiction over your facility.

PENALTIES

Any owner or operator of a facility who fails to submit or supplies false Tier One information shall be liable to the United States for a civil penalty of up to \$25,000 for each such violation. Each day a violation continues shall constitute a separate violation. In addition, any citizen may commence a civil action on his or her own behalf against any owner or operator who fails to submit Tier One information.

You may use the Tier Two form as a worksheet for completing Tier One. Filling in the Tier Two chemical information section should help you assemble your Tier One responses.

If your responses require more than one page, fill in the page number at the top of the form.

REPORTING PERIOD

Enter the appropriate calendar year, beginning January 1 and ending December 31.

FACILITY IDENTIFICATION

Enter the complete name of your facility (and company identifier where appropriate).

Enter the full street address or state road. If a street address is not available, enter other appropriate identifiers that describe the physical location of your facility (e.g., longitude and latitude). Include city, state, and zip code.

Enter the primary Standard Industrial Classification (SIC) code and the Dun & Bradstreet number for your facility. The financial officer of your facility should be able to provide the Dun & Bradstreet number. If your firm does not have this information, contact the state or regional office of Dun & Bradstreet to obtain your facility number or have one assigned.

OWNER/OPERATOR

Enter the owner's or operator's full name, mailing address, and phone number.

EMERGENCY CONTACT

Enter the name, title, and work phone number of at least one local person or office that can act as a referral if emergency responders need assistance in responding to a chemical accident at the facility.

Provide an emergency phone number where such emergency information will be available 24 hours a day, every day.

PHYSICAL AND HEALTH HAZARDS

Descriptions, Amounts, and Locations

This section requires aggregate information on chemicals by hazard categories as defined in 40 CFR 370.3. The two health hazard categories and three physical hazard categories are a consolidation of the 23 hazard categories defined in the OSHA Hazard Communication Standard, 29 CFR 1910.1200. For each hazard type, indicate the total amounts and general locations of all applicable chemicals present at your facility during the past year.

• What units should I use?

Calculate all amounts as weight in pounds. To convert gas or liquid volume to weight in pounds, multiply by an appropriate density factor.

• What about mixtures?

If a chemical is part of a mixture, you have the option of reporting either the weight of the entire mixture or only the portion of the mixture that is a particular hazardous chemical (e.g., if a hazardous solution weighs 100 lbs. but is composed of only 5% of a particular hazardous chemical, you can indicate either 100 lbs. of the mixture or 5 lbs. of the chemical).

Select the option consistent with your Section 311 reporting of the chemical on the MSDS or list of MSDS chemicals.

• Where do I count a chemical that is a fire reactivity physical hazard and an immediate (acute) health hazard?

Add the chemical's weight to your totals for all three hazard categories and include its location in all three categories. Many chemicals fall into more than one hazard category, which results in double-counting.

MAXIMUM AMOUNT

The amounts of chemicals you have on hand may vary throughout the year. The peak weights -- greatest single-day weights during the year -- are added together in this column to determine the maximum weight for each hazard type. Since the peaks for different chemicals often occur on different days, this maximum amount will seem artificially high.

To complete this and the following sections, you may choose to use the Tier Two form as a worksheet.

To determine the Maximum Amount:

1. List all of your hazardous chemicals individually
2. For each chemical...
 - a. Indicate all physical and health hazards that the chemical presents. Include all chemicals, even if they are present for only a short period of time during the year.

- b. Estimate the maximum weight in pounds that was present at your facility on any single day of the reporting period.
3. For each hazard type -- beginning with Fire and repeating for all physical and health hazard types...
 - a. Add the maximum weights of all chemicals you indicated as the particular hazard type.
 - b. Look at the Reporting Ranges at the bottom of the Tier One form. Find the appropriate range value code.
 - c. Enter this range value as the Maximum Amount.

EXAMPLE:

You are using the Tier Two form as a worksheet and have listed raw weights in pounds for each of your hazardous chemicals. You have marked an X in the Immediate (acute) hazard column for phenol and sulfuric acid. The maximum amount raw weight you listed were 10,000 lbs. and 50 lbs. respectively. You add these together to reach a total of 10,050 lbs. Then you look at the Reporting Range at the bottom of your Tier One form and find that the value of 03 corresponds to 10,050 lbs. Enter 03 as your Maximum Amount for Immediate (acute) hazards materials.

You also marked an X in the Fire hazard box for phenol. When you calculate your Maximum Amount totals for fire hazards, add the 10,000 lb. weight again.

AVERAGE DAILY AMOUNT

This column should represent the average daily amount of chemicals of each hazard type that were present at your facility at any point during the year.

To determine this amount:

1. List all of your hazardous chemicals individually (same as for Maximum Amount).
2. For each chemical...
 - a. Indicate all physical and health hazards that the chemical presents (same as for Maximum Amount).
 - b. Estimate the average weight in pounds that was present at your facility throughout the year. To do this, total all daily weights and divide by the number of days the chemical was present on the site.
3. For each hazard type -- beginning with Fire and repeating for all physical and health hazards...
 - a. Add the average weights of all chemicals you indicated for the particular hazard type.
 - b. Look at the Reporting Ranges at the bottom of the Tier One form. Find the appropriate range value code.
 - c. Enter this range value as the Average Daily Amount.

EXAMPLE:

You are using the Tier Two form, and have marked an X in the Immediate (acute) hazard column for nicotine and phenol. Nicotine is present at your facility 100 days during the year, and the sum of the daily weights is 100,000 lbs. By dividing 100,000 lbs. by 100 days on-site, you calculate an Average Daily Amount of 1,000 lbs. for nicotine. Phenol is present at your facility 50 days during the year, and the sum of the daily weights is 10,000 lbs. By dividing 10,000 lbs. by 50 days on-site, you calculate an Average Daily Amount of 200 lbs. for phenol. You then add the two average daily amounts together to reach a total of 1,200 lbs. Then you look at the Reporting Range on your Tier One form and find that the value 02 corresponds to 1,200 lbs. Enter 02 as your Average Daily Amount for Immediate (acute) Hazard.

You also marked an X in the Fire hazard column for phenol. When you calculate your Average Daily Amount for fire hazards, use the 200 lb. weight again.

NUMBER OF DAYS ON-SITE

Enter the greatest number of days that a single chemical within that hazard category was present on-site.

EXAMPLE:

At your facility, nicotine is present for 100 days and phosgene is present for 150 days. Enter 150 in the space provided.

GENERAL LOCATION

Enter the general location within your facility where each hazard may be found. General locations should include the names or identifications of buildings, tank fields, lots, sheds, or other such areas.

For each hazard type, list the locations of all applicable chemicals. As an alternative you may also attach a site plan and list the site coordinates related to the appropriate locations. If you do so, check the Site Plan box.

EXAMPLE:

On your worksheet you have marked an X in the Fire hazard column for acetone and butane. You noted that these are kept in steel drums in Room C of the Main Building, and in pressurized cylinders in Storage Shed 13, respectively. You could enter Main Building and Storage Shed 13 as the General Locations of your fire hazards. However, you choose to attach a site plan and list coordinates. Check the Site Plan box at the top of the column and enter site coordinates for the Main Building and Storage Shed 13 under General Locations.

If you need more space to list locations, attach an additional Tier One form and continue your list on the proper line. Number all pages.

CERTIFICATION

This must be completed by the owner or operator or the officially designated representative of the owner or operator. Enter your full name and official title. Sign your name and enter the current date.

§ 370.41 Tier II emergency and hazardous chemical inventory form.

(a) The form set out in paragraph (b) of this Section must be completed and submitted as required in § 370.25(c). In lieu of the form set out in paragraph (b) of this section, the facility owner or operator may submit a State or local form that contains identical content.

(b) Tier II Emergency and Hazardous Chemical Inventory Form.

BILLING CODE 6560-50-M

BRB 0052

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TIER TWO INSTRUCTIONS

GENERAL INFORMATION

Submission of this Tier Two form (when requested) is required by Title III of the Superfund Amendments and Reauthorization Act of 1986, Section 312, Public Law 99-499. The purpose of this Tier Two form is to provide State and local officials and the public with specific information on hazardous chemicals present at your facility during the past year.

YOU MUST PROVIDE ALL INFORMATION REQUESTED ON THIS FORM TO FULFILL TIER TWO REPORTING REQUIREMENTS.

This form may also be used as a worksheet for completing the Tier One form or may be submitted in place of the Tier One form.

WHO MUST SUBMIT THIS FORM

Section 312 of Title III requires that the owner or operator of a facility submit this Tier Two form if so requested by a State emergency planning commission, a local emergency planning committee, or a fire department with jurisdiction over the facility.

This request may apply to the owner or operator of any facility that is required, under regulations implementing the Occupational Safety and Health Act of 1970, to prepare or have available a Material Safety Data Sheet (MSDS) for a hazardous chemical present at the facility. MSDS requirements are specified in the Occupational Safety and Health Administration (OSHA) Hazard Communications Standard, found in Title 29 of the Code of Federal Regulations at §1910.1200.

WHAT CHEMICALS ARE INCLUDED

You must report the information required on this form for each hazardous chemical for which Tier Two information is requested. However, OSHA regulations and Title III exempt some chemicals from reporting.

Section 1910.1200(b) of the OSHA regulations currently provides the following exemptions:

- (I) Any hazardous waste as such term is defined by the Solid Waste Disposal Act as amended (42 U.S.C. 6901 et seq.) when subject to regulations issued under that Act;
- (II) Tobacco or tobacco products;
- (III) Wood or wood products;
- (IV) "Articles" - defined under §1910.1200(b) as a manufactured item:
 - Which is formed to a specific shape or design during manufacture;
 - Which has end use function(s) dependent in whole or in part upon the shape or design during end use; and
 - Which does not release, or otherwise result in exposure to a hazardous chemical under normal conditions of use.
- (V) Food, drugs, cosmetics or alcoholic beverages in a retail establishment which are packaged for sale to consumers;
- (VI) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace.

(VII) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 1251 et seq.) respectively, where the employer can demonstrate it is used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers

(VIII) 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 (i.e., tablets or pills).

In addition, Section 311(e) of Title III excludes the following substances:

- (I) Any food, food additive, color additive, drug, or cosmetic regulated by the Food and Drug Administration;
- (II) Any substance present as a solid in any manufactured item to the extent exposure to the substance does not occur under normal conditions of use;
- (III) Any substance to the extent it is used for personal, family, or household purposes, or is present in the same form and concentration as a product packaged for distribution and use by the general public;
- (IV) Any substance to the extent it is used in a research laboratory or a hospital or other medical facility under the direct supervision of a technically qualified individual;
- (V) Any substance to the extent it is used in routine agricultural operations or is a fertilizer held for sale by a retailer to the ultimate customer.

Also, minimum reporting thresholds have been established for Tier One under Title III, Section 312. You need to report only those hazardous chemicals that were present at your facility at any time during the preceding calendar year at or above the levels listed below:

- January to December 1987
(or first year of reporting) ...10,000 lbs.
- January to December 1988
(or second year of reporting) ...10,000 lbs.
- January to December 1989
(or third year of reporting) ...zero lbs.*
- * EPA will publish the final threshold, effective in the third year, after additional analysis.
- For extremely hazardous substances...500 lbs. or the threshold planning quantity, whichever is less, from the first year of reporting and thereafter.

A requesting official may limit the responses required under Tier Two by specifying particular chemicals or groups of chemicals. Such requests apply to hazardous chemicals regardless of established thresholds.

INSTRUCTIONS

Please read these instructions carefully. Print or type all responses.

WHEN TO SUBMIT THIS FORM

Owners or operators must submit the Tier Two form to the requesting agency within 30 days of receipt of a written request from an authorized official.

WHERE TO SUBMIT THIS FORM

Send the completed Tier Two form to the requesting agency.

PENALTIES

Any owner or operator who violates any Tier Two reporting requirements shall be liable to the United States for a civil penalty of up to \$25,000 for each such violation. Each day a violation continues shall constitute a separate violation.

You may use the Tier Two form as a worksheet for completing the Tier One form. Filling in the Tier Two Chemical Information section should help you assemble your Tier One responses.

If your responses require more than one page, fill in the page number at the top of the form.

REPORTING PERIOD

Enter the appropriate calendar year, beginning January 1 and ending December 31.

FACILITY IDENTIFICATION

Enter the full name of your facility (and company identifier where appropriate).

Enter the full street address or state road. If a street address is not available, enter other appropriate identifiers that describe the physical location of your facility (e.g., longitude and latitude). Include city, state, and zip code.

Enter the primary Standard Industrial Classification (SIC) code and the Dun & Bradstreet number for your facility. The financial officer of your facility should be able to provide the Dun & Bradstreet number. If your firm does not have this information, contact the state or regional office of Dun & Bradstreet to obtain your facility number or have one assigned.

OWNER/OPERATOR

Enter the owner's or operator's full name, mailing address, and phone number.

EMERGENCY CONTACT

Enter the name, title, and work phone number of at least one local person or office who can act as a referral if emergency responders need assistance in responding to a chemical accident at the facility.

Provide an emergency phone number where such emergency chemical information will be available 24 hours a day, every day.

CHEMICAL INFORMATION: Description, Hazards, Amounts, and Locations

The main section of the Tier Two form requires specific information on amounts and locations of hazardous chemicals, as defined in the OSHA Hazard Communication Standard.

• What units should I use?

Calculate all amounts as weight in pounds. To convert gas or liquid volume to weight in pounds, multiply by an appropriate density factor.

• What about mixtures?

If a chemical is part of a mixture, you have the option of reporting either the weight of the entire mixture or only the portion of the mixture that is a particular hazardous chemical (e.g., if a hazardous solution weighs 100 lbs. but is composed of only 5% of a particular hazardous chemical, you can indicate either 100 lbs. of the mixture or 5 lbs. of the chemical).

Select the option consistent with your Section 311 reporting of the chemical on the MSDS or list of MSDS chemicals.

CHEMICAL DESCRIPTION

1. Enter the Chemical Abstract Service number (CAS#).

For mixtures, enter the CAS number of the mixture as a whole if it has been assigned a number distinct from its components. For a mixture that has no CAS number, leave this item blank or report the CAS numbers of as many constituent chemicals as possible.

If you are withholding the name of a chemical in accordance with criteria specified in Title II, Section 322, enter the generic chemical class (e.g., list toluene diisocyanate as organic isocyanate) and check the box marked Trade Secret. Trade secret information should be submitted to EPA and must include a substantiation. Please refer to Section 322 of Title III for detailed information on how to comply with trade secret requests.

2. Enter the chemical name or common name of each hazardous chemical.

3. Circle ALL applicable descriptors: pure or mixture, and solid, liquid, or gas.

EXAMPLE:

You have pure chlorine gas on hand, as well as two mixtures that contain liquid chlorine. You write "chlorine" and enter the CAS#. Then you circle "pure" and "mix" -- as well as "liq" and "gas".

PHYSICAL AND HEALTH HAZARDS

For each chemical you have listed, check all the physical and health hazard boxes that apply. These hazard categories are defined in 40 CFR 370.3. The two health hazard categories and three physical hazard categories are a consolidation of the 23 hazard categories defined in the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

MAXIMUM AMOUNT

1. For each hazardous chemical, estimate the greatest amount present at your facility on any single day during the reporting period.
2. Find the appropriate range value code in Table I.
3. Enter this range value as the Maximum Amount.

Table I REPORTING RANGES

Range Value	Weight Range in Pounds From...	To...
00	0	99
01	100	999
02	1,000	9,999
03	10,000	99,999
04	100,000	999,999
05	1,000,000	9,999,999
06	10,000,000	49,999,999
07	50,000,000	99,999,999
08	100,000,000	499,999,999
09	500,000,000	999,999,999
10	1 billion	higher than 1 billion

If you are using this form as a worksheet for completing Tier One, enter the actual weight in pounds in the shaded space below the response blocks. Do this for both Maximum Amount and Average Daily Amount.

EXAMPLE:

You received one large shipment of a solvent mixture last year. The shipment filled your 5,000-gallon storage tank. You know that the solvent contains 10% benzene, which is a hazardous chemical.

You figure that 10% of 5,000 gallons is 500 gallons. You also know that the density of benzene is 7.29 pounds per gallon, so you multiply 500 by 7.29 to get a weight of 3,645 pounds.

Then you look at Table I and find that the range value 02 corresponds to 3,645. You enter 02 as the Maximum Amount.

(If you are using the form as a worksheet for completing a Tier One form, you should write 3,645 in the shaded area.)

AVERAGE DAILY AMOUNT

1. For each hazardous chemical, estimate the average weight in pounds that was present at your facility during the year.

To do this, total all daily weights and divide by the number of days the chemical was present on the site.

2. Find the appropriate range value in Table I.
3. Enter this range value as the Average Daily Amount.

EXAMPLE:

The 5,000-gallon shipment of solvent you received last year was gradually used up and completely gone in 315 days. The sum of the daily volume levels in the tank is 929,250 gallons. By dividing 929,250 gallons by 315 days on-site, you calculate an average daily amount of 2,950 gallons.

You already know that the solvent contains 10% benzene, which is a hazardous chemical. Since 10% of 2,950 is 295, you figure that you had an average of 295 gallons of benzene. You also know that the density of benzene is 7.29 pounds per gallon, so you multiply 295 by 7.29 to get a weight of 2,150 pounds.

Then you look at Table I and find that the range value 02 corresponds to 2,150. You enter 02 as the Average Daily Amount.

(If you are using the form as a worksheet for completing a Tier One form, you should write 2,150 in the shaded area.)

NUMBER OF DAYS ON-SITE

Enter the number of days that the hazardous chemical was found on-site.

EXAMPLE:

The solvent composed of 10% benzene was present for 315 days at your facility. Enter 315 in the space provided.

STORAGE CODES AND STORAGE LOCATIONS

List all non-confidential chemical locations in this column, along with storage types/conditions associated with each location.

Storage Codes: Indicate the types and conditions of storage present.

- a. Look at Table II. For each location, find the appropriate storage type(s). Enter the corresponding code(s) in front of the parentheses.
- b. Look at Table III. For each storage type, find the temperature and pressure conditions. Enter the applicable pressure code in the first space within the parentheses. Enter the applicable temperature code in the last space within the parentheses.

Table II - STORAGE TYPES

CODES	Types of Storage
A	Above ground tank
B	Below ground tank
C	Tank inside building
D	Steel drum
E	Plastic or non-metallic drum
F	Can
G	Carboy
H	Silo
I	Fiber drum
J	Bag
K	Box
L	Cylinder
M	Glass bottles or jugs
N	Plastic bottles or jugs
O	Tote bin
P	Tank wagon
Q	Rail car
R	Other

Optional attachments: If you choose to attach one of the following, check the appropriate Attachments box at the bottom of the Tier Two form.

- A site plan with site coordinates indicated for buildings, lots, areas, etc. throughout your facility.
- A list of site coordinate abbreviations that correspond to buildings, lots, areas, etc. throughout your facility.

EXAMPLE:

You have benzene in the main room of the main building, and in tank 2 in tank field 10. You attach a site plan with coordinates as follows: main building = G-2, tank field 10 = B-8. Fill in the Storage Location as follows:

B-8 [Tank 2] G-2 [Main Room]

Table III - TEMPERATURE AND PRESSURE CONDITIONS

CODES	Storage Conditions
	(PRESSURE)
1	Ambient pressure
2	Greater than ambient pressure
3	Less than ambient pressure
	(TEMPERATURE)
4	Ambient temperature
5	Greater than ambient temperature
6	Less than ambient temperature but not cryogenic
7	Cryogenic conditions

EXAMPLE:

The benzene in the main building is kept in a tank inside the building, at ambient pressure and less than ambient temperature.

Table II shows you that the code for a tank inside a building is C. Table III shows you that code for ambient pressure is 1, and the code for less than ambient temperature is 6.

You enter: C(1,6)

Under Title III, Section 324, you may elect to withhold location information on a specific chemical from disclosure to the public. If you choose to do so:

- Enter the word "confidential" in the Non-Confidential Location section of the Tier Two form.
- On a separate Tier Two Confidential Location Information Sheet, enter the name and CAS# of each chemical for which you are keeping the location confidential.
- Enter the appropriate location and storage information, as described above for non-confidential locations.
- Attach the Tier Two Confidential Location Information Sheet to the Tier Two form. This separates confidential locations from other information that will be disclosed to the public.

CERTIFICATION.

This must be completed by the owner or operator or the officially designated representative of the owner or operator. Enter your full name and official title. Sign your name and enter the current date.

Storage Locations:

Provide a brief description of the precise location of the chemical, so that emergency responders can locate the area easily. You may find it advantageous to provide the optional site plan or site coordinates as explained below.

For each chemical, indicate at a minimum the building or lot. Additionally, where practical, the room or area may be indicated. You may respond in narrative form with appropriate site coordinates or abbreviations.

If the chemical is present in more than one building, lot, or area location, continue your responses down the page as needed. If the chemical exists everywhere at the plant site simultaneously, you may report that the chemical is ubiquitous at the site.

STATE EMERGENCY RESPONSE COMMISSIONS

Alabama

Alabama Emergency Response
Commission
Department of Environmental
Management
1751 Federal Drive
Montgomery, Alabama 36109
(205) 271-7700

Alaska

Alaska Emergency Response
Commission
P.O. Box 0
Juneau, Alaska 99811
(907) 465-2600

American Samoa

Territorial Emergency Manage-
ment Coordination Office
American Samoan Government
Pago Pago, American Samoa
96799
International # (684) 633-2331

Arizona

Arizona Emergency Response
Commission
Division of Emergency Services
5636 East McDowell Road
Phoenix, Arizona 85008
(602) 244-0504

Arkansas

Arkansas Hazardous Materials
Emergency Response
Commission
P.O. Box 9583
8001 National Drive
Little Rock, Arkansas 72219
(501) 562-7444

California

California Emergency
Response Commission
Office of Emergency Services
2800 Meadowview Road
Sacramento, California 95832
(916) 427-4201

Colorado

Colorado Emergency Planning
and Community Right-to-
Know Commission
Division of Disaster Emer-
gency Services
Camp George West
Golden, Colorado 80401
(303) 273-1624

Commonwealth of Northern Mariana Islands

Office of the Governor CNMI
Saipan, CNMI 96950
International # (670) 322-9529

Connecticut

Connecticut Emergency
Response Commission
Department of Environment
Protection
State Capitol Building
Room 161
165 Capitol Avenue
Hartford, Connecticut 06106
(203) 566-4017

Delaware

Delaware Commission on
Hazardous Materials
Department of Public Safety
Administration Center
Dover, Delaware 19901
(302) 834-4531 or 736-4321

District of Columbia

Office of Emergency
Preparedness
2000 14th Street, NW 8th Floor
Washington, D.C. 20009
(202) 727-6161

Florida

Florida Emergency Response
Commission
Florida Department of
Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399
(904) 487-4915

Georgia

Georgia Emergency Response
Commission
Georgia Department of Natural
Resources
205 Butler Street, SE
Floyd Towers East
Atlanta, Georgia 30334
(404) 656-4713

Guam

Civil Defense
Emergency Services Office
Government of Guam
P.O. Box 2877
Aguana, Guam 96910
FTS 550-7230

Hawaii

Hawaii Emergency Response
Commission
Hawaii Department of Health
Environmental Epidemiology
Program
P.O. Box 3378
Honolulu, Hawaii 96801
(808) 548-2076 or 548-5832

Idaho

Idaho Emergency Response
Commission
Department of Health &
Welfare
State House
Boise, Idaho 83720
(208) 334-5898

Illinois

Illinois Emergency Response
Commission
Illinois Emergency Services &
Disaster Agency
Attn: Hazmat Section
110 E. Adams Street
Springfield, Illinois 62706
(217) 782-4694

Indiana

Indiana Department of
Environmental Management
Emergency Response Branch
5500 West Bradbury Street
Indianapolis, Indiana 46241
(317) 243-5176

Iowa

Iowa Emergency Response
Commission
301 East 7th Street
Des Moines, Iowa 50319
(515) 281-6175

Kansas

State Emergency Response
Commission
Kansas Department of Health
and Environment
Forbes Field, Building 728
Topeka, Kansas 66620
(913) 296-1690

Kentucky

Kentucky Emergency
Response Commission
Kentucky Disaster and
Emergency Services
Boone National Guard Center
Frankfort, Kentucky 40601
(502) 564-8682

Louisiana

Louisiana Emergency
Response Commission
Department of Public Safety &
Correction
Office of Public Safety
P.O. Box 66614
Baton Rouge, Louisiana
70896
(504) 925-6117

Maine

Bureau of Labor Standards
Attn: SARA
State Office Building
Station 82
Augusta, Maine 04333
(207) 289-4291

Maryland

Governor's Management
Advisory Council
Maryland Emergency
Management & Civil Defense
2 Sudbrook Lane East
East Pikesville, Maryland
21208
(301) 486-4422

Massachusetts

Title Three Emergency
Response Commission
Department of Environmental
Quality Engineering
One Winter Street
Boston, Massachusetts 02108
SERC (617) 292-5851
LEPC Info (617) 875-1381

Michigan

Michigan Department of
Natural Resources
Environmental Response
Division
Title III Notification
P.O. Box 30028
Lansing, Michigan 48909
(517) 373-9893

Minnesota	New Hampshire	Ohio	South Carolina
Minnesota Emergency Response Commission Division of Emergency Services State Capitol Room B-5 St. Paul, Minnesota 55155 (612) 296-2233	State Emergency Management Agency State Office Park South 107 Pleasant Street Concord, New Hampshire 03301 (603) 271-2231	Ohio Emergency Response Commission Ohio Environmental Protection Agency Office of Emergency Response P.O. Box 1049 Columbus, Ohio 43266-0149 (614) 481-4300	South Carolina Emergency Response Commission Division of Public Safety Programs Office of the Governor 1205 Pendleton Street Columbia, South Carolina 29201 (803) 734-0425
Mississippi	New Jersey	Oklahoma	South Dakota
Mississippi Emergency Response Commission Mississippi Emergency Management Agency P.O. Box 4501 Fondren Station Jackson, Mississippi 39216-0501 (601) 352-9100	New Jersey Emergency Response Commission SARA Title III Project Department of Environmental Quality CN-402 Trenton, New Jersey 08625 (609) 292-6714	Oklahoma Emergency Response Commission Office of Civil Defense P.O. Box 53365 Oklahoma City, Oklahoma 73152 (405) 521-2481	South Dakota Emergency Response Commission Department of Water & Natural Resources Joe Foss Building 523 East Capitol Pierre, South Dakota 57501-3181 (605) 773-3151
Missouri	New Mexico	Oregon	Tennessee
Missouri Emergency Response Commission Missouri Department of Natural Resources P.O. Box 3133 Jefferson City, Missouri 65102 (314) 751-7929	New Mexico Emergency Response Commission New Mexico Department of Public Safety P.O. Box 1628 Santa Fe, New Mexico 87504-1628 (505) 827-9226	Oregon Emergency Response Commission c/o State Fire Marshall 3000 Market Street Plaza Suite 534 Salem, Oregon 97310 (503) 378-2885	Tennessee Emergency Response Commission Tennessee Emergency Management Agency 3041 Sidco Drive Nashville, Tennessee 37204 (615) 252-3300 (800) 258-3300
Montana	New York	Pennsylvania	Texas
Montana Emergency Response Commission Environmental Sciences Division Department of Health & Environmental Sciences Cogswell Building A-107 Helena, Montana 59620 (406) 444-3948	New York Emergency Response Commission New York State Department of Environmental Conservation Bureau of Spill Prevention & Response 50 Wolf Road, Room 326 Albany, New York 12233-3510 (518) 457-4107	Pennsylvania Emergency Response Commission SARA Title III Officer PEMA Response & Recovery P.O. Box 3321 Harrisburg, Pennsylvania 17105 (717) 783-8150 Puerto Rico Puerto Rico Emergency Response Commission Environmental Quality Board P.O. Box 11488 Sanjurjo, Puerto Rico (809) 722-1175 or 722-2173	Texas Emergency Response Commission Division of Emergency Management 5805 Lamar Austin, Texas 76752 (512) 465-2138
Nebraska	North Carolina	Rhode Island	Utah
Nebraska Emergency Response Commission Nebraska Department of Environmental Control Technical Services Section P.O. Box 94877 State House Station Lincoln, Nebraska 68509 (402) 471-4230	North Carolina Emergency Response Commission Division of Emergency Management North Carolina Department of Crime Control and Public Safety 116 West Jones Street Raleigh, North Carolina 27611 (919) 733-2126	Rhode Island Emergency Response Commission Rhode Island Emergency Management Agency State House M. 27 Providence, Rhode Island 02903 (401) 421-7333	Utah Hazardous Chemical Emergency Response Commission Department of Health 288 North 1460 West P.O. Box 16690 Salt Lake City, Utah 84116-0690 (801) 538-6101
Nevada	North Dakota		Vermont
Nevada Division of Emergency Management 2525 South Carson Street Carson City, Nevada 89710 (702) 885-4240 or 885-5300	North Dakota State Department of Health 1200 Missouri Avenue P.O. Box 5520 Bismarck, North Dakota 58502-5520 (701) 224-2370		Department of Labor and Industry 120 State Street Montpelier, Vermont 05002 (802) 828-2286

Virgin Islands

U.S. Virgin Islands Emergency
Response Commission
Title III
179 Altona
St. Thomas, VI 00802
(809) 774-3320 Ext. 169 or 170

Virginia

Virginia Emergency Response
Council
Department of Waste
Management
James Monroe Building
11th Floor
101 North 14th Street
Richmond, Virginia 23219
(804) 225-2999

Washington

Washington Emergency
Response Commission
Division of Emergency
Management
4220 East Martin Way,
Mailstop PT-11
Olympia, Washington 98504
(206) 753-5255

West Virginia

West Virginia Emergency
Response Commission
Department of Natural
Resources
Capitol Building, Room 669
1800 Washington Street, East
Charleston, West Virginia
25305
(304) 348-2754

Wisconsin

Division of Emergency
Governor
4802 Sheboygan Avenue
Room 99A
P.O. Box 7865
Madison, Wisconsin 53707
(608) 266-3232

Wyoming

Wyoming Emergency
Management Agency
Comprehensive Emergency
Management
5500 Bishop Boulevard
P.O. Box 1709
Cheyenne, Wyoming 82003
(307) 777-7566

EPA REGIONAL OFFICES

Region -- State

4 -- Alabama	5 -- Indiana	8 -- North Dakota
10 -- Alaska	7 -- Iowa	5 -- Ohio
9 -- American Samoa	7 -- Kansas	6 -- Oklahoma
9 -- Arizona	4 -- Kentucky	10 -- Oregon
6 -- Arkansas	6 -- Louisiana	3 -- Pennsylvania
9 -- California	1 -- Maine	2 -- Puerto Rico
9 -- Colorado	3 -- Maryland	1 -- Rhode Island
9 -- Commonwealth of Northern Mariana Islands	1 -- Massachusetts	4 -- South Carolina
1 -- Connecticut	5 -- Michigan	8 -- South Dakota
3 -- Delaware	5 -- Minnesota	4 -- Tennessee
3 -- District of Columbia	4 -- Mississippi	6 -- Texas
4 -- Florida	7 -- Missouri	8 -- Utah
4 -- Georgia	8 -- Montana	1 -- Vermont
9 -- Guam	7 -- Nebraska	2 -- Virgin Islands
9 -- Hawaii	9 -- Nevada	3 -- Virginia
10 -- Idaho	1 -- New Hampshire	10 -- Washington
5 -- Illinois	2 -- New Jersey	3 -- West Virginia
	6 -- New Mexico	5 -- Wisconsin
	2 -- New York	
	4 -- North Carolina	

Contact the Preparedness Coordinator at the Regional Office

Region 1

EPA - Region 1
New England Regional
Laboratory
60 Westview Street
Lexington, MA 02173
(617) 860-4300 Ext. 221

Region 2

EPA - Region 2
Woodbridge Avenue
Edison, NJ 08837
(201) 321-6656

Region 3

EPA - Region 3
841 Chestnut Street
Philadelphia, PA 19107
(215) 597-0807

Region 4

EPA - Region 4
345 Courtland Street, NE
Atlanta, GA 30365
(404) 257-3931

Region 5

EPA - Region 5
230 South Dearborn Street
Chicago, IL 60604
(312) 886-1964

Region 6

EPA - Region 6
Allied Bank Tower
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 655-2270

Region 7

EPA - Region 7
726 Minnesota Avenue
Kansas City, Kansas 66101
(913) 236-2806

Region 8

EPA - Region 8
One Denver Place
999 18th Street
Suite 1300
Denver, CO 80202-2413
(303) 293-1723

Region 9

EPA - Region 9
215 Fremont Street
San Francisco, CA 94105
(415) 974-7460

Region 10

EPA - Region 10
1200 6th Avenue
Seattle, WA 98101
(206) 442-1263

HAZARD COMMUNICATION
COMPLIANCE CHECKLIST

CHAPTER SEVEN

Hazard Communication Compliance Checklist

HazCom is a "performance-oriented rule." OSHA has set certain objectives you must reach, but it is not dictating the methods you use to achieve those objectives. This checklist will help you prepare for the kind of questions OSHA might ask you in determining whether your company has complied. A lot of work will go into earning the right to say "yes" to each question, but this checklist gives you a way to keep track of your company's progress in reaching full compliance.

Planning and Administration of Your Company's Program:

- ☐ 1. Have we reviewed the requirements of the HazCom rule?
- ☐ 2. Has an employee been designated to be responsible for coordinating our written hazard communication program?
- ☐ 3. Have we prepared a written hazard communication program? (It is recommended this program be placed in a loose-leaf binder for ease in updating. See Chapter Three.)
- ☐ 4. Do we have a system for responding to medical requests for chemical information during a medical emergency?
- ☐ 5. Have we developed our emergency procedures and incorporated them into our Standard Operating Procedures?
- ☐ 6. Do we have a policy for exchanging hazard information with other contractors?
- ☐ 7. Do we have a system for documenting that we have informed other contractors about the hazards we have on the jobsite and how they are classified? (Assign this responsibility to the project manager.)
- ☐ 8. Have we reviewed all existing company policies and operating procedures for their compliance with the HazCom Standard and amended them where necessary?

Identification of Hazardous Substances:

- ☐ 1. Do we have an inventory list of all chemicals used in the workplace?
- ☐ 2. Is a list of all hazardous chemicals available at the jobsite?
- ☐ 3. Do we have a procedure for checking that we have received an MSDS from the manufacturer for

incoming chemicals and that we have received any updates? (MSDSs need not be sent with every shipment after the initial MSDS is received, but a new MSDS should be sent whenever a chemical is changed or the MSDS is revised.)

- ☐ 4. Do we review incoming container labels to see if they have the chemical's name and appropriate hazard warnings? (The label should be an immediate warning and should summarize the most important information found in the MSDS.)
- ☐ 5. Have we developed labels, placards or batch tickets to be used when any product is removed from its original container or when it is mixed by us?

Employee Training Programs:

- ☐ 1. Have we developed a system for communicating the information in MSDSs to all company employees?
- ☐ 2. Do we have procedures for employee training to provide information on chemical hazards at both initial assignment and whenever new information becomes available?
- ☐ 3. Are our employees familiar with the different types of chemicals and the hazards associated with them?
- ☐ 4. Do our employees understand how to detect the presence or release of hazardous chemicals in the workplace?
- ☐ 5. Are our employees trained in proper work practices and personal protective equipment in relation to the hazardous chemicals in their work area?
- ☐ 6. Does our training program provide information on appropriate first aid, emergency procedures and the likely symptoms of overexposure?
- ☐ 7. Does our training program include an explanation of labels and warnings that are used in each work area?
- ☐ 8. Does the training describe where to obtain MSDSs and how employees may use them?
- ☐ 9. Do we have a recordkeeping system to show that employees have been informed of hazards?
- ☐ 10. Do employees not routinely exposed to chemicals know where to find the MSDS forms and how to use them?

As noted in the foreword to this manual, the participating associations are presently involved in a legal challenge to the Hazard Communication Standard. Pending the resolution of this litigation, the participating associations make no warranty that the information contained herein will necessarily be accepted by OSHA.

CHAPTER EIGHT

"What If ..." **Simple Answers to Anticipated Problems**

As you have made your way through this manual, you have no doubt had a number of questions about how HazCom is actually going to work on construction sites. You also are probably wondering what you are going to do when you hit a snag in the system. The following question and answer discussion hopefully will provide some answers to your questions.

Q. What if a labeled product arrives without the Material Safety Data Sheet?

A. Since the product is labeled as hazardous, you should make a good-faith effort to obtain the MSDS. Do the following:

1. Type the sample letter requesting the MSDS or the label (See the chapter entitled "Sample Forms and Letters") and send it to the manufacturer/supplier as soon as possible.
2. Keep a copy of your letter in your files and document when you sent it.
3. Send a follow-up letter in thirty days if you have still not received the requested information.
4. Record the receipt of the MSDS when it arrives and file it.
5. Continue to keep records of each request you have made and the response received.

Q. What if I live in a small town and deal with only a few retail outlets or suppliers, and I have trouble getting MSDSs or labels from them? I don't want to alienate them by harassing them for the information.

A. If you have trouble getting the information from the local suppliers, write them a letter requesting the information in a friendly or business-like tone stating you are trying to fulfill the requirements of the OSHA Hazard Communication Standard. Keep copies of this correspondence. If it appears likely that this will not do any good, write directly to the manufacturer of the product and document this as well. OSHA also urges employers to contact their local OSHA office for assistance if they have problems obtaining MSDSs from suppliers or manufacturers.

Q. Is there a complete list of hazardous chemicals used in construction?

A. There are hundreds of thousands of chemicals which qualify as hazardous under HazCom. Obviously, not all of them are used in construction, but many are. There is no

definitive list of chemicals used in construction and you should be wary of purchasing one from a company which says they have one. Every construction firm will have to evaluate its own products, which is the intention of HazCom. No two companies or jobsites will be alike, even in the same specialty trade.

Q. Who is responsible for the accuracy of the MSDSs?

A. It is the responsibility of the manufacturer to provide accurate information on the MSDSs. No one expects you to be a chemist.

Q. What if I receive the MSDS to a product separate from the shipment and the MSDS doesn't identify the product by its common name? How do I know which product it belongs with?

A. Until manufacturers understand their own obligations under HazCom, this situation is likely to occur. All MSDSs should identify the common identity of the product. If you receive one which doesn't, regardless of whether it came with the product, contact the manufacturer for the information. You need the information for training and your employees need it for reference and emergencies.

Q. What if I receive an MSDS with one or more blank spaces? Do I assume that those sections don't apply?

A. If a section of an MSDS doesn't apply, then the box should read "not applicable" or "N/A." If nothing is filled in, you should contact the manufacturer requesting the information. (See the chapter entitled "Sample Forms and Letters.")

Q. How do I know if the chemical make-up of a product changes?

A. It is the responsibility of the manufacturer to provide you with a new MSDS when the chemical make-up of a product changes. It is then your responsibility to inform your employees about the changes.

Q. Do labels and MSDSs have to be translated into foreign languages if the majority of workers do not read or understand English?

A. While labels and MSDSs must be in English, you are not required to have them translated. You must still make an effort to train these employees. Contact your local OSHA office for assistance.

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Q. On the other hand, what do I do if I use some specialized products that are only available from foreign suppliers? Do I have to translate MSDSs and labels myself?

A. If you rely on foreign supplies, it is the responsibility of the importer of the product to translate labels and MSDSs. As with requests for missing labels and MSDSs, make sure you put requests for translations in writing and keep them on file.

Q. Do workers have to be trained whenever a different brand of a product is used?

A. No. Retraining must take place when new hazards are introduced, not when one brand is substituted for another.

Q. Who is responsible for training employees on construction sites?

A. Each contractor is responsible only for his or her own employees. However, you must train your employees about the hazards other contractors working in the same area may be exposing your employees to and what protective and emergency measures they have to take. You must get this information from the other contractor(s) and the same information will be requested from you.

Q. Who will coordinate this exchange of information between contractors?

A. It is up to the individual contractors to get the information from other contractors on site. However, the simplest method will be to find out who the other contractors will be before work begins and contact them. Keep careful documentation of this effort.

Q. What if another contractor has never heard of HazCom?

A. This will probably be a major problem in the early years of compliance. As in the last answer, the best thing to do is to contact the other contractor. (See the chapter entitled "Sample Forms and Letters.") This will be part of your good faith effort to comply.

Q. Can't I just hire a consultant to bring my company into compliance?

A. HazCom is going to be an ongoing process as long as you are in business. You can hire someone to do it for you, but only if you are confident of their knowledge of the requirements. Unfortunately, a number of unreputable "safety consultants" will be popping up all over the country hoping to cash in on contractors' confusion over the standard. There are a number of reputable outfits providing good services, but you will need to be able to tell the good from the bad.

Q. Do I have to keep records of my employee training?

A. While it is not a requirement of HazCom, it is strongly recommended that you keep a record of all employees trained and have them sign off on it. (See the chapter entitled "Sample Forms and Letters.") Otherwise, you will have no proof of an employee's training. It could be vital in liability cases.

Q. What are the penalties for non-compliance?

A. Violations of HazCom and other OSHA standards are punishable by civil and criminal penalties which could go as high as several thousand dollars. In addition, failure to implement a hazard communication program could result in a liability suit directed at your company and increased insurance rates.

Q. What if I'm a small contractor? Do I really need to worry about compliance?

A. There is no exemption from compliance for small contractors. The penalties for non-compliance can be just as severe, the liability risk just as great and the insurance rates just as high for small contractors who fail to comply.

Q. What if I'm doing repair work on a project that has long since been completed. How do I know what hazards already exist on the project?

A. Under HazCom, on repair work you are required only to provide the best known information about the hazards of the items already installed. You do not need labels and MSDSs on those products if they are not available, but you should make sure your employees are informed.

CHAPTER NINE

Federal HazCom Assistance and State Enforcement

Because of the complexity of HazCom, OSHA has appointed "Hazard Communication Coordinators" in its ten regional offices around the country (see following list of offices). These coordinators are there to assist you with any questions or problems you may have with establishing a hazard communication program within your company, as well as assisting you with tracking down MSDSs, labels and other information necessary to comply.

Some contractors need to also be aware that federal OSHA does not enforce the standard in all states and territories. In some cases, state OSHAs will be enforcing the standard's requirements. These state OSHAs are known by a variety of acronyms such as MOSHA, WISHA, VOSHA, etc., and these agencies have just as much authority, and sometimes more authority, than federal OSHA in handing out citations, fines, and sometimes jail sentences for safety violations.

However, only those states which have an "OSHA-approved" state plan can enforce the standard. Those states are: Alaska, Arizona, California (after July 1, 1989), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming (see following list of state OSHA offices). In some instances, these states may have additional requirements that exceed the requirements of the federal standard. You may want to contact your local state agency for assistance.

All other state and local HazCom or "Right-to-Know" regulations are preempted by the federal standard, and federal OSHA will conduct HazCom inspections in all other states. Don't be confused by "state vs. federal" HazCom enforcement. All contractors will be expected to comply with essentially the same standard.

U.S. Department of Labor

Regional OSHA Offices with Hazard Communication Coordinators

REGION I (CT, MA, ME, NH, RI, VT)

133 Portland Street
Boston, MA 02114
(617) 565-7164

REGION II (NJ, NY, PR, VI)

201 Varick Street, Room 670
New York, NY 10014
(212) 337-2348

REGION III (DC, DE, MD, PA, VA, WV)

Gateway Building, Suite 2100
3535 Market Street
Philadelphia, PA 19104
(215) 596-1201

REGION IV (AL, FL, GA, KY, MS, NC, SC, TN)

1375 Peachtree Street, N.E., Suite 587
Atlanta, GA 30367
(404) 347-3573

REGION V (IL, IN, MI, OH, WI)

32nd Floor, Room 3244
230 South Dearborn Street
Chicago, IL 60604
(312) 353-2220

REGION VI (AR, LA, NM, OK, TX)

525 Griffin Square, Room 602
Dallas, TX 75202
(214) 767-4731

REGION VII (IA, KS, MO, NE)

911 Walnut Street, Room 406
Kansas City, MO 64106
(816) 426-5861

REGION VIII (CO, MT, ND, SD, UT, WY)

Federal Building, Room 1576
1961 Stout Street
Denver, CO 80294
(303) 844-3061

REGION IX (AZ, CA, HI, NV)

71 Stevenson Street, Room 415
San Francisco, CA 94105
(415) 995-5672

REGION X (AK, ID, OR, WA)

Federal Office Building, Room 6003
909 First Avenue
Seattle, WA 98174
(206) 442-5930

States with OSHA-Approved State Plans

In the following states and territories, HazCom is enforced by these state agencies:

ALASKA

Alaska Department of Labor
P.O. Box 1149
Juneau, AK 99802
(907) 465-2700

ARIZONA

Industrial Commission of Arizona
800 W. Washington
Phoenix, AZ 85007
(602) 255-5795

CALIFORNIA (after July 1, 1989)

California Department of Industrial Relations
525 Golden Gate Avenue
San Francisco, CA 94102
(415) 577-3356

HAWAII

Hawaii Department of Labor and Industrial Relations
825 Mililani Street
Honolulu, HI 96813
(808) 548-3150

INDIANA

Indiana Department of Labor
1013 State Office Building
100 North Senate Avenue
Indianapolis, IN 46204
(317) 232-2663

IOWA

Iowa Division of Labor Services
1000 E. Grand Avenue
Des Moines, IA 50319
(515) 281-3447

KENTUCKY

Kentucky Labor Cabinet
U.S. Highway 127 South
Frankfort, KY 40601
(502) 564-3070

MARYLAND

Maryland Division of Labor and Industry
Department of Licensing and Regulation
501 St. Paul Place
Baltimore, MD 21202
(301) 333-4176

MICHIGAN

Michigan Department of Labor
309 N. Washington
P.O. Box 30015
Lansing, MI 48909
(517) 373-9600

MINNESOTA

Minnesota Department of Labor and Industry
444 Lafayette Road
St. Paul, MN 55101
(612) 296-2342

NEVADA

Nevada Department of Industrial Relations
Division of Occupational Safety and Health
Capitol Complex
1370 S. Curry Street
Carson City, NV 89710
(702) 885-5240

NEW MEXICO

New Mexico Environmental Improvement Division
Health and Environment Department
P.O. Box 968
Santa Fe, NM 87504
(505) 827-2850

NORTH CAROLINA

North Carolina Department of Labor
4 West Edenton Street
Raleigh, NC 27603
(919) 733-7166

OREGON

Accident Prevention Division
Oregon Department of Insurance and Finance
Labor and Industries Building
Salem, OR 97310
(503) 378-3304

PUERTO RICO

Puerto Rico Department of Labor and Human Resources
Prudencio Rivera Martinez Building
505 Munoz Rivera Avenue
Hato Rey, PR 00918
(809) 754-2119-22

SOUTH CAROLINA

South Carolina Department of Labor
3600 Forest Drive
P.O. Box 11329
Columbia, SC 29211
(803) 734-9594

TENNESSEE

Tennessee Department of Labor
501 Union Building
Suite A, 2nd Floor
Nashville, TN 37219
(615) 741-2582

UTAH

Utah Occupational Safety and Health
160 East 300 South
P.O. Box 5800
Salt Lake City, UT 84110
(801) 530-6900

VERMONT

Vermont Department of Labor and Industry
120 State Street
Montpelier, VT 05602
(802) 828-2765

VIRGIN ISLANDS

Virgin Islands Department of Labor
Box 890
Christiansted
St. Croix, VI 00820
(809) 773-1994

VIRGINIA

Virginia Department of Labor and Industry
P.O. Box 12064
Richmond, VA 23241
(804) 786-2376

WASHINGTON

Washington Department of Labor and Industries
General Administration Building
Room 334-AX-31
Olympia, WA 98504
(206) 753-6307

WYOMING

Wyoming Department of Occupational Health and Safety
604 East 25th Street
Cheyenne, WY 82002
(307) 777-7786

SAMPLE FORMS AND
LETTERS

CHAPTER TEN

Sample Forms and Letters

Substance Inventory Control Sheet

Jobsite Name (if applicable): _____ Date Purchased: _____

Chemical Name: _____ Synonyms: _____

Trade Names: _____ Manufacturer Name: _____

Address: _____

_____ Telephone Number: _____

Supplier Name: _____

Address: _____

_____ Telephone Number: _____

Label Statements: _____

MSDS Cross Reference Number: _____

MSDS received with shipment? ☐ Yes ☐ No

(If no, attach copy of letter sent to manufacturer requesting MSDS.) Updated MSDS received? ☐ Yes ☐ No

If yes:

Date received: _____ Date new MSDS was added to MSDS file: _____ Does MSDS contain new health or physical hazard information? ☐ Yes ☐ No

Must new employee training be scheduled? ☐ Yes ☐ No Date training held: _____

Where substance is used: _____

	Location	Frequency	Quantity	Used By
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
7.	_____	_____	_____	_____

Completed by: _____ Date: _____

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Sample MSDS Information Posting

The Occupational Safety and Health Administration requires all employers to make information on any hazardous chemicals in their workplace available to all employees. Vital information about the nature of these substances, safety precautions, and emergency procedures may be found in the Material Safety Data Sheets (MSDSs).

**MSDSs
For This
Workplace
Are Located At**

Location(s)

Location(s)

Person(s) Responsible for MSDS(s)

Phone

A copy of this company's written hazard communication program is located at

Location _____

Sample Letter Requesting an MSDS

*(*Place all letters on your company letterhead.)*

Date

Name and Address of/
chemical manufacturer, importer
or supplier

Dear _____:

In order to comply with the OSHA Hazard Communication Standard, we will need an accurate and current Material Safety Data Sheet for all hazardous products purchased from your company. The enclosed list shows the product(s) for which we do not have an MSDS.

Please send us the MSDSs concerning these products. All correspondence should be directed to the address above. If you have any questions concerning this matter, please contact (name) at (telephone number, including area code).

Thank you for your timely response to this request.

Sincerely,

Follow-up Letter to Request for MSDS

(*Place on company letterhead.)

Date _____

Name and Address of/
chemical manufacturer, importer
or supplier

Dear _____:

Recently we sent you a request for Material Safety Data Sheets on products purchased from your company. To date, we have not received the requested MSDSs. A second copy of the list of products for which we need MSDSs is enclosed.

In order for our firm and yours to be in compliance with the federal Hazard Communication Standard, you must provide us with current, accurate MSDSs for all hazardous products we have purchased from you. Your prompt attention to this matter is appreciated.

Sincerely,

Purchase Order Requesting an MSDS

TO: (Seller) _____

RE: Purchase Order No. _____ for _____

The OSHA Hazard Communication Standard requires us to maintain and distribute Material Safety Data Sheets (MSDSs) for all chemical substances and hazardous materials used by our employees. To meet these requirements, we request a current, completed MSDS for the following purchased items:

ITEM NUMBER

PRODUCT NAME

(Identify chemicals by the item numbers and product names appearing on the purchase order, including any trade names, code numbers, or stock numbers.)

MSDSs should be sent to the address below on or before the date the product(s) will be delivered to us.

(shipping address or office address)

Follow-up Letter to Purchase Order Request for MSDS

(*Place on company letterhead.)

Date _____

Name and Address of/
chemical manufacturer, importer
or supplier

Dear _____:

Recently we requested current and complete Material Safety Data Sheets for the following items purchased pursuant to Purchase Order Number _____:

ITEM NUMBER

PRODUCT NAME

(Identify chemicals by the item numbers and product names appearing on the purchase order, including any trade names, code numbers, or stock numbers.)

In order for our firm and yours to be in compliance with the federal Hazard Communication Standard, you must provide us with current, accurate MSDSs for all chemicals we have purchased from you. Your prompt attention to this matter is appreciated.

Sincerely,

Sample Letter Requesting Additional MSDS Information

Name and Address of/
chemical manufacturer, importer
or supplier

Dear _____:

In an effort to comply with the OSHA Hazard Communication Standard, my company is seeking additional information on products produced by your company. The MSDS's forwarded to us appear deficient as follows:

1. Paint Thinner #340 — no health effects listed.
2. Speedy Varnish — no physical hazard listed.

Please be advised that for us to comply with the Hazard Communication Standard and to provide adequate training for our employees, we must have complete MSDSs, particularly with reference to the above-identified items. Your cooperation will be appreciated.

Sincerely,

HAZARDOUS COMMUNICATION
EMPLOYEE TRAINING LOG

BRB 0073

Sample Employee Training Record

Jobsite (if applicable): _____

Employee's Name: _____

Department Trainer(s): _____

Date and Time of Training: _____

Substances Covered/Which Work Areas/Special Procedures Required: _____

Employee's signature attesting to the training: _____ Date: _____

Jobsite (if applicable): _____

Employee's Name: _____

Department Trainer(s): _____

Date and Time of Training: _____

Substances Covered/Which Work Areas/Special Procedures Required: _____

Employee's signature attesting to the training: _____ Date: _____

Jobsite (if applicable): _____

Employee's Name: _____

Department Trainer(s): _____

Date and Time of Training: _____

Substances Covered/Which Work Areas/Special Procedures Required: _____

Employee's signature attesting to the training: _____ Date: _____

Sample Letter to Other Contractors on the Same Construction Site

(*Place on company letterhead.)

Date

Name and Address of/
other contractor

Dear _____:

Employees of our company will be working on the (location) construction site at the same time as your company. Our employees may be in close proximity to hazardous substances your company may produce, store or use on site. In order to comply with the OSHA Hazard Communication Standard, all contractors who could cause hazard exposures to another company's employees are required to exchange information about the hazardous chemicals used on site.

Please advise us where your MSDSs are kept and give us any information regarding any precautionary measures needed to protect employees, any foreseeable emergency situations, and your labeling system used in the work site. All correspondence should be directed to the address above. We are enclosing similar information on the hazardous chemicals our company will have on the site.

Thank you for your timely response to this request. If you have any questions concerning this matter, please contact (name) at (telephone number, including the area code).

Sincerely,

Follow-up Letter to Other Contractors on the Same Construction Site

(*Place on company letterhead.)

Date

Name and Address of/
other contractor

Dear _____:

Recently we requested that you advise us where your MSDSs are kept for all hazardous substances produced, used or stored on (location) construction site. We also requested information regarding any precautionary measures to protect employees during normal operations and in foreseeable emergencies and your labeling system used on the work site.

In order for your firm and ours to be in compliance with the OSHA Hazard Communication Standard, we must receive the requested information. Your prompt attention to this matter would be appreciated.

Sincerely,

FEDERAL REGISTER

Federal Register

Monday
August 24, 1987

Part III

Department of Labor

**Occupational Safety and Health
Administration**

**29 CFR Parts 1910, 1915, 1917, 1918,
1926, and 1928**

Hazard Communication; Final Rule

DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1910, 1915, 1917, 1918, 1926, and 1928

[Docket No. H-022D]

Hazard Communication

AGENCY: Occupational Safety and Health Administration (OSHA); Labor.
ACTION: Final rule.

SUMMARY: OSHA is revising its Hazard Communication Standard (HCS) (29 CFR 1910.1200), which currently applies to the manufacturing sector, to cover all employers with employees exposed to hazardous chemicals in their workplaces. Expansion of the scope of the HCS requires non-manufacturing employers to establish hazard communication programs to transmit information on the hazards of chemicals to their employees by means of labels on containers, material safety data sheets, and training programs. This action will reduce the incidence of chemically-related occupational illnesses and injuries in non-manufacturing workplaces.

DATES: Effective September 23, 1987. The revised standard published today requires that chemical manufacturers, importers, and distributors ensure that material safety data sheets are provided with the next shipment of hazardous chemicals to non-manufacturing employers or distributors after September 23, 1987. All employers in the non-manufacturing sector are to be in compliance with all provisions of the standard by May 23, 1988.

FOR FURTHER INFORMATION CONTACT: Mr. James F. Foster, Office of Information and Consumer Affairs, Occupational Safety and Health Administration, 200 Constitution Avenue, NW., Room N3637, Washington, DC, 20210; telephone (202)523-8151.

SUPPLEMENTARY INFORMATION: References to the rulemaking record are made in the text of this preamble, and the following abbreviations have been used:

H-022. Ex.: Exhibit number in Docket H-022, which includes Dockets H-022A and H-022B.

Ex.: Exhibit number in Docket H-022D for exhibits collected since the 1985 Court remand.

Tr.: Public hearing transcript page number.

Copies of the official list of entries in the record, as well as the exhibits

themselves, are available from the OSHA Docket Office, Dockets H-022 and H-022D, Occupational Safety and Health Administration, 200 Constitution Avenue, NW., Room N3670, Washington, DC, 20210; telephone (202)523-7894.

I. Background

A. History of OSHA's Hazard Communication Standard

When Congress passed the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 *et seq.* (the Act), it included language in section 6(b)(7) stating that any occupational safety or health standard promulgated by the Secretary of Labor under section 6(b) rulemaking authority "shall prescribe the use of labels or other appropriate forms of warning as are necessary to insure that employees are apprised of all hazards to which they are exposed, relevant symptoms and appropriate emergency treatment, and proper conditions and precautions of safe use or exposure." Whenever OSHA has promulgated a substance-specific rule to address the hazards of a particular chemical, this Congressional directive has been followed. However, given the universe of chemicals present in American workplaces (as many as 575,000 hazardous chemical products), and the time-consuming nature of OSHA's rulemaking process, it soon became clear that little information would be available to employees if this substance-by-substance approach were the only one pursued. The Agency thus decided to address the issue of hazard information transmittal on a generic basis. OSHA's experience, as well as our rulemaking record to date, supports the view that when employees have access to, and understand, the nature of the chemical hazards they are exposed to during the course of their employment, they are better able to participate in their employers' protective programs, and take steps to protect themselves. In addition, providing employers with complete chemical hazard information enable them to better design and implement protective programs. Together these actions will result in more effective worker protection and the occurrence of fewer illnesses and injuries due to exposure to chemicals. See, e.g., 48 FR 53282-84, 53321, 53323-24, 53327-29 (Nov. 25, 1983); 47 FR 12093-12101 (Mar. 19, 1982).

In 1974, OSHA established a Standards Advisory Committee on Hazardous Materials Labeling under section 7(b) of the Act to develop guidelines for the implementation of section 6(b)(7). On June 6, 1975, the

Committee submitted its final report to the Assistant Secretary for Occupational Safety and Health which recommended categorization and ranking of chemical hazards, as well as provisions for labels, material safety data sheets, and training programs for all workers.

The National Institute for Occupational Safety and Health (NIOSH) published a criteria document in 1974 which also recommended a standard to OSHA. The document, entitled "A Recommended Standard . . . An Identification System for Occupationally Hazardous Materials," included provisions for labels and material safety data sheets.

In 1976, Congressman Andrew Maguire from New Jersey and the Health Research Group petitioned OSHA to issue a standard to require the labeling of all workplace chemicals. The House of Representatives' Committee on Government Operations (1976 and 1977) recommended that OSHA enforce the health provisions of the Act by requiring manufacturers to disclose any toxic ingredients in their products, and by requiring all employers to disclose this information to workers.

On January 28, 1977, OSHA initiated the public participation phase of the rulemaking process on these issues by publishing an advance notice of proposed rulemaking (ANPR) on chemical labeling in the Federal Register (42 FR 5372). The ANPR requested comments and information on the need for such a standard, and the particular provisions that should be included. The Agency received eighty-one comments. Most supported the need for the rule, but opinions as to the specific approaches to be pursued varied significantly.

On January 16, 1981, OSHA published a notice of proposed rulemaking (NPRM) entitled "Hazard Identification" (46 FR 4412). The rule would have required manufacturing employers to assess the hazards in their workplaces using specified procedures, and to label containers. The requirements were quite different from the comprehensive approach previously recommended by the Standards Advisory Committee and NIOSH as they did not include provisions for material safety data sheet development or training.

OSHA withdrew the NPRM on February 12, 1981 (46 FR 12214) for further consideration of regulatory alternatives. A new NPRM was published on March 19, 1982, and was entitled "Hazard Communication" (47 FR 12092). It proposed to require producers of chemicals to evaluate them to determine their hazards, label

containers, and provide material safety data sheets to manufacturing purchasers of their products. The standard also proposed that all employers in the manufacturing sector have a hazard communication program, label in-plant containers, maintain and provide access to material safety data sheets, and train workers. The proposal also invited comments on whether non-manufacturing employers should be subject to the rule.

Following a period for written comments, informal public hearings, and a post-hearing comment period, OSHA published the final Hazard Communication Standard on November 25, 1983 (48 FR 53280). The provisions of the final rule are very similar to those described above for the proposal, i.e., chemical manufacturers and importers are required to evaluate the hazards of the chemicals they produce or import, and all manufacturers are required to have hazard communication programs for their employees exposed to hazardous chemicals. This comprehensive standard was designed to reduce the hazards faced by manufacturing workers when they handle chemicals without adequate information on, among other things, the physical and health hazards of the chemicals, safe handling precautions, and emergency and first aid procedures. See, e.g., 48 FR 53321. OSHA found that inadequate communication regarding chemical hazards presents a significant risk to workers. See, e.g., 48 FR 53321. *Accord United Steelworkers of America v. Aucther*, 763 F.2d 728, 735 (3d cir. 1985) (*United Steelworkers I*) ("[I]nadequate communication is itself a hazard, which the standard can eliminate or mitigate").

OSHA decided to limit the scope of coverage of the HCS to the manufacturing sector based on an analysis of the chemical source illnesses and injuries occurring in each industrial sector. (See discussion at 48 FR 53284-80.) In particular, since the purpose of the standard is to reduce the occurrence of such incidents, OSHA determined that the rule should focus on those industrial sectors where they are recorded most frequently. The Agency found that over half of these incidents occur in manufacturing, although manufacturing accounts for only about 30 percent of total employment. Thus OSHA decided that the greatest need for transmittal of chemical hazard information is in the manufacturing sector. The Agency further recognized that since chemicals are developed and produced in the manufacturing sector, the hazard information would have to be

developed in the manufacturing sector first, regardless of the eventual coverage of the rule. OSHA believed that requiring the development of the chemical hazard information in manufacturing would lead to its increased availability in the other sectors without the standard specifically requiring the transmittal of hazard information to those sectors. The Agency acknowledged that hazardous chemicals are pervasive throughout industry and that chemical source injuries and illnesses have been recorded in all industry sectors. See, e.g., 48 FR 53282-87. See also *United Steelworkers I*, 763 F.2d at 737. The Agency planned to make a decision regarding the explicit coverage of the non-manufacturing sectors once the HCS was in effect, and a determination could be made as to whether the other industries were. In fact, obtaining the information they needed, OSHA believed that the Act gives the Secretary of Labor and the Agency the authority to regulate the most hazardous industry first under section 6(g), 29 U.S.C. 655(g), which states in part:

In determining the priority for establishing standards under this section, the Secretary shall give due regard to the urgency of the need for mandatory safety and health standards for particular industries, trades, crafts, occupations, businesses, workplaces or work environments.

B. Court Challenges

The HCS was challenged in the U.S. Court of Appeals for the Third Circuit (hereinafter referred to as "the Court" or "the Third Circuit") on several grounds. The Court issued its decision on May 24, 1985 (*United Steelworkers I*, 763 F.2d 728 (3d Cir. 1985)). The standard was upheld in most respects, but three issues were remanded to the Agency for reconsideration. The decision was not appealed.

First, the Court concluded that the definition of trade secrets incorporated by OSHA included chemical identity information that was readily discoverable through reverse engineering and, therefore, was "broader than the protection afforded trade secrets by state law." The Court directed the Secretary of Labor to reconsider a trade secret definition which would not include chemical identity information that is readily discoverable through reverse engineering. Second, the Court held the trade secret access rule in the standard invalid insofar as it limited access to health professionals, but found the access rule otherwise valid. The Secretary was directed to adopt a rule permitting access by employees and

their collective bargaining representatives to trade secret chemical identities. OSHA complied with the Court orders regarding the two trade secret issues in a separate rule, published in final form on September 30, 1986 (51 FR 34590).

The third issue remanded to OSHA involved the scope of the standard's coverage. As noted, the HCS currently applies to employers and employees in the manufacturing sector. The Court rejected the Secretary's contention that section 6(g) gave him the flexibility to regulate the most hazardous sector first before commencing rulemaking for other sectors in which workers are exposed, to a lesser extent, to the same hazards. The Court agreed that section 6(g) "clearly permits the Secretary to set priorities for the use of the Agency's resources, and to promulgate standards sequentially." 763 F.2d at 738. The Court also acknowledged that "there is substantial evidence in the record that the manufacturing sector has the highest incidence rate of chemical exposures which the Agency has authority to regulate." *Id.* at 737. However, the Court held that it is not enough merely to establish that the sector selected for coverage presents greater hazards than those that have been left for later rulemaking. Given the record evidence of high levels of exposure to hazardous chemicals in several job settings outside the manufacturing sector, the Secretary was required to explain "why coverage of workers outside the manufacturing sector would have seriously impeded the rulemaking process" or "why it is not feasible for the same standard to be applied in other sectors where workers are exposed to similar hazards." *Id.* at 738.

The Court was not persuaded that the HCS would provide protection to uncovered workers because chemical hazard warnings would be found on container labels and detailed information on material safety data sheets would become increasingly available in the unregulated sectors as a result of being required in manufacturing. *Id.* There was considerable record evidence that indicated that workers in the non-manufacturing industries are exposed to chemical hazards. The Court concluded that the Secretary had not stated why it would not be feasible to require employers in non-manufacturing industries to give workers material safety data sheets and training as required in the manufacturing sector. *Id.* The Court maintained that the Act required an explanation why the same information, that is, labels, material

safety data sheets, and training, is not needed for workers in other sectors similarly exposed to hazardous chemicals. *Id.* at 738-39. Therefore, as previously indicated, OSHA was directed by the Court to reconsider the application of the standard to employees in the non-manufacturing industries and to order its application to these other sectors unless the Secretary can state reasons why this application would not be feasible. It should be noted that in previous OSHA litigation, the Courts have defined "feasibility" in terms of OSHA rules as meaning "capable of being done." *American Textile Manufacturers Institute v. Donovan*, 452 U.S. 490, 508-509 (1980) (ATMI).

OSHA decided not to appeal this decision. As stated in the preamble to the final rule (48 FR 53286):

It should be emphasized that the Agency does not believe that employees in other industries are not exposed to hazardous chemicals, or that they should not be informed of those hazards. OSHA has merely exercised its discretion to establish rulemaking priorities, and chosen to first regulate those industries with the greatest demonstrated need.

OSHA was prepared to evaluate the HCS' effectiveness in getting information to downstream employers, and to extend the standard if necessary. In fact, the Agency initiated the process on March 4, 1985, prior to the Court decision, when the Assistant Secretary asked the National Advisory Committee on Occupational Safety and Health (NACOSH) to give OSHA its recommendation on the need and feasibility of expanding the scope of the HCS to other industries. On June 21, 1985, NACOSH adopted the following recommendation:

[NACOSH] strongly endorses the OSHA effort to promulgate a Hazard Communication Standard and selection of the manufacturing sector for its initial scope of coverage. It is the consensus recommendation of the Committee that the scope of the current Hazard Communication Standard should be expanded to cover all employees in all industries at as early a time as possible. Complete implementation may require phasing in gradually. The BLS [Bureau of Labor Statistics] incidence rates of occupational illnesses, and other appropriate factors, should be primary considerations in expanding the coverage. The Committee further recommends that OSHA establish a task force to address these issues.

Meanwhile, OSHA's review of the rulemaking record showed that while there was considerable evidence concerning the need for hazard communication in other industries, and general support for a finding that the HCS would be feasible for non-

manufacturing, there was a need for more direct evidence of the feasibility of expanded coverage, particularly in the area of economic feasibility. Accordingly, OSHA believed it was necessary and appropriate to initiate further rulemaking. OSHA commissioned a study of the economic impact of extending the HCS to the fifty major non-manufacturing industry groups within its jurisdiction, and issued an Advance Notice of Proposed Rulemaking (ANPR) seeking public comment on present hazard communication practices outside manufacturing, and the likely impact of extending the HCS to industries significantly different from the prototypical manufacturing worksites on which the original standard was based. 50 FR 48794 (Nov. 27, 1985). Over two hundred responses were received. Based on this newly acquired evidence and on the previous rulemaking record, OSHA was in the process of drafting a proposed rule which it expected to publish for notice and comment, followed by promulgation of a final rule in early 1988.

On January 27, 1987, however, the United Steelworkers of America, AFL-CIO-CLC and Public Citizen, Inc., petitioners in the 1985 challenge, filed a Motion For An Order Enforcing The Court's Judgment and Holding Respondent In Civil Contempt. Petitioners claimed that the Court's 1985 order had not authorized OSHA to embark on further fact gathering; that OSHA should have made a feasibility determination on the 1985 rulemaking record. Petitioners also argued that even if further fact gathering had been allowed by the Court's order, OSHA's pace was unduly slow.

In response, OSHA noted that the Court's 1985 order did not specify that OSHA should act on the then-existing record. OSHA believed that seeking further evidence on feasibility in non-manufacturing was appropriate in light of its statutory obligation to issue rules that are well grounded in a factual record. OSHA also asserted that, consistent with Supreme Court precedent, the Agency should be permitted to exercise its discretion in determining the appropriate rulemaking procedures for complying with the Court's remand order. Lastly, the Agency argued that its schedule to complete the rulemaking was reasonable and did not constitute undue delay.

On May 29, 1987, the Court issued a decision holding that the Court's 1985 remand order required consideration of the feasibility of an expanded standard without further rulemaking. *United*

Steelworkers of America, AFL-CIO-CLC v. Pendergrass, No. 83-3554 (3d Cir.) (*United Steelworkers II*). The Court declared that adequate notice had been provided to non-manufacturers during the original rulemaking that they might be covered by the HCS, *id.* slip op. at 7-10, 16-17, that the answers to the remaining questions OSHA may have had regarding feasibility were "self-evident" or "readily ascertainable" from the original record, *id.* at 15, 17, and that further fact finding was "unnecessary", *id.* at 15. The Court ordered the Agency to issue, within 60 days of its order, "a hazard communication standard applicable to all workers covered by the OSHA Act, including those which have not been covered in the hazard communication standard as presently written, or a statement of reasons why, on the basis of the present administrative record, a hazard communication standard is not feasible." *Id.* at 19. OSHA is responding to the Court order by issuing this final rule expanding the scope of the HCS' coverage to all workers within OSHA's jurisdiction.

OSHA continues to believe that it should have been permitted to follow the rulemaking procedures in the Act by issuing a notice of proposed rulemaking and developing a public record prior to promulgating a final rule. However, as discussed in the following section regarding feasibility, the Agency does not have sufficient evidence in the current record to indicate that the rule would be infeasible for any part of the non-manufacturing sector. OSHA recognizes that information submitted during a normal rulemaking process might have resulted in further changes to the provisions to better address feasibility or practicality concerns.

In light of the fact that there may be additional information regarding the feasibility or practicality of the rule as it applies to some non-manufacturing sectors, the Agency invites persons to provide such information and any recommendations for further rulemaking within sixty days of the date of publication of this final rule. OSHA will then evaluate these submissions and determine whether any additional rulemaking is required. Data or evidence related to feasibility should be addressed to: Directorate of Health Standards Programs, Occupational Safety and Health Administration, Attention: Hazard Communication, 200 Constitution Avenue, NW., Room N3718, Washington, DC, 20210.

C. Feasibility of the Standard

In the context of OSHA standard setting, feasibility constraints limit the extent to which standards can address health and safety concerns within the workplace. Section 6(b)(5) of the Act, 29 U.S.C 655(b)(5). Feasibility analysis involves an inquiry to determine whether a standard is both technologically and economically capable of being done. *ATMI*, 452 U.S. at 512-13 and 513 n.31 (1980). As the Third Circuit has indicated, "the Secretary was able to determine that the hazard communication standard could feasibly be applied in the manufacturing sector." *United Steelworkers II*, slip op. at 16. The Court further noted that OSHA had concluded in the final rule that importers and distributors could feasibly comply with the HCS based on the evidence in the record and that "this is equally true of all non-manufacturer user employers. Plainly, the ease with which the same information can be utilized by those employers can be easily determined from the information already in the record." *Id.* at 18. The Third Circuit has ordered expansion of the HCS to all workers *unless* OSHA can give reasons why the HCS is infeasible for particular industries, and has forbidden OSHA from gathering further evidence.

OSHA concludes that the original HCS rulemaking record (Docket H-022), does not contain credible evidence indicating the standard would be infeasible for any industrial sector. In fact, OSHA believes that the original record on the whole supports a finding that the performance-oriented HCS is feasible for all industries. In addition, the Agency's experience under the present HCS and other pertinent OSHA standards, the promulgation and implementation of State and local right-to-know laws, and evidence and data gathered by the Agency since the 1985 Court order (Docket H-022D), further supports OSHA's conclusion that non-manufacturing employers are "capable" of implementing the HCS for their employees potentially exposed to hazardous chemicals.

OSHA found that the HCS is technologically feasible for manufacturers, and believes it is clearly technologically feasible for non-manufacturers as well. Twelve of the OSHA-approved State plan States have already extended the rule to cover the non-manufacturing sector, and the requirements are being enforced in those States as workplace standards. This experience provides practical evidence of the technological feasibility of the requirements of the rule. The more

technical aspects of the standard—scientific evaluation of chemicals to determine their hazards and creation of material safety data sheets and warning labels—remain a burden on those producing or importing hazardous chemicals. The technical expertise needed to develop the chemical hazard information, and its associated costs, is subsumed within the current rule covering manufacturers, and it has been found feasible. All other requirements in the HCS, such as maintaining material safety data sheets, developing a written hazard communication program, and designing and implementing chemical hazard training, are conventional and common business practices that are administrative in nature, and no technological barriers prevent their development and implementation. OSHA has mandated such practices for some non-manufacturing workplaces since the early 1970's. *See, e.g.*, 29 CFR 1915.97 (requiring material safety data sheets and chemical hazard training for shipyard workers); 1917.22 (requiring marine terminal workers be instructed as to the chemical hazards presented by cargo); 1918.86 (requiring chemical hazard instruction for longshore workers); 1928.21 (requiring chemical hazard training for construction workers). *See, also*, H-022, Ex. 99 (journal article regarding usefulness of material safety data sheets, written by Dow Chemical Company representatives and published in December 1957).

OSHA also believes that the economic feasibility of extending the current HCS to the non-manufacturing sector is supported by the record. Simply put, economic feasibility is established by evidence that the standard will not threaten the regulated industry's "long-term profitability." *ATMI*, 452 U.S. at 531 n.55. Costs associated with expanding the standard to cover non-manufacturing workplaces will stem from the initial start-up costs and the less substantial recurring program implementation and upkeep costs for: maintaining material safety data sheets received from manufacturers, importers, distributors, and other employers; creating labels for in-house containers of hazardous chemicals; developing a written hazard communication program, including a list of hazardous chemicals present in the workplace; and developing and implementing chemical hazard training.

After careful analysis of the original HCS rulemaking record, OSHA concludes that, as a whole, it supports a finding that non-manufacturers are economically capable of providing

employees chemical hazard information in the manner prescribed by the HCS. As noted previously, development of the evidentiary record for the HCS began as early as 1974. In that year, NIOSH recommended that OSHA adopt a standard requiring *all* employers to implement a system of labels, placards and material safety data sheets in their workplaces to inform employees about the chemical hazards to which they may be exposed. (H-022, Ex. 4). The NIOSH recommended standard, like the HCS, included requirements that employers ensure that chemicals in the workplace are marked with hazard warnings and that material safety data sheets are "filed in the establishment" where they are "readily available for examination by workers." *Id.* at 3. This hazard identification and warning system was designed to additionally "help in the education of employees and provide the data necessary for employers to take proper action to safeguard their employees." *Id.* at 1. NIOSH concluded that such a chemical hazard communication program was appropriate for all employers. *See, also* comments of the Air Transport Association, H-022, Ex. 5-3 ("[T]he airlines have no general objection to the [NIOSH] Criteria . . . [except that it] should clearly delineate the responsibility of the manufacturer supplying the necessary data on the Material Safety Data Sheets.").

The 1975 report of the Standards Advisory Committee on Hazardous Materials Labeling (H-022, Ex. 3), recommended a "total system" approach to chemical hazard communication not unlike the comprehensive approach of the current HCS. The Advisory Committee, which included representatives of non-manufacturers, recommended labeling and placarding systems, the creation and availability of material safety data sheets, and employee education and training programs for all workers potentially exposed to hazardous chemicals. The Committee recognized that these practices "are not new and novel concepts" but "well established in many industries and professional associations as well as regulated by various governmental agencies and international agreements." *Id.* at 3. The Advisory Committee made "no distinction among employees in different sectors of the economy." *United Steelworkers II*, at 7.

As the Court has stated, *id.* at 8, the 1977 ANPR requested public comment from all interested persons on whether a chemical hazard communication standard should be promulgated by

OSHA. Comments on the Standards Advisory Committee's recommended standard were specifically requested. Although OSHA did not receive comment from employers in every industrial sector, those non-manufacturers that did respond supported a comprehensive hazard communication system for their workplaces. For example, Sea-Land Service, Inc. (H-022, Ex. 2A-8), supported requirements for container labels (consistent with transportation labels already in place), the availability of material safety data sheets to persons in the workplace, and individual training programs. Panhandle Eastern Pipe Line Company (H-022, Ex. 2A-7) and Truckline Gas Company (H-022, Ex. 2A-9) both "agree[d] that employees need information about the product with which they work" and that this could be accomplished by requiring suppliers of hazardous chemicals to label containers with the "degree and nature of the hazard" and by requiring user employers to "inform employees of the hazard." Those companies had already developed "a special manual of data for all chemicals, solvents and cleaners used in [their] operations and maintenance."

Wisconsin Electric Power Company (H-022, Ex. 2A-30), stated that given adequate labels and material safety data sheets from chemical manufacturers and suppliers, chemical users such as they "would be in a position to prepare their own Material Safety Data Sheets, hazard placard systems, proper labeling of auxiliary and secondary containers and training of personnel who may use or otherwise contact this material." Recognizing the need for "proper labeling, storage, handling and instructions in the use of hazardous materials," Wisconsin Electric Power Company had already "developed and put into effect a Hazardous Materials Control Program." Southern Gas Association (SGA) (H-022, Ex. 2A-75) also believed that suppliers and manufacturers of hazardous materials should be required to provide proper labeling, warnings and other hazard information to all employers using these materials. SGA further suggested that OSHA promulgate a standard directing all employers "to establish required training for employees that may handle or otherwise be exposed to any hazardous materials." These comments and others filed in response to OSHA's 1977 ANPR indicate that many non-manufacturers consider maintaining labels received on chemical containers, making material safety data sheets received from suppliers available

to employees, and providing information and training to employees regarding the chemical hazards present in the workplace to be economically feasible. See, also H-022, Exs. 2A-2 (Schirmer Engineering Corporation); 2A-31 (Union Electric Company); 2A-32 (Texaco); 2A-38 (American Trucking Association, Inc.).

Moreover, comments received from non-manufacturers at later stages of the original rulemaking also indicate they are capable of implementing the performance-oriented HCS. In fact, there are comments which indicate that many of these requirements were already being implemented in the non-manufacturing sector.

For example, the Western Agricultural Chemicals Association indicated that its members provide material safety data sheets to anyone who requests them, including customers in the non-manufacturing sector (Tr. 2873). Their representative further stated that "[i]n the agricultural field, I would say most technical products have material safety data sheets. I would say maybe 75% to 80% of the inerts have them . . ." (Tr. 2881).

There was also testimony from employee representatives, including those in the non-manufacturing sector such as airline mechanics, that they requested and were able to obtain material safety data sheets from manufacturers for products in use in their facilities. Tr. 2819-21, 3131, 3828. One union testified that a joint employee-employer safety committee received every material safety data sheet it requested, and that the union then trained workers to be able to use the information. Tr. 2824-A.

Another non-manufacturing union representative, the International Brotherhood of Painters and Allied Trades, indicated that it shared collected material safety data sheets with employers who needed such information. "[T]o contractors who make requests of us for information, we do provide them material safety data sheets, write-ups on the chemicals and the products . . . We do everything—our union does everything they can as a service to our contractor members to provide them with the information they need to operate safely. . . ." Tr. 2101-2.

Other large companies with manufacturing as well as non-manufacturing establishments testified that information was made available throughout their corporations, and they provide information to all customers regardless of industry. For example, Atlantic Richfield Company testified that they have a company-wide material

safety data sheet policy and program. "[U]nder this program, a material safety data sheet is recognized as a basic source of information for practical health, safety and environmental information. The MSDS whether generated internally or obtained from a supplier is used to communicate relevant data within the company and to outside customers. It is the responsibility of our various operating companies to distribute copies of each MSDS to customers and company facilities for employee instruction and/or information." Tr. 2439. Their company facilities include such non-manufacturing operations as petroleum production.

Similarly, Exxon, Inc. testified that it too provides material safety data sheets to all customers: "[W]e consider a material safety data sheet a matter of public information that's part of our literature, regularly available to anyone who requests it." Tr. 1708-09. See, also, Shell testimony at Tr. 1712 and 2500, and Uniroyal Chemicals at Tr. 1464.

Therefore, based on the recommendations of NIOSH, the Standards Advisory Committee and the comments received from non-manufacturers and their representatives participating in the lengthy rulemaking, OSHA concludes that the original record as a whole indicates that non-manufacturers are capable of complying with the HCS. As long as chemical suppliers provide adequate chemical hazard information in the form of labels and material safety data sheets to non-manufacturers using the chemicals, those user employers, like the manufacturers who use hazardous chemicals which they themselves did not manufacture or import, can develop hazard communication programs and provide employees information and training on the chemical hazards in the workplace.

In light of the evidence in the original rulemaking record, OSHA concludes that non-manufacturers can incorporate the HCS' administrative practices and provide chemical hazard information to their employees. OSHA believes all employers can ensure that containers of chemicals are maintained with proper hazard warnings just as an employer would maintain labels or marks on containers to ensure that employees comprehend their contents and intended uses. Likewise, all employers are able to acquire and maintain up-to-date material safety data sheets for hazardous chemicals just as they are able to acquire and maintain up-to-date cost information and performance specifications on those very same

chemicals. OSHA also concludes that it is feasible for employers to inform and train their workers regarding the chemical hazards present in the workplace just as employers are capable of training their workers to perform their jobs in an efficient and speedy manner. These conclusions are further supported by the experience and evidence gathered by the Agency since promulgation of the HCS for manufacturers in 1983.

At this time, OSHA has no evidence indicating that the profitability of manufacturers generally, or even chemical manufacturers in SIC 28 (by far the most economically burdened by the HCS, see 48 FR 53333), has been threatened by complying with the HCS. Manufacturers have had the considerable costs of evaluating, collectively, hundreds of thousands of chemicals for their hazards and creating corresponding labels and material safety data sheets since November 1985, as well as the costs of implementing an in-plant program by May 1986. After thorough analysis, OSHA determined that the current HCS would not impose a substantial burden on manufacturers and that the HCS was economically feasible for them. See 48 FR 53333. Experience to date in implementation of the rule supports that finding. For example, if manufacturers were experiencing significant feasibility problems in complying with the rule, OSHA would have expected to receive numerous substantive comments regarding those problems in response to the 1985 ANPR questions addressing feasibility concerns. However, although some manufacturing employers objected to some requirements, substantive comments demonstrating infeasibility were not received, which appears to support OSHA's conclusion that compliance with the HCS was, and continues to be, economically feasible for manufacturers and indicates the standard is also feasible for non-manufacturers. In fact, some manufacturers took the opportunity to state their continuing support for the rule and its requirements. See, e.g., H-022D, Ex. 2-14. (The Chemical Manufacturers Association "strongly believes that the substantive provisions of the Hazard Communication Standard are sound as a matter of science and policy."); Ex. 2-67 (Economics Laboratory, Inc. "considers hazard communication worth the effort.")

Generally, the HCS costs to non-manufacturers would be a function of the number of hazardous chemicals in the workplace, and the number of employees exposed to hazardous

chemicals. If employees are not potentially exposed to hazardous chemicals in a particular work operation, the proposed standard does not apply. Also, to the extent that employers are voluntarily providing information, or providing information in order to comply with other regulations or laws, this should significantly reduce the burden of compliance with this rule. Approximately 32 States and several localities already have hazard communication/right-to-know laws covering non-manufacturing industries indicating that many others seeking to protect the safety and health of workers have concluded that industry can comply with these types of requirements. In fact, as evidenced in the original rulemaking record, many companies involved in interstate commerce would benefit from promulgation of a uniform Federal standard as it would preempt different and potentially conflicting State and local laws and lessen overall compliance burdens. 48 FR 53283. See also, e.g., H-022D, Ex. 2-83 (The American Gas Association "believes that a Federal Standard, rather than a variety of differing state regulations, would best serve the needs of the natural gas industry, the employees in our industry, and the general public as well."); Ex. 2-108 (The National Constructors Association has found that "[i]t has been nearly impossible to establish uniform interstate policy" and "can clearly see the wisdom of having one workable/cost-effective government regulation that addresses hazard communication.")

Although the original HCS record contained no evidence to indicate the HCS would be economically infeasible for non-manufacturing, OSHA recognized that potential feasibility concerns could arise, for example, with small businesses, businesses with large employee turnover (such as retail stores and construction companies), and businesses with rapid turnover of hazardous chemicals in the workplace (such as warehouses and marine cargo operations). However, based on the original HCS rulemaking record, and additionally based on: (1) The apparent successful implementation of the present HCS by manufacturers; (2) the implementation of other Federal communication standards and of State plan States' laws by non-manufacturers; and, (3) on regulatory impact and regulatory flexibility analyses prepared by the Agency since the 1985 Court order and summarized in Section III of this document, OSHA concludes that the provisions in the current Hazard

Communication Standard are economically feasible for all of the non-manufacturing industries.

OSHA is also aware that many employers in the manufacturing sector have been able to satisfy some of their responsibilities under the HCS by using compliance materials obtained from various sources. Trade associations, for example, have frequently been instrumental in assisting their members in developing programs suitable for their type of industrial facility. This is particularly appropriate given the performance orientation of the HCS; and the flexibility employers are permitted to design appropriate compliance programs. Sample written programs and other written materials, as well as training programs regarding the requirements of the rule, have been developed and provided to association members and have facilitated compliance efforts. The ability of associations to accomplish this successfully demonstrates technical feasibility and enhances economic feasibility. Trade associations in states covering non-manufacturing workplaces under their right-to-know rules have also been able to develop materials to assist their members to comply. Materials developed for these State laws or for the manufacturing sector under the current HCS could be adapted for the non-manufacturing workplaces newly covered by the HCS.

There have also been a number of services provided by consultants in the private sector. These range from very specific items, such as computer programs to manage information, to a comprehensive compliance strategy, where a consultant will devise an entire program to enable a facility to comply. Such services will often minimize the burden of compliance by minimizing the time the facility staff must spend to develop and implement a program. The availability of such programs also provides support for the conclusion that the rule is feasible.

For large companies, the burden per facility will often be minimized by corporate development of a standardized program. It can be expected that most corporations with multiple facilities will use this approach (this has occurred in the manufacturing sector as well).

Therefore, OSHA concludes that similar resources will be available to employers in the non-manufacturing sectors, which further demonstrates that the rule is feasible for implementation in all sectors. In fact, given the pre-existing coverage of non-manufacturing under various state rules, and the extent of the

materials developed in response to the current HCS which would also be applicable in non-manufacturing, additional development of such materials should require considerably less effort and be easier for non-manufacturers to obtain.

Nevertheless, OSHA recognizes that the unique characteristics of some businesses render certain provisions of the current standard unnecessary or ineffective in communicating the hazards of chemicals to workers. The Agency has thus made some modifications to the standard to ensure that its provisions are practical and effective in communicating hazards to all workers. *Cf. ATMI*, 452 U.S. at 531 n.32 (OSHA may use cost-effectiveness analyses and choose the less costly of two equally effective standards). The inclusion of these "tailoring" provisions is consistent with the Agency's action in tailoring the original HCS to make it practical and cost-effective for all manufacturers. See 29 CFR 1910.1200(b) (3)-(5). Now that the coverage of the standard is being expanded to non-manufacturing employers as well, it is necessary to tailor the standard to the unique characteristics of these non-manufacturing employers. The tailoring provisions, explained in Section II of this preamble, are based on the original record in the HCS rulemaking, and also on Agency experience in implementing the current rule; State plan State experience in implementing expanded versions of the current rule; and comments submitted to the Agency in response to the ANPR published in November 1985. OSHA believes that the knowledge and experience gained during the past few years of implementation and enforcement of the current rule must be taken into consideration when crafting a rule to appropriately apply to the non-manufacturing sector.

The Agency's position is that all employees are entitled to information regarding the chemical hazards they are exposed to in the workplace, and that a uniform Federal hazard communication standard is the best method to ensure that information is provided. This position is consistent with the Act (protecting all employees to the extent feasible), as well as with the Court's decision upon review of the rule. Therefore, this final rule addresses communicating chemical hazards to all exposed employees.

It should be emphasized that in preparing a detailed regulatory impact analysis for the expansion of the scope of the HCS, OSHA has accumulated evidence to indicate that some

employees in every SIC code designation are exposed to hazardous chemicals, and that it is therefore not appropriate to exempt any particular industry sector. For example, OSHA has received suggestions that retail establishments be exempted since employee exposure to chemicals is believed to be unlikely in these types of facilities. However, there is testimony in the original rulemaking record from the United Food and Commercial Workers International Union (Tr. 3088-97) that demonstrates that workers in such facilities are exposed to hazardous chemicals, and therefore do need the protections afforded by coverage under the HCS:

While supermarkets don't use hundreds of hazardous chemicals like some manufacturing industries, a large number of workers are exposed to the dozen or so they do use. Chemicals used include caustic and acid cleaning compounds, solvents, waxes, paints and disinfectants . . . Let me relate to you one case within our union where workers were overexposed to an unidentified substance. A group of supermarket workers began experiencing dizziness, upper respiratory tract irritation and headaches . . . Not until workers started to talk with one another did they start to suspect a possible link between their illness and a certain solvent that was used to remove old price labels from merchandise called Garvey XC-36.

See Tr. 3088-89. See also Tr. 414 and Tr. 1840-43. The testimony further relates other incidents, as well as the various activities the union had to pursue to obtain information for exposed workers—including chemical analysis of products to determine their contents. This illustrates the need for application of the standard in industries such as retail stores, as well as those industries where chemical exposures are more obvious. For additional testimony regarding the extent of chemical exposures in the non-manufacturing sector, see, e.g., hospital workers: Tr. 411-14, 2738-41, and 3036 (" . . . hospital workers are exposed to formaldehyde, ethylene oxide, cleaning agents which are often very caustic . . .") (Tr. 411); barbers and beauticians: Tr. 415-18 (" . . . work around hair dyes . . . known to cause cancer . . ."); longshore workers: Tr. 3143; utility workers: Tr. 417, 3078, 3130; workers in dry cleaners and laundries: Tr. 416, 4084-90 (" . . . [B]eyond the chlorinated solvents that your dry cleaners use, some cleaners and laundries also use dyes . . ."); farmworkers: Tr. 2260.

D. Construction Advisory Committee Recommendations

On June 23, 1987, the Construction Advisory Committee on Occupational

Safety and Health met to discuss a draft proposed standard prepared by OSHA to expand the scope of the HCS to the non-manufacturing industries. The draft proposed rule was very similar to the final standard being promulgated herein. OSHA has reviewed the recommendations of the Construction Advisory Committee, and incorporated a number of the suggested revisions into this document to tailor the rule for the construction industry, and for other industries which have similar concerns due to similar differences in work operations from the typical manufacturing establishment. Other recommendations called for more substantive changes to the HCS, affecting the obligations of chemical manufacturers and others, and OSHA does not believe they are supported by the record or appropriate to incorporate into this final rule without further opportunity for notice and comment from those affected. It is important to note, however, that despite the recommended changes there were no indications that members of the Construction Advisory Committee believe that it is infeasible to implement hazard communication programs in the construction industry. In fact, as OSHA has noted previously, the construction industry has been subject to training requirements concerning chemical hazards for many years (see 29 CFR 1926.21).

In preparing the draft proposed rule, and subsequently this final rule, OSHA did review the *Report on Occupational Health Standards for the Construction Industry* which was submitted by the Construction Advisory Committee to the Assistant Secretary on May 16, 1980. In that report, the Committee addressed recommendations for labels, material safety data sheets, and training—all of the major components of the HCS.

Of particular concern to the Committee at that time was that construction employers do not have access to the necessary information upon which to develop appropriate signs and labels or material safety data sheets, and therefore must depend upon suppliers for such information. "[C]onstruction employers may not always be aware of the hazard associated with a particular product or device if the items are not accompanied upon purchase by appropriate labels and data sheets. . . ." OSHA agrees that this lack of information has been a problem for all downstream users of chemicals, and thus developed the approach incorporated into the HCS—producers or importers of chemicals are responsible for evaluating the hazards

and transmitting that information to downstream employers or users of the materials. Under the expanded rule, construction employers would be the recipients in this downstream flow of information.

The HCS did not exist at the time of the report, and the Committee thus recommended that a solution to the problem of lack of information "would be to modify and extend the existing OSHA standard for material safety data sheets which now applies only to ship repairing, shipbuilding, and ship breaking (29 CFR 1915, 1916 and 1917). The modified standard would require manufacturers or formulators of harmful materials or agents to supply material safety data sheets along with their products in such a fashion that they reach construction employers." Shipbuilding and ship repairing are in the manufacturing sector, and covered by the requirements of the 1983 final rule—ship breaking will be covered by these expanded provisions. Therefore, OSHA is doing what was recommended in 1980, i.e., extending the existing OSHA standard for material safety data sheets to construction. The Advisory Committee concluded that although the hazard information may have been difficult for construction employers to acquire in the past, "such information was fundamental to the preparation of warning signs, labels, training programs, and other important job safety and health activities."

The Construction Advisory Committee is now recommending that the construction industry be regulated under a separate standard for Hazard Communication, rather than being treated as any other downstream employer who uses chemicals. The rationale is that construction sites are unique among industrial workplaces and should be addressed in a vertical standard specific to the industry. Although OSHA has found this argument persuasive for a few health standards, where there are fundamental differences in control strategies to achieve permissible exposures for a chemical in a fixed site facility versus the construction site, it does not appear to be appropriate in this situation which simply involves transmittal of information, that can be accomplished on any type of site. Arguments regarding transient workers, mobile work sites, etc. can appropriately be made for other non-manufacturing users of chemicals as well. The problems raised can be dealt with more effectively by modifying the provisions of the current rule to address them, rather than preparing completely separate standards for each industry.

It was interesting to note that although the Construction Advisory Committee was essentially maintaining that hazard communication in construction could be treated as a separate issue, many of the changes the members were recommending would often have required substantive changes in the requirements for the manufacturing sector. As noted above, the Committee expects to receive labels on containers and material safety data sheets from its suppliers. This is certainly consistent with OSHA's approach in the rule. But the Committee is also recommending that the labels on containers being shipped to construction contain additional information, and that the requirements for material safety data sheets be slightly different as well. They also recommended changes in the hazard determination provisions, while maintaining that hazard determinations must be accomplished in the manufacturing sector. These recommendations serve to support OSHA's view that in an approach which requires a downstream flow of information, the relationship between the requirements for producers and downstream users are so interdependent that separation of them into two separate standards would be logically inconsistent. And furthermore, since the requirements for hazard determinations, labels, and material safety data sheets were based on an extensive rulemaking record, and are not industry-specific, it would not be appropriate to modify those requirements at this point.

Two separate standards would also require cross-referencing provisions from one rule to another to ensure proper information transmittal, a regulatory format which would be unnecessarily confusing to the regulated community. OSHA believes it is more effective to list, in one standard, the obligations of chemical producers, importers, and suppliers with those of the users so that employers using hazardous chemicals will be aware of the content and quality of the hazard information they are entitled to receive from their suppliers. Furthermore, it would not be appropriate to indicate requirements for chemical manufacturers and importers in a standard which purports to cover solely the construction industry, as would have to be done to accommodate all of the recommendations of the Committee. Therefore, construction employers are included with all other employers in this standard. However, OSHA will print the rule in full in 29 CFR Part 1926 (in § 1926.59) for ease of reference for

construction employers and employees. In addition, it will also be printed in 29 CFR Parts 1915, 1917, and 1918, for the use of maritime employers and employees (at new § 1915.99, 1917.28, and 1918.90, respectively), and will be referenced in Part 1928 covering agricultural employments.

E. Federal Community Right-to-Know Law

Expansion of OSHA's HCS will also have an impact on employers' obligations under another Federal law to inform State and local communities of the hazardous chemicals present in the workplace. On October 17, 1986, the President signed into law the Superfund Amendments and Reauthorization Act of 1986 ("SARA"). Part of the new law, Title III, the Emergency Planning and Community Right-to-Know Act of 1986, encourages and supports emergency planning efforts at the State and local level and provides citizens and local governments with information concerning potential chemical hazards present in their communities.

Two provisions in the new law, sections 311 and 312, mandate that employers required under the Occupational Safety and Health Act of 1970 and regulations under that Act to prepare or have available material safety data sheets for hazardous chemicals in their workplaces, must also submit chemical hazard information to State and local governments. Specifically, employers required by the OSHA HCS to create or maintain material safety data sheets for employees must also submit to the State emergency response commissions, the local emergency planning committee and the local fire department: (1) A material safety data sheet for each hazardous chemical for which a data sheet is available (section 311); and (2) an emergency and hazardous chemical inventory form (section 312). The public may request material safety data sheets and inventory information from the local planning committee.

Because all manufacturing employers are currently subject to the OSHA HCS and required to create or maintain data sheets for the hazardous chemicals present in their workplaces, they must also comply with the community reporting requirements of the Emergency Planning and Community Right-to-Know Act. An expanded HCS covering non-manufacturers will require non-manufacturers to provide chemical hazard information not only to their employees but also to the surrounding communities.

On January 27, 1987, EPA proposed regulations to implement the community data sheet and inventory reporting requirements. A detailed explanation of the EPA proposal can be found at 52 FR 2836 (January 27, 1987). A final rule is expected to be published in the near future. OSHA has prepared a preliminary estimate of the costs of expansion of the EPA requirements into the non-manufacturing sector. This estimate is addressed further in the section of this preamble dealing with the regulatory impact analysis for the final rule.

EPA has established a toll-free hotline to answer questions concerning the requirements: Chemical Emergency Preparedness Program Hotline, 1-800/535-0202; in Washington, DC at 1-202/479-2449.

II. Summary and Explanation of the Issues and the Provisions of the Final Standard

This final rule is both an expansion and revision of the current HCS. The regulatory text presented herein includes the unchanged provisions of the present rule, as well as those which OSHA is changing. This was done to ensure that readers can clearly follow where these changes would appear in the standard. As explained below, the substantive changes were found to be necessary and appropriate for a hazard communication standard covering all workers exposed to hazardous chemicals. OSHA is also making several corrections and minor technical amendments to the standard. OSHA finds prior public notice and comment for these minor amendments to be unnecessary because of their non-substantive nature. 5 U.S.C. 553(b); 29 CFR 1911.5.

The discussion which follows will address the changed provisions of the rule, as well as the issues related to these changes. A detailed summary and explanation of the current rule's provisions is only provided when necessary for the discussion of the modification. For a complete explanation of the existing provisions, please see the preamble to the current HCS (48 FR 53334-40). The current rule is codified at 29 CFR 1910.1200, and was published at 48 FR 53340-48. The modified trade secret provisions are discussed at 51 FR 34590.

This discussion is organized by paragraph of the standard, and is presented in the order these paragraphs appear in the HCS.

For ease of reference, OSHA will be printing the same rule in full in 29 CFR Part 1910 (in § 1910.1200) for general industry, 29 CFR Part 1928 (in § 1928.59)

for construction, and in 29 CFR Parts 1915, 1917, and 1918, for the use of the maritime industry (at new §§ 1915.99, 1917.28, and 1918.90, respectively).

(a) Purpose

All references to the manufacturing sector, SIC Codes 20 to 39, have been deleted to reflect the expansion of the scope to all employers and employees. It should be noted that these changes have been made throughout the provisions of the rule, wherever the HCS currently addresses employers and employees in the manufacturing sector rather than employers and employees in general. Despite the expansion of covered employers from manufacturers to all employers, however, OSHA retains in this final rule the distinction between chemical manufacturers and importers who produce or import hazardous chemicals, and downstream employers who merely use the chemicals. Only the former are to prepare the technical hazard information for labels and materials safety data sheets accompanying hazardous chemicals, whereas all employers are to pass this information on to their workers potentially exposed to the chemicals through a comprehensive hazard communication program which includes individual training.

The original Hazard Communication Standard included, at 29 CFR 1910.1200(a)(2), a generally-worded statement concerning the Agency's position regarding the preemptive effect of the standard. This paragraph has been revised to more explicitly state the Agency's position regarding preemption based on the provisions of the Act and related legal actions. This final rule significantly expands the number of industrial groups to which the Federal standard applies, and thus it significantly expands the area in which state and local laws will be preempted.

Section 18(a) of the Act, 29 U.S.C. 667(a), provides that a state may assert jurisdiction through any court or agency over "any occupational safety or health issue with respect to which no standard is in effect under section 6." Conversely, where OSHA has issued a standard, section 18 expressly preempts states from asserting jurisdiction through any court or agency over the issue addressed by that standard, unless a Federally-approved State plan is in effect. 29 U.S.C. 667(a) and (b); 29 CFR 1901.2.

The express preemption provisions of the Act apply to all state or local laws which relate to an issue covered by a Federal standard, without regard to whether the state law would conflict with, complement, or supplement the Federal standard, and without regard to

whether the state law appears to be "at least as effective as" the Federal standard. The "at least as effective as" test applies only to state standards adopted under an approved State plan. 29 U.S.C. 667(c)(2). In enacting OSHA, Congress rejected provisions which would have permitted states to enforce laws which were "not in conflict with" or "at least as effective as" Federal OSHA standards. See Senate Comm. on Labor and Public Welfare, 92d Cong., 1st Sess., Legislative History of the Occupational Safety and Health Act of 1970, at 58, 706 (Comm. Print 1971). Instead, Congress enacted section 18 providing that Federally-approved State plans are the exclusive alternative to preemption.

Since the promulgation of OSHA's original Hazard Communication Standard, a number of court decisions have dealt with the effect of express and implied Federal preemption upon state and local hazard communication or "right-to-know" laws. *United Steelworkers of America v. Aucther*, 763 F.2d 728, 733-36 (3d Cir. 1985) (Federal Hazard Communication Standard expressly preempts state hazard disclosure laws in manufacturing sector); *New Jersey State Chamber of Commerce v. Hughey*, 774 F.2d 587 (3d Cir. 1985) (provisions of New Jersey right-to-know law which pertain primarily to community or environmental safety and health are not expressly preempted; right-to-know laws subject to implied preemption if they make it impossible to comply with Federal law or pose an obstacle to objectives of the Federal Act); *Manufacturers Association of Tri-County v. Knepper*, 801 F.2d 130 (3d Cir. 1986) (similar holding in connection with Pennsylvania right-to-know law).

The revised paragraph (a)(2) specifically provides that both state and local laws pertaining to occupational hazard communication are preempted by the Federal standard. In the one court decision which has addressed the question, the United States Court of Appeals for the Sixth Circuit ruled that the Federal Hazard Communication Standard preempts local as well as state laws. *Ohio Manufacturers Association v. City of Akron*, 801 F.2d 824 (1986). The court noted that the text of § 1910.1200(a)(2) did not mention localities and referred only to preemption of "state" laws. *Id.* at 827, 831-832. Nevertheless, relying upon references to local as well as state laws in the preamble to the 1983 standard, the court correctly inferred that OSHA had intended to preempt all non-Federal occupational hazard communication

laws. *Id.* at 832. Therefore, in accordance with the Court decision, OSHA is making a technical amendment to paragraph (a)(2) so that it explicitly states that the HCS preempts local worker right-to-know laws.

The revised § 1910.1200(a)(2) not only defines hazard communication as an "issue" under the terms of the Act, but also enumerates the generic areas addressed by the standard for purposes of establishing the parameters of preemption. Thus any State or local government provision requiring the preparation of material safety data sheets, labeling of chemicals and identification of their hazards, development of written hazard communication programs including lists of hazardous chemicals present in the workplace, and development and implementation of worker chemical hazard training for the primary purpose of assuring worker safety and health, would be preempted by the HCS unless it was established under the authority of an OSHA-approved State plan.

(b) Scope and Application

Laboratories. With regard to the coverage of laboratories, specifically addressed in paragraph (b)(3), OSHA concludes that the current rule's provisions, requiring only that labels and material safety data sheets received with incoming chemicals be maintained and that the general training of paragraph (h) be provided, are feasible for non-manufacturing laboratories as well. *See, e.g.,* comments of the Massachusetts Institute of Technology, H-022D, Ex. 2-120 ("We agree that the Hazard Communication Standard's requirements for labs are adequate. . . . We expect our compliance costs to remain at the current level of spending because the majority of these are start-up costs and some activities have been absorbed and integrated within existing programs.") OSHA believes that these somewhat limited hazard communication requirements for manufacturing laboratories are also appropriate for non-manufacturing laboratories because both share the operating conditions that distinguish them from the typical industrial workplace: they commonly use small quantities of many different hazardous chemicals for short periods of time; the conditions and purposes of the use of the chemicals frequently change, often unpredictably; many substances are of unknown toxicity; and many workers are highly trained. *Compare* 48 FR 53287-89, with 51 FR 26663-64. OSHA concludes that the same HCS provisions tailored for manufacturing laboratories are appropriate for the protection of all

laboratory workers within OSHA's jurisdiction.

It should also be noted that OSHA is currently proceeding with a specific rulemaking to directly address "Occupational Exposure to Toxic Substances in Laboratories" (51 FR 26660; July 24, 1986). When that rule becomes final, its provisions may supplement the information transmittal requirements of the HCS by directly reducing hazardous chemical exposures in laboratories by requiring, among other things, safe work practices. As noted in that proposal, the final rule might modify the general information and training requirements in the HCS to incorporate other aspects of that standard. Any changes in the application of the HCS provisions to laboratories will be addressed in detail in the final rule for laboratories and will be based on that rulemaking record (Docket H-150).

Coverage determined by "exposure." The HCS covers situations where employees "may be exposed" to hazardous chemicals (paragraph (b)(2)), and such exposure is defined to include potential exposure as well as actual exposure. This is to ensure that employees receive information about all chemical hazards in their work areas, and that they are prepared to deal with any unexpected releases or emergency situations, as well as exposures during the normal course of employment. OSHA concluded that employees are entitled to information regarding the chemicals to which they are exposed in their work areas. It should be noted, however, that individual facilities and workplaces may have some employees who are covered since their work involves exposure to hazardous chemicals, and others who are not covered because their work does not. For example, in a retail department store, maintenance workers or workers in a graphic arts department may be covered since their jobs involve exposure to chemicals, but an accountant in the billing department would not be likely to experience exposure that would require coverage by the HCS.

There are a number of work situations where employees only handle sealed containers of chemicals, and under normal conditions of use would not open the containers and would not expect to experience any measurable exposure to the chemicals. Such work operations include, for example, warehousing, retail sales, marine cargo handling, and trucking terminals. It is reasonable to assume, however, that all such containers are subject to leakage and

breakage, and these employees are in fact potentially exposed by virtue of the presence of these hazardous chemicals in their workplaces. Because of this potential exposure, they need information to protect themselves from the hazards of these chemicals in the event such an emergency situation occurs.

However, OSHA has considered the extent of information necessary or appropriate in this type of operation, and the practicality of requiring such work operations to be subject to all of the provisions of the rule. The primary need is to ensure that these employees know how to acquire and use the hazard information available to them, and to handle an emergency exposure situation. As in laboratory operations, maintaining lists of chemicals where the chemicals present may change on short notice, sometimes on a daily basis, is not a useful requirement. Similarly, obtaining material safety data sheets for every chemical in a sealed container that passes through a facility—even if it is there less than a day in some situations—would result in a considerable amount of paperwork, with little discernable benefit for the employees involved. Therefore, OSHA has added a provision, paragraph (b)(4), to limit the duties of employers for those work operations where employees only handle sealed containers that are not intended to be opened under normal conditions of use. (Some States which have adopted right-to-know laws have also recognized the practical problems of coverage in this area, and have included provisions limiting coverage of workplaces where chemicals are handled in sealed containers. *See, e.g.,* Tennessee Hazardous Chemical Right to Know Law, Tennessee Code Annotated, 50-3-2001 through 50-3-20019.) In these situations, employers must not remove labels affixed to incoming containers of hazardous chemicals; must maintain and provide access to material safety data sheets that are received for hazardous chemicals while the chemicals are in the workplace, and obtain material safety data sheets when they are not received but an employee requests one; and must train employees in accordance with the provisions of the rule to ensure they are protected in the event of a spill or leak.

The employees in these operations will always have access to the label information, which will provide appropriate hazard warnings and be a visual reminder of the potential hazards if exposure occurs. Employees will also be trained regarding the general classes of chemical hazards faced and the means by which they can protect

themselves from these hazards when there is a spill or leak. The training must also address the availability and use of substance-specific information found on labels and material safety data sheets, where available. These requirements should provide employees handling only sealed containers of chemicals with the information they need.

This limited provision also addresses some of the concerns raised by representatives of industries with these types of workplaces. (See, e.g. Exs. 2-53, 2-75, 2-201, and 2-214). Although they generally were arguing that this type of operation warrants exclusion from the rule, OSHA does not agree that no protection under the HCS is required in these situations. As already described, a potential for exposure does exist, and therefore such employees must be appropriately covered. OSHA believes the limited coverage described will effectively protect employees while recognizing the constraints of the particular work operations involved with regard to the applicability of the current rule to these types of work.

Labeling exemptions. The HCS includes a number of labeling exemptions to ensure that OSHA does not provide duplicative coverage for products which are already labeled under the rules of another Federal agency. It should be reemphasized that these exemptions (in paragraph (b)(4) of the original rule; paragraph (b)(5) in this final rule) are only from the container labeling requirements under paragraph (f)—all other provisions of the rule are still in effect. A minor correction is being made, however, to these exemptions to indicate that when medical or veterinary devices are labeled in accordance with the labeling requirements of the Food and Drug Administration (FDA) under authority of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 *et seq.*), those items are exempted from HCS labeling requirements. All other items regulated by FDA under that Act were listed in the HCS labeling exemption. Medical and veterinary devices were inadvertently omitted from the list of items that might be subject to FDA labeling requirements under the Federal Food, Drug, and Cosmetic Act, and they are exempted from HCS labels for the same reasons that the other items are exempt when subject to labeling under FDA. See 48 FR 53289. To ensure that all these FDA regulated items are treated in the same manner and that devices are exempted from HCS labeling if subject to FDA labeling, paragraph (b)(5)(ii) is amended by adding medical and veterinary devices.

Other exemptions. The HCS includes a number of specific, total exemptions from the requirements of the rule for certain types of chemicals. This rule adds three categories of exemptions: food, drugs, cosmetics, or alcoholic beverages in a retail establishment packaged for retail sale (paragraph (b)(6)(vi); consumer products (paragraph (b)(6)(vii)); and certain pharmaceuticals (paragraph (b)(6)(viii)).

Food, drugs, cosmetics, alcoholic beverages. The current HCS includes an exemption for food, drugs, or cosmetics brought into the workplace for employee consumption. These types of exposures are not related to an employee's work, and therefore do not need to be covered under the HCS.

The expansion of the HCS into the non-manufacturing sector will result in many of these types of products being present in workplaces (e.g., liquor stores) where they are not intended for employee consumption, and where they normally would not result in employee exposure because they are packaged for sale to consumers. Although some of these products may meet the definition of a "hazardous chemical" (e.g., vinegar is acetic acid), when packaged for retail sale they do not pose a hazard to workers that is any different than the hazards of such products in their homes. The label information required by other Federal agencies for foods, drugs, cosmetics, and alcoholic beverages should thus provide sufficient protection for workers, and OSHA has exempted these products from coverage under the rule. It should be noted that this is not an exemption for facilities of any particular industry, as all facilities may have other chemicals in use that would be covered by the HCS. In addition, since these products are exempted, employers which package them for retail sale would not have to furnish material safety data sheets to distributors receiving the products.

Consumer products. The current rule provides a labeling exemption for consumer products when they are labeled in accordance with the requirements of the Consumer Product Safety Commission (CPSC). CPSC requires consumer products which contain hazardous substances to be appropriately labeled. Examples of consumer products would include such items as oven cleaner, paint stripper, and adhesive, which may be found in various types of workplaces. In addition to the specific labeling exemption, OSHA has been interpreting the rule as not being applicable to consumer products when used as a consumer product. OSHA is now adding

this interpretation to the rule itself, paragraph (b)(6)(vi), stating that where such consumer products are used in the workplace in a manner comparable to normal conditions of consumer use, resulting in a duration and frequency of exposure to employees which is no greater than exposures experienced by ordinary consumers, under such conditions the chemical would not have to be included in the employer's hazard communication program. This position is consistent with OSHA's reason for originally limiting the exemption for hazardous consumer products used in the course of employment to only an exemption from HCS labeling, and not material safety data sheet and training requirements. "OSHA recognizes . . . that there may be situations where worker exposure is significantly greater than that of consumers, and that under these circumstances, substances which are safe for contemplated consumer use may pose unique hazards in the workplace." 48 FR 53289. However, to the extent that workers are exposed to the substances in a manner similar to that of the general public, there is no need for any HCS requirements.

One example of such a differentiation in exposure situations involves the use of abrasive cleaners in the workplace. Where these are used intermittently to clean a sink, much as they would be used at home, the cleaners would not be covered under the standard. But if they are used to clean out reactor vessels, thus resulting in a much greater level of exposure, they would be covered. Or if an employee cleans sinks all day long, thus resulting in more frequent exposures, the abrasive would also be included in the hazard communication program. Thus workplaces which only have chemicals which are consumer products used in the same way and as frequently as the general public would normally use them, would not have to have a hazard communication program.

It should be noted that OSHA intends to read this exemption narrowly. Where an employer is uncertain whether the duration and frequency of exposure to these products is comparable to consumer use, an employer should obtain or develop the material safety data sheet and make it available to employees.

In response to questions raised in the 1985 ANPR, OSHA received a few comments on the use of consumer products in the non-manufacturing sector. A number indicated that overexposure may occur from the use of such products, or that the frequency and duration of workplace exposure is typically greater than that experienced

by consumers (Exs. 2-59, 2-83, 2-100, 2-120, and 2-164). Others stated that the exposure was comparable to consumer use (Exs. 2-46 and 2-63). There were several that felt the label provided enough information, and no additional requirements were needed to protect employees (Exs. 2-75, 2-79, 2-99, 2-107, and 2-116), while others felt the employer should be required to request material safety data sheets because employees are not getting enough information (Exs. 2-109, 2-128, and 2-169). One suggested that the label note that a material safety data sheet is available on request (Ex. 2-100), while another contended that when a product is used by a professional, it is no longer a consumer product (Ex. 2-199). OSHA believes that the consumer product exemption in this final rule takes all of these concerns into consideration, and strikes a balance between the practical considerations of acquiring and maintaining material safety data sheets on CPSC regulated products which employees are exposed to at home as well as at work, and the worker's need for more hazard information than a CPSC label when exposures are greater or more frequent than typical public use of the chemical would generate.

A number of States adopting right-to-work laws have also developed consumer product exemptions. (See, e.g., Wisconsin "Employees' Right to Know Law"; Illinois "Toxic Substances Disclosure to Employees Act.") However, most of these rules have taken a broader approach to the consumer product exemption, generally eliminating coverage of such products unless exposure is "significantly greater" than consumer exposure during the "principal consumer use." OSHA considered and rejected such language for the consumer product exemption. It would be very difficult from an enforcement perspective to determine when exposure to a consumer product is "significantly greater" than consumer exposure. The key elements of concern to OSHA are as stated in the consumer product exemption included in this rule—that the consumer product be used in the same manner as a consumer would use it (and therefore as intended by the manufacturer when preparing the label information), and that the duration and frequency of exposure be essentially the same as would be experienced by a consumer (and thus the label warnings would provide adequate protection.) A broader exemption than this would not be appropriate to protect workers from occupational exposures that were not anticipated by the manufacturer when

the labels, and thus the protective measures, were developed.

Application to Office Products. A number of questions have been raised about the application of the rule to office products that may contain hazardous chemicals. It is OSHA's determination that office products such as pencils, pens, typewriter ribbons, and the like, are "articles" under the rule and therefore exempted, paragraph (b)(6)(iv). Employers are not therefore required to implement a program for such products. OSHA has also determined that intermittent, occasional use of a copying machine to make copies is not covered by the rule. The copying machine would also be considered an article for purposes of this standard. However, if a firm has a copying machine operator who is responsible for handling the chemicals associated with its use, or who operates the machine frequently, that individual would be entitled to information under the rule.

Medicine. The rule, paragraph (b)(6)(vii), also includes an exemption for drugs when they are solid, and are in final form for direct administration to the patient (i.e., pills or tablets). Employees handling such finished drug products would not be exposed to the chemicals involved, and would not need information other than that supplied on the container label under FDA requirements. (The State of North Carolina adopted a similar exemption in their Hazard Communication Standard, 13 NCAC 27C.101(a)(99)).

Wood dust. As OSHA has received a number of questions regarding the application of the wood and wood products exemption to wood dust, OSHA would like to reiterate its interpretation regarding the wood and wood product exemption in paragraph (b)(6)(iii) of this final rule. The wood and wood products exemption was included in the HCS for two reasons. First, the presence and identity of wood and wood products in the workplace is "unmistakable" and second, their hazards (i.e., flammability or combustibility) are well-known to workers. 48 FR 53289. Because wood and wood products, characteristic hazards are self-evident, regulations requiring formal notification were not thought to be necessary. Wood and wood products "are not expected to be hazardous for purposes of this standard." *Id.* at 53335. OSHA never intended, however, that wood dust be excluded from the standard's coverage under the wood and wood products exemption. Wood dust is not generally a wood "product," but is created as a byproduct during manufacturing

operations involving sawing, sanding, and shaping of wood. Wood dust does not share solid wood products' "self-evident" hazard characteristics that supported the exemption of wood products from the HCS' coverage. Except for the chemical additives present in the wood, products such as lumber, plywood, and paper are easily recognizable in the workplace and pose a risk of fire that is obvious and well-known to the employees working with them. The potential for exposure to wood dust within the workplace, especially with regard to respirable particles, is not self-evident, nor are its hazards through inhalation so well-known that hazard communication programs are unnecessary.

"Wood dust" is a recognized health hazard, with exposure limits recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) to control employee exposures to the substance. Under the provisions of the HCS, this means that wood dust is to be considered a hazardous chemical (paragraph (d)(3)(ii)), and therefore subject to the requirements of the rule including material safety data sheets and training.

(c) Definitions

The only changes to the definitions in the current HCS are those that need to be made to accomplish the expansion of the HCS.

The reference to SIC Codes 20 through 39 is being deleted from the definition of "chemical manufacturer" to be consistent with the extent scope of the rule. Any employer who produces a hazardous chemical for "use or distribution" is considered a "chemical manufacturer" under the HCS, and must prepare and provide the appropriate hazard information.

OSHA has modified the definition of "container" to exempt "engines, fuel tanks, or other operating systems in a vehicle." The Agency has received some questions regarding the need for labeling such parts of a vehicle in applying the rule to the manufacturing sector. Expansion into non-manufacturing will greatly increase the number of vehicles involved in work operations, and thus OSHA determined that this clarification will ensure that the Agency's position regarding this issue is clear—vehicles do not have to bear labels regarding hazardous chemicals used to operate them. This does not exempt such chemicals from coverage by the rule—it simply eliminates the need to label once they are placed into the vehicle.

The definition of "distributor" has also been changed to reflect the

extended scope of the rule. A "distributor" means "a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers." Among other things, distributors must transmit hazard information they receive from chemical manufacturers and importers to all their employer customers.

Under the current rule, OSHA defined "employee" as someone working in the manufacturing sector, and stated that those employees in manufacturing whose jobs did not involve routine potential exposure to hazardous chemicals would not generally be covered by the rule. Examples related to the manufacturing sector were provided. This was intended to limit the coverage primarily to those employees in the industry who were actually involved in production operations. However, since the scope of the entire standard is being expanded to cover employees in all types of work operations, the definition has been modified to clarify that workers who are exposed to hazardous chemicals as part of their assigned jobs would generally be covered under the rule, except for those who only encounter hazardous chemicals in non-routine, isolated instances. OSHA believes most office workers, and many other workers, are not exposed to the hazardous chemicals covered by the HCS in such a way that the rule would apply to those types of work operations. The rule, therefore, simply defines a covered "employee" as any "worker who is exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies" and further states that "workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered." "Normal operating conditions" are those which employees encounter in performing their job duties in their assigned work areas. For example, if the receptionist in a facility receives and delivers a telephone message for someone in a different work area where hazardous chemicals are present, this does not mean that the receptionist would be covered under the rule by virtue of the one potential exposure from delivering the message. However, if performance of the receptionist's job entails walking through the production area every day, and thus being potentially exposed during the performance of regular duties, that job would be covered under the rule.

The definitions of "employer" and "importer" are also amended to indicate

that all employers are covered by the standard. In addition, the definition of "employer" is amended to indicate that the term includes contractors and subcontractors. This reflects the definition of employer used in OSHA's construction standards. Similarly, the definition of "workplace" has been modified to specifically include job sites and projects.

Hazard warning. While OSHA is not modifying the definition of "hazard warning" contained in the current rule, the Agency wishes to reiterate the intent to help employers better understand and comply with the requirements. "Hazard warning" means "any words, pictures, symbols, or combination thereof which convey the hazard(s) of the chemical(s) in the container(s)." "Appropriate hazard warnings" are to be put on container labels. (See final rule paragraphs (f)(1)(ii) and (f)(5)(ii)). Since the rule covers "physical" and "health" hazards, specific information regarding these would be required on a label to comply.

Many labels at the time the HCS was promulgated includes only precautionary statements, rather than providing necessary information about the specific hazards of the chemicals. Thus employees encountered statements such as "avoid inhalation" on virtually every chemical container, but were not provided with statements regarding what type or severity of effect inhalation could be expected to produce.

Therefore, OSHA's standard requires identity and hazard information on labels. Although employers can choose to provide additional statements, OSHA's requirements are limited to that required to convey the hazards to the workers. Under the OSHA scheme, other data regarding protective measures, first aid, etc., are to be included on the material safety data sheet or in training, rather than appearing on the label itself. This approach is in keeping with the Agency's evaluation of available data on effectiveness of labels which indicates that the more detail there is on a label, the less likely it is that employees will read and act on the information. The purpose of the label is to serve as an immediate visual warning of the chemical hazards in the workplace. (See generally, 48 FR 53300-03).

There have been misinterpretations of the requirements made based on statements in the preamble to the current rule concerning various labeling systems (see 48 FR 53301). This preamble discussion involves format of labels, and is not an unqualified

endorsement of any particular labeling system. It simply states that any format may be used, as long as the label includes the information regarding the chemical hazards required by the standard. It should be noted that it can be expected that some labels prepared in accordance with any of the available labeling systems can be expected to be found to be deficient. Again, the preamble discussion cited merely reemphasized that employers are not constrained to use any particular format or wording, but are constrained by the necessity to comply with the requirements of the rule concerning the information to be provided—the identity, the hazards, and for containers leaving the workplace, the name and address of the responsible party.

The terms "physical" and "health" hazards are already defined in the rule, and these are the specific hazards that are to be "conveyed" in an "appropriate" hazard warning. There are some situations where the specific target organ effect is not known. Where this is the case, a more general warning statement would be permitted. For example, if the only information available is an LC₅₀ test result, "harmful if inhaled" may be the only type of statement supported by the data and thus may be appropriate.

It will not necessarily be "appropriate" to warn on the label about every hazard listed in the MSDS. The data sheet is to address essentially everything that is known about the chemical. The selection of hazards to be highlighted on the label will involve some assessment of the weight of the evidence regarding each hazard reported on the data sheet. This does not mean, however, that only acute hazards are to be covered on the label, or that well-substantiated hazards can be omitted from the label because they appear on the data sheet.

It may be "appropriate" to provide less detailed information on the chemical hazards in an in-plant labeling system, where MSDSs and training are readily available, than on a label placed on a container leaving the workplace, where it may provide the only hazard information in certain situations and where there is no guarantee that the downstream employees handling or using the chemical will fully understand the less detailed label. This difference in appropriateness allows employers to establish standardized in-plant labeling systems, as long as training regarding the use of these systems is conducted, and MSDSs provide the required, detailed information.

Article. OSHA is not modifying the definition of "article" but would like to provide some clarification regarding the Agency's interpretation. Releases of very small quantities of chemicals are not considered to be covered by the rule. So if a few molecules or a trace amount are released, the item is still an article and therefore exempted. In an earlier discussion in this preamble, application of the rule to office products was discussed and it was stated that items such as pens or pencils are to be considered articles. Other examples would be: emissions from tires when in use; emissions from toner on pieces of paper; or emissions from newly varnished furniture.

Furthermore, it should be reiterated that the HCS is limited to hazardous chemicals "known to be present" (paragraph (b)(2)), and does not require any chemical analysis or testing to determine or verify such presence. See 48 FR 53334-35. Thus although one may assume that molecules are being emitted from an item, under the standard one does not "know" that a particular hazardous chemical is "present."

The article exemption applies solely to the ultimate end use—intermediate users which result in exposure are covered and require hazard information to be provided. The following are examples of items which would require information for intermediate use prior to being finally installed: encapsulated asbestos insulation where the normal installation involves hammering the material into openings, thus releasing the asbestos; tiles to be placed on a ship's hull which contain lead that is released during installation; and glass mercury switches to be installed in equipment, a percentage of which are expected to break during this installation process. In these cases, installation is the "normal condition of use" for the employees installing the items, and thus hazard information is required for these intermediate uses. Once installed, these items would be articles and thus exempted.

Although installation of an item may render the exemption temporarily void (until the item is installed, information must still be provided if there is a potential for exposure), OSHA does not believe that the possibility that exposure could occur when the item is repaired or worked on need be considered in the determination of when information must be transmitted downstream. Employers of employees performing repairs must provide the best information they have concerning the potential exposures. There would be no way to ensure, for example, that a material safety data

sheet prepared for a lead pipe would be available to a worker repairing the pipe some years following installation. The employer would provide the employees with general information concerning the hazards of the operations they were performing in lieu of specific information on the pipe itself.

(d) Hazard Determination

OSHA is not modifying the current rule's hazard determination requirements. The burden of evaluating chemicals to determine whether they are hazardous remains on the chemical manufacturers and importers who produce or import them and on those user employers who choose not to rely on the evaluations made by their suppliers and instead evaluate the chemicals themselves. A detailed explanation of these provisions can be found at 48 FR 53296-99, 53335-36.

(e) Written Hazard Communication Program

Under the current rule, a written hazard communication program must be developed and implemented for each workplace. Since the current rule covers fixed manufacturing sites, it did not appear to be necessary to specifically state that the written program be available at the site. With expansion to non-manufacturing, however, particularly in the construction industry where a firm may have multiple sites, the standard must be tailored to specifically state that the intent is to maintain the written program at each site. Employees will then be able to access the information as required.

The current written hazard communication program requirements include a provision that requires manufacturing employers to provide hazard information to on-site contractor employers who have employees who may be exposed to the hazards generated by the manufacturer (current paragraph (e)(1)(iii)). The current standard does not address the reverse situation, i.e., where a contractor employer brings hazardous materials on-site, and exposes the manufacturer's employees to them. Since the expanded rule will affect more worksites with work arrangements of this type (e.g., construction), and the need for an exchange of hazard information is obvious, OSHA has revised the requirements to tailor it to address the multi-employer workplace. (This was suggested in comments submitted in response to the ANPR. See Ex. 2-225, comments from the National Constructors Association. In addition, this situation has also been addressed in existing State right-to-know laws. See,

e.g., Alabama Act 85-658; Tennessee "Hazardous Chemical Right to Know Law.")

Under these provisions (paragraph (e)(2)), the employers must exchange material safety data sheets, as well as information about precautionary measures necessary to protect employees and an indication of the type of labeling system in use, where exposures may occur to another employer's employees. Each employer will then have the information necessary to inform and train their employees. This will help ensure that all employees have sufficient information to protect themselves in the workplace, regardless of which employer uses the hazardous chemical.

Consistent with the performance-orientation of the rule, the provisions do not specify how this coordination is to be accomplished. This is best left to the discretion of the parties involved. In many cases, it would probably be most efficient for the general contractor to coordinate the function. For example, the general contractor could keep and make available material safety data sheets in the office on the site.

It should be emphasized that the exchange of information is limited to those situations where exposures of other employers' employees may occur. Given the nature of multi-employer work sites in construction, there would be many situations where subcontractors responsible for various phases of the building project would not have employees present during other phases and thus no such exchange would be required. For example, if the electricians are not working near, or at the same time as, the paving contractor, then no interchange is required. But if a painting contractor's workers are using flammable solvents in an area where another subcontractor is welding pipes, this information exchange is vital to ensure proper protection of employees.

(f) Labels and Other Forms of Warning

A tailoring provision has been added concerning shipments which consist of solid metal. OSHA considers this change to be necessary since the problem addressed will occur more frequently in shipments to the nonmanufacturing sector than has been the case in the manufacturing sector. (Paragraph (f)(2)). Solid metal is often considered to be an "article" under the rule, and thus exempt. Where the metal is not an "article" since its downstream use results in hazardous chemical exposure to employees working with it, a provision has been added which allows shippers of this type of material

to send the label information once, similar to material safety data sheet transmittal, as long as the material is the same and it is being shipped to the same customer. In these situations, there should be no hazard to anyone handling the metal from the time it is produced in solid form, until the time someone works on it in a way that releases a chemical hazard. Since the label information transmitted would only reflect the chemical hazards released when it is later worked on, the label would not provide any hazard information that is needed by those handling the material in transit. It must be emphasized that this exception is only for the solid metal itself—any hazardous chemicals present in conjunction with the metal in such a form that employees may be exposed when handling the material (e.g., cutting fluids, lubricants, and greases), require labels with each shipment. This tailoring provision, therefore, does not diminish worker protection—workers get the hazard information they need.

(g) Material Safety Data Sheets

Under the hazard determination provisions, a requirement is included which indicates that there are situations where the percentage cut-off for mixtures would not apply—when the released chemical is particularly hazardous, or when it could exceed an established permissible exposure limit or Threshold Limit Value when released (paragraph (d)(5)(iv)). Although this is clearly a requirement of the rule, see also 48 FR 53336, the material safety data sheet provisions for disclosure of hazardous ingredient identities did not address that particular situation. Clearly it was OSHA's intent to have all hazardous ingredients of mixtures listed on a material safety data sheet, even those in very small concentrations, when the hazard determination provisions of paragraph (d) mandate that they are to be considered hazardous for purposes of the HCS. As noted in the HCS preamble discussion of the material safety data sheet provisions: "Employers must also list ingredients present in concentrations of less than one percent if there is evidence that the permissible exposure limit may be exceeded or if it could present a health hazard in those concentrations." *Id.* at 53337. This obvious oversight has been corrected by a minor amendment to the rule. Paragraph (g)(2)(i)(C)(2).

Another situation which raises practicality concerns because of the expansion of the scope of the rule involves employers who purchase hazardous chemicals from local retail distributors, rather than directly from the chemical manufacturer or importer,

or from wholesale distributors as is more commonly done in the manufacturing sector. Under the current HCS, distributors of hazardous chemicals must automatically provide commercial customers material safety data sheets (paragraph (g)(7)). Retail distributors, however, often sell to businesses and the general public and frequently have no way of knowing who a particular purchaser is. Under the current rule, retail distributors might have to give material safety data sheets to each customer to ensure that commercial customers get the information they need under the HCS. A specific statement regarding retail distributors is, therefore, included in paragraph (g)(7) to address this practical problem. Those retail distributors who sell hazardous chemicals to employers must provide a material safety data sheet upon request, and must post a sign or otherwise inform the employers that an MSDS is available. According to Schneider Hardware of Banksville, Inc., this is a reasonable approach (Ex. 2-179):

If OSHA does require commercial customers to get information through a retail outlet, I do not foresee any problems with that arrangement. The manufacturers could supply us with the information, as they are required to now for shipments to manufacturing plants, and we could make it available to customers upon request. We would merely keep the sheets in a file drawer and post a sign informing customers of their availability. We have less than 100 chemicals that would probably be affected, and keeping information on those would require at most, one file drawer. It would not be burdensome.

The retail distributors likely affected are those selling building supplies, hardware, etc. Retail distributors will have to assess their product lines, and whether or not they have commercial accounts, to determine whether they must comply with this provision. It is clear that most other types of retail establishments (e.g., grocery stores, clothing stores, etc.) would not.

With regard to the maintenance of material safety data sheets so that they are readily available to employees, whereas manufacturing facilities are generally fixed work sites with fixed locations for these materials, in some types of nonmanufacturing work operations, employees must travel between work areas during a workshift. For example, employees involved in servicing oil and gas wells may have a central office location, but then travel by truck to the wells to perform their work. These remote locations may not have any staff, or may not have an office facility. OSHA has added a provision to the MSDS requirements to allow MSDSs

to be kept at a central location in this type of situation, as long as the employer ensures that the employees can immediately obtain the information in an emergency, paragraph (g)(9). OSHA believes that this provision tailors the HCS so that it remains practical, yet effective, in getting workers the hazard information they need. This was also supported by a number of ANPR commenters (see, e.g., Exs. 2-83, 2-107, 2-114, 2-116, and 2-117).

The current rule, as well as the expanded standard, allows downstream employers to rely on upstream chemical manufacturers and importers to provide MSDSs. However, there is a duty for downstream users to request an MSDS when they don't receive one at the time of the first shipment. There have been some questions regarding how the downstream user will know a data sheet is required without doing a hazard evaluation. Such an evaluation is not necessary. If the label indicates a hazard, the employer will know he needs a data sheet and must request one if it is not received. If there are no hazards on the label, the downstream user can assume the product is not hazardous and a data sheet is not required.

(h) Employee Information and Training

OSHA is not making any modifications to the current rule's information and training provisions. These requirements remain performance-oriented and designed so that each employer will adequately address the hazards posed by chemicals in the workplace. An explanation of these provisions can be found at 48 FR 53310-12, 53337-38.

One question that does arise regarding training is whether it needs to be done specifically on each chemical, or whether employers can train regarding categories of hazards. Either method would be acceptable. See 48 FR 53312, 53338. If employees are exposed to a small number of chemicals, the employer may wish to discuss the particular hazards of each one. Where there are large numbers of chemicals, the training regarding hazards could be done on categories (e.g., flammable liquids; carcinogens), with employees being referred to substance-specific information on the labels and MSDSs. Similarly, the re-training occurs when the hazard changes, not just when a new chemical is introduced into the workplace. If the new chemical has hazards which employees have been trained about, no re-training occurs. If the chemical has a hazard they have not

been trained about, re-training would be limited to that hazard.

(i) Trade Secrets

Paragraph (i)(11) of the current rule states that "[i]f, following the issuance of a citation and any protective orders, the chemical manufacturer, importer, or employer continues to withhold the information, the matter is referable to the Occupational Safety and Health Review Commission for enforcement of the citation. . . ." This provision was worded in such a manner that it left the impression that OSHA could refer the matter to the Review Commission. This is incorrect as a matter of law. An enforcement proceeding is referred to the Review Commission when a citation is issued by OSHA, and is subsequently contested by the employer receiving the citation. Therefore, OSHA has made a technical amendment to paragraph (i)(11) to reflect the applicable procedural law.

(j) Effective Dates

The expansion of the rule to cover all employers becomes effective nine months from the date of promulgation of the final standard. Since the chemical hazard information for labels and material safety data sheets has already been generated in the manufacturing sector, and in many cases has also been distributed in non-manufacturing due to State law requirements and voluntary transmittal by suppliers, one month should be sufficient time for chemical manufacturers, importers, and distributors to initiate provision of material safety data sheets to other distributors and to customers in the non-manufacturing sector. An additional eight months is being provided for non-manufacturers to complete preparation of a written hazard communication program for each facility and to conduct employee training. It should be noted that this eight month period for compliance only applies to those employers which are newly covered under the expanded provisions—employers in SIC Codes 20 through 39 are covered under the current HCS and are already required to be in compliance with the provisions of that rule. Those tailoring provisions that apply to manufacturing workplaces, such as the consumer product exemption, go into effect immediately for those facilities.

Appendices A and B

OSHA is not amending Appendix A's discussion of the health hazards posed by chemicals, or Appendix B's discussion of hazard determination. They remain applicable to all chemical manufacturers, importers, and

employers performing hazard determinations.

Appendix C

The reference sources listed in this non-mandatory appendix have been updated to reflect currently available sources.

Appendix D

The recent rulemaking on trade secrets added a new Appendix D regarding the evaluation of the validity of trade secret claims. 51 FR 34590. The full text of this appendix has been reprinted in this document as well.

III. Analyses of Regulatory Impact, Regulatory Flexibility, and Environmental Impact

The following is a summary of the regulatory impact and regulatory flexibility analysis prepared by OSHA for the revision of the Hazard Communication Standard which extends the scope of the existing standard to the nonmanufacturing sector. The full text of the document may be examined and copied in OSHA's Docket Office, 200 Constitution Avenue, NW., Room N3670, Washington, DC 20210; telephone (202) 523-7894.

Economic Analysis

As part of OSHA's efforts to gather information concerning the economic feasibility of extending the coverage of the HCS to include workplaces in the nonmanufacturing sector, the JACA Corporation performed a study examining the benefits, costs, and overall economic impact of such a revision. This report was used as the basis for the regulatory impact analysis prepared by OSHA.

The analysis reflects the extent to which employers in the nonmanufacturing sector are currently subject to state right-to-know laws and are voluntarily implementing their own hazard communication programs. The analysis also takes into account OSHA's existing policy regarding the use of consumer products and training requirements already imposed on employers by other OSHA standards. With respect to consumer products covered by the HCS, OSHA Instruction CPL 2-2.38A ("Inspection Procedures for the Hazard Communication Standard, 29 CFR 1910.1200") states:

A common sense approach must be employed whenever a product is used in a manner similar to which it could be used by a consumer, thus resulting in levels of exposure comparable to consumer exposure. The frequency and duration of use should be considered. For example, it may not be necessary to have a data sheet for a can of

cleanser used to clean the sink in an employee restroom. However, if such cleanser is used in large quantities to clean process equipment, it should be addressed in the Hazard Communication Program.

This policy has been incorporated into the revisions to the HCS, and was taken into account when evaluating data describing the number of hazardous chemicals in the various two-digit SIC groups that could be affected by extension of the HCS to the nonmanufacturing sector.

Assessing the net impact of the training provisions required identifying and deducting the costs of existing OSHA standards which already require employers to provide the types of information and training activities prescribed in the HCS. This was done for construction (§ 1926.21), shipbreaking (§ 1915.97), marine terminals (§ 1917.22), and longshoring (§ 1918.86). However, it was not possible to separately identify and deduct the existing training costs for substance-specific standards that currently apply to the nonmanufacturing sector. Thus, the compliance costs presented in this analysis are somewhat overstated.

In extending the rule for manufacturing to the nonmanufacturing sector, OSHA has made revisions to reflect unique aspects of some work operations. For example, the standard allows MSDSs to be maintained at central locations in circumstances where employees must travel between work operations during a workshift, provided that the information can be obtained immediately in an emergency. This provision is expected to lower costs in SIC groups 07, 08, 09, 13, 46, 49, and 73. (See Table 1 for a description of the SICs.)

The standard also allows for limited coverage in those work situations where employees handle chemicals in sealed containers that are not opened under normal conditions of use, and thus have little potential for measurable exposures. Employers would be required to leave warning labels on containers, and make available any MSDSs received with the containers. Employers would also have to be trained in accordance with the standard, with particular emphasis on procedures to follow if there is a spill or leak of the hazardous chemicals in the normally sealed containers. Affected establishments would not have to make special efforts to obtain and keep MSDSs that are not received with the chemicals, and no written plan for complying with the HCS would be required. This provision is expected to

result in lower costs in SIC groups 42, 44, 45, 47, 51, and 52.

Thus the changes made to establish more appropriate provisions for unique work situations should result in lower costs than would be experienced if the HCS for manufacturing were extended to the nonmanufacturing sector without revision.

Table 1.—SIC Groups Covered in the OSHA Analysis

Division A. Agriculture, Forestry, and Fishing

- Major Group 01. Agricultural production—crops
- Major Group 02. Agricultural production—livestock
- Major Group 07. Agricultural services
- Major Group 08. Forestry
- Major Group 09. Fishing, hunting, and trapping

Division B. Mining

- Major Group 13. Oil and gas extraction

Division C. Construction

- Major Group 15. Building construction—general contractors and operative builders
- Major Group 16. Construction other than building construction—general contractors
- Major Group 17. Construction—special trade contractors

Division E. Transportation, Communication, Electric, Gas, and Sanitary Services

- Major Group 40. Railroad transportation
- Major Group 41. Local and suburban transit and interurban highway passenger transportation
- Major Group 42. Motor freight transportation and warehousing
- Major Group 44. Water transportation
- Major Group 45. Transportation by air
- Major Group 46. Pipe lines, except natural gas
- Major Group 47. Transportation services
- Major Group 48. Communication
- Major Group 49. Electric, gas, and sanitary services

Division F. Wholesale Trade

- Major Group 50. Wholesale trade—durable goods
- Major Group 51. Wholesale trade—nondurable goods

Division G. Retail Trade

- Major Group 52. Building materials, hardware, garden supply, and mobile home dealers
- Major Group 53. General merchandise stores
- Major Group 54. Food stores
- Major Group 55. Automotive dealers and gasoline service stations
- Major Group 56. Apparel and accessory stores
- Major Group 57. Furniture, home furnishing, and equipment stores
- Major Group 58. Eating and drinking places
- Major Group 59. Miscellaneous retail

Division H. Finance, Insurance, and Real Estate

- Major Group 80. Banking
- Major Group 81. Credit agencies other than banks

- Major Group 82. Security and commodity brokers, dealers, exchanges, and services
- Major Group 83. Insurance
- Major Group 84. Insurance agents, brokers, and service
- Major Group 85. Real estate
- Major Group 86. Combinations of real estate, insurance, loans, law office
- Major Group 87. Holding and other investment offices

Division I. Services

- Major Group 70. Hotels, rooming houses, camps, and other lodging places
- Major Group 72. Personal services
- Major Group 73. Business services
- Major Group 75. Automotive repair, services, and garages
- Major Group 76. Miscellaneous repair services
- Major Group 78. Motion pictures
- Major Group 79. Amusement and recreation services, except motion pictures
- Major Group 80. Health Services
- Major Group 81. Legal Services
- Major Group 82. Education Services
- Major Group 83. Social Services
- Major Group 84. Museums, art galleries, botanical and zoological gardens
- Major Group 86. Membership organizations
- Major Group 89. Miscellaneous services

The analysis of the benefits, costs, and economic impacts of extending the HCS to the nonmanufacturing sector are projected for 40 years. As indicated, the analysis reflects requirements of state right-to-know laws and voluntarily implemented hazard communication programs.

Risk Evaluation/Benefits Analysis

For this analysis OSHA estimated the percentage of workers exposed to hazardous chemicals. The percentage and numbers of exposed workers are shown in Table 2¹ by SIC group. The analysis of risks and benefits proceeds from the current annual incidence of chemical-related injuries and illnesses in the nonmanufacturing sector. For workers in this sector, measures of acute chemical source injuries and illnesses included nonlost workday (NLWD) injuries (13,671) and LWD illnesses (38,249); and fatalities (103). Measures for chronic illnesses include: chronic illness cases (17,153), cancer cases (25,388), and cancer deaths (12,890). The cancer cases category includes cancer deaths. (Note that tables used in the computer models for this analysis may vary slightly from these figures due to rounding.)

The benefits of the standard result from its expected reduction of occupational injuries and illnesses that are chemically related. Specifically, OSHA projects that the standard will avert 20 percent of these injuries and illnesses. (Five percent of all cancer

cases are assumed to be occupationally related; the 20 percent reduction is applied to this 5 percent of all cases among occupationally exposed workers in the nonmanufacturing sector.) However, the full reduction of chronic illnesses and cancers will not occur immediately; rather, the reduction for these cases is phased in over time. For chronic illnesses, the standard is expected to reduce 1 percent of the cases in the first year, 2 percent in the second year, and so on, until it reaches the full reduction of 20 percent. For cancer cases and cancer deaths, the standard is expected not to have an effect for the first 10 years, then it is expected to reduce 2 percent of the cases in the eleventh year, 4 percent in the twelfth year, and so on until it reaches the full reduction of 20 percent.

Benefits were monetized using two independent approaches. The first took into account medical costs and lost earnings incurred by each victim. This "human capital" approach resulted in first-year benefits of \$56.3 million, and a 40 year present value of \$6.66 billion (summarized in Table 3).

A second estimate of benefits was made using the "willingness-to-pay" approach. This approach resulted in first-year benefits of \$568.7 million, and a 40 year present value of \$54.6 billion (Table 3).

To provide comparability with the estimates of compliance costs, benefits were attributed to the states with right-to-know laws in proportion to the share of hazard communication costs projected for firms in those states. Under the "human capital" approach the present value of the 40 year stream of benefits from the extension of the HCS, after deducting states with right-to-know laws, is \$3.80 billion (1995 dollars). Under the willingness-to-pay approach, the present value of the 40-year stream of benefits from extension of the HCS is \$31.0 billion, after deducting the amount attributable to states with right-to-know laws.

The monetized benefits of hazard communication in the nonmanufacturing sector, whether monetized in terms of human capital or willingness to pay, are presented after discounting (at 10 percent). Such discounting does not convey the magnitude of the expected number of injuries, illnesses and deaths that should be averted by the extension of hazard communication to the nonmanufacturing sector. The actual number of NLWD cases, LWD cases, chronic illness cases, cancer cases, cancer deaths, and other fatalities that are expected to be averted in the first,

¹ Tables 2 to 10 appear at the end of this article.

twentieth, and fortieth years are presented in Table 4.

The numbers of cases presented in Table 4 are projections of cases that will be averted by the state right-to-know laws and the extension of the HCS. Approximately 43 percent of these cases will be averted as a result of the hazard communication (i.e., right-to-know) laws of the states. The remaining 57 percent uniquely relate to the extension of HCS and translate into the following: 148,400 cancer cases and 74,200 cancer deaths, 119,200 chronic disabling illnesses, 448,500 lost work day cases, 702,000 non-lost work day cases, and about 653 non-cancer fatalities avoided over the next 40 years. This estimate is believed to be conservative since OSHA assumed that only 5 percent of all cancers are occupationally related.

The original Regulatory Impact Analysis (RIA) for the HCS in manufacturing included estimates of benefits arising from the reduction of the incidence of chemical fires in the manufacturing sector. Using the RIA's methodology and newer data obtained from the U.S. Fire Administration's National Fire Incidence Reporting System, OSHA has determined that extension of the HCS to the nonmanufacturing sector would yield first-year benefits (i.e., the value of property damages and losses avoided) of \$1.6 million (1985 dollars). For the twentieth and fortieth years, the estimates are \$2.2 and \$2.9 million, respectively. The present value of the 40-year stream of benefits is \$20.3 million (using a 10 percent discount rate).

Extending the HCS to the nonmanufacturing sector will also yield benefits by eliminating the need for employers to comply with multiple state and local right-to-know laws with differing requirements. The estimated benefits for the first year amount to \$39.6 million (1985 dollars). For the twentieth and fortieth years, the benefits are \$69.5 and \$125.5 million, respectively. The present value of the 40-year stream of benefits is \$578 million (using a 10 percent discount rate).

Compliance Costs

Compliance costs were estimated for five items: preparation of a written hazard communication program; container labeling; provision of MSDSs; maintenance of MSDSs; and information and training.

Table 5 provides a summary of total regulatory costs, the costs attributable to state right-to-know laws and the costs attributable to the extension of the OSHA standard. Costs are presented for the first, twentieth, and fortieth year of

the standard, as well as in terms of total present value over forty years. Present values were calculated using a 10 percent discount rate. Table 6 presents the costs by provision.

The total cost attributable to hazard communication laws during the first year the expanded HCS is effective is \$1.28 billion (1985 dollars). The first year cost associated with compliance with state right-to-know laws is \$597.3 million and \$687.3 million with the Federal HCS. The present value of the total HCS-related compliance costs over the 40 year period is \$1.57 billion.

Recordkeeping activities are required in the maintenance of MSDSs. As shown in Table 6, the Year 1 costs for this function amount to \$44.9 million (1985 dollars). The costs for the twentieth and fortieth years are \$6.0 and \$13.3 million. The present value of the costs over 40 years is \$84.8 million.

Economic Impacts

In order to assess the potential economic impacts of expanding the hazard communication standard, OSHA studied the impact of the first year costs on typical establishments that have not implemented any of the provisions. No allowance was made for partial compliance. If establishments can pass through or absorb first year costs, it is assumed that they can afford the minimal recurring costs related to training new employees and the introduction of new hazards. Table 7 presents the average compliance costs, assuming no current compliance, for typical establishments in each SIC Code. Typical establishments in the preponderance for SICs (over 80 percent) would incur compliance costs of less than \$700 in the first year.

In only one of the SICs does the average total first year cost exceed \$800 per establishment. The average first year cost per exposed employee in all SICs is less than \$250, or less than \$5.00 per worker per week.

Table 8 presents a comparison of the post-tax compliance costs to a typical firm's revenues and profits. A typical establishment's pre-tax compliance cost will be a negligible percentage (less than one-half of one percent) of the establishment's average annual revenue in over 96 percent of the SICs. The only exceptions, SIC 83 (Social Service) and SIC 86 (Membership Organizations), are primarily composed of nonprofit establishments that are characterized by relatively inelastic demand for their services. Given the magnitude of the compliance costs in relation to revenue, and the fact that the affected industry sectors are predominantly service providers, which are necessarily

characterized by localized markets it appears likely that most firms will pass the compliance costs on to their customers. The post-tax compliance cost as a percent of profits is less than two percent in most (over 80 percent) of the SICs. Typical firms in these SICs should be able to absorb the costs even if they cannot pass them on to their customers. Given the small absolute magnitude of the compliance costs, and the fact that the analysis was conducted using first year compliance costs which are significantly higher than the recurring compliance costs for subsequent years, the expansion of the hazard communication standard should have little or no economic impact on typical firms.

Community Right-to-Know

The cost of extending the Superfund Amendments and Reauthorization Act (SARA) requirements for community right-to-know to the non-manufacturing sector was also estimated. Under Title III of SARA, establishments holding a given hazardous chemical in amounts greater than specified threshold quantities must report these chemicals and their quantities to State and local emergency planning committees and the local fire department. Cost estimates were based on EPA's projected phase-in threshold quantities of 10,000 pounds of hazardous chemicals in the first two years, and 500 pounds in the third and subsequent years that the requirements apply to the non-manufacturing sector. The estimated costs for the first and second years are \$8,614,300 and \$3,524,000, respectively. Third and fourth year costs were estimated to be \$63,492,800 and \$32,736,300.

The economic impact of extending SARA to nonmanufacturing was also estimated by OSHA. The third year average total cost of SARA was combined with OSHA's recurring average total costs of the Hazard Communication Standard to estimate the impact. The analysis indicated that the economic impact per facility of extending SARA to nonmanufacturing is minor, and that costs incurred by affected establishments could be passed on to the consumer. OSHA believes that the extension of SARA to nonmanufacturing will not affect the feasibility of the Hazard Communication Standard.

Regulatory Flexibility

As is shown in Table 9, a majority of establishments in all of the potentially impacted SICs are small businesses with fewer than 20 employees. Thus, the average compliance costs for small firms

are very similar to those for typical firms. No disproportionate economic impact is foreseen for small firms.

Most establishments in the potentially affected SICs are service providers, which typically compete on the basis of many factors (e.g., location, specialized service, customer relations, etc.) in addition to price. Assuming all firms try to pass their compliance cost on to their customers, minor price differentials of less than one-half of one percent, shown in Table 10, are unlikely to adversely affect the overall competitive position of small entities.

As can be seen from Table 10, the cost differential between small and large firms in over 80 percent of the SICs is anticipated to be less than 0.2 percent of revenue. In SICs 83 and 88 the difference is about 2 percent. However, these SICs are dominated by non-profit firms which are less likely to be subject to price competition.

Environmental Impacts

At the time the current HCS was promulgated in the Federal Register (48 FR 53280), OSHA stated that the standard was unlikely to result in the occurrence of significant health or environmental impacts outside of the workplace. The extension of the HCS does not entail any change from the current HCS in terms of impacts outside the workplace. As concluded previously, the labeling of containers will not have a direct or significant impact on air or water quality, land or energy use, or solid waste disposal outside of the workplace. Similarly, the requirements for preparation of a written compliance plan, provision and maintenance of MSDSs, and provision of information and training should have no adverse environmental impact.

IV. Clearance of Information Collection Requirements

On March 31, 1983, the Office of Management and Budget (OMB) published a new 5 CFR Part 1320, implementing the information collection provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* (48 FR 13666). Part 1320, which became effective on April 30, 1983, sets forth procedures for agencies to follow in

obtaining OMB clearance for information collection requirements. The sections of the Hazard Communication Standard which may create recordkeeping requirements are paragraphs (d) hazard determination; (e) written hazard communication program; (f) labels and other appropriate forms of warning; (g) material safety data sheets; (h) information and training; and (i) trade secrets.

In accordance with the provisions of the Paperwork Reduction Act and the regulations issued pursuant thereto, OSHA certifies that it has submitted the information collection requirements contained in its rule on hazard communication to OMB for review under section 3504(h) of that Act.

V. State Plan Applicability

The 25 States with their own OSHA-approved occupational safety and health plans must adopt a comparable standard within six months of the publication date of a final standard. These States include: Alaska, Arizona, California, Connecticut (for State and local government employees only), Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, New York (for State and local government employees only), North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Virgin Islands, Washington, and Wyoming. Until such time as a State standard is promulgated, Federal OSHA will provide interim enforcement assistance, as appropriate. (Thirteen (13) of these States (Alaska, California, Iowa, Maryland, Michigan, Minnesota, New Mexico, North Carolina, Oregon, Tennessee, Vermont, Washington, and Wyoming) have already expanded the scope of their hazard communication standard/right-to-know law to cover private sector, non-manufacturing workplaces.)

Although a State HCS becomes effective in accordance with State promulgation provisions, and is enforceable upon promulgation, OSHA must also review and approve the standard to assure that it is "at least as effective" as the Federal standard. OSHA intends to closely scrutinize State standards submitted under current

or future State plans to assure not only equal or greater effectiveness, but also that any additional requirements do not conflict with, or adversely affect, the effectiveness of the national application of OSHA's standard. Because the HCS is "applicable to products" in that it permits the distribution and use of hazardous chemicals in commerce only if they are in labeled containers accompanied by material safety data sheets, OSHA must determine in its review whether any State plan standard provisions which differ from the Federal are "required by compelling local conditions and do not unduly burden interstate commerce." Section 18(c) of the Act, 29 U.S.C. 667(c).

VI. Authority, Signature, and the Final Rule

This document was prepared under the direction of John A. Pendergrass, Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, DC 20210.

For the reasons set out in the preamble, and under the authority of section 41 of the Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941), section 107 of the Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333), sections 4, 6 and 8 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657), Secretary of Labor's Order No. 9-83 (48 FR 35736) and 29 CFR Part 1911, and 5 U.S.C. 553, the Occupational Safety and Health Administration hereby amends Parts 1910, 1915, 1917, 1918, 1926, and 1928 of Title 29 of the Code of Federal Regulations, as set forth below.

List of Subjects in 29 CFR Parts 1910, 1915, 1917, 1918, 1926, and 1928

Hazard communication, Occupational safety and health, Right-to-know, Labeling, Material safety data sheets, Employee training.

Signed at Washington, DC, this 18th day of August 1987.

John A. Pendergrass,

Assistant Secretary for Occupational Safety and Health.

TABLE 2.—WORKER EXPOSURE TO HAZARDOUS CHEMICALS

Industry	Total number of establishment	Total employment	Percent of workers exposed to hazardous chemicals	Number of exposed employees
SIC 01.....	31,739	504,025	70	352,818
SIC 02.....	10,994	126,039	70	88,227

TABLE 2.—WORKER EXPOSURE TO HAZARDOUS CHEMICALS—Continued

Industry	Total number of establishment	Total employment	Percent of workers exposed to hazardous chemicals	Number of exposed employees
SIC 07.....	65,704	459,479	70	321,635
SIC 08.....	2,117	20,223	70	14,156
SIC 09.....	3,886	13,549	20	2,710
SIC 13.....	31,572	591,714	70	414,200
SIC 15.....	166,012	1,137,853	70	796,497
SIC 16.....	44,702	791,892	70	554,324
SIC 17.....	320,208	2,406,916	70	1,654,841
SIC 40.....	18,539	324,206	40	129,682
SIC 41.....	15,539	285,578	20	57,116
SIC 42.....	99,805	1,323,495	20	264,699
SIC 44.....	8,346	178,013	70	124,609
SIC 45.....	8,691	490,395	40	195,158
SIC 46.....	859	18,405	60	11,043
SIC 47.....	30,783	267,113	40	106,845
SIC 48.....	22,910	1,321,116	5	66,056
SIC 49.....	15,571	890,586	40	355,234
SIC 50.....	300,972	3,357,168	10	335,717
SIC 51.....	191,745	2,295,451	25	573,863
SIC 52.....	66,756	662,051	50	331,026
SIC 53.....	29,818	2,230,449	5	111,522
SIC 54.....	137,393	2,696,839	20	539,368
SIC 55.....	173,902	1,850,359	60	1,110,215
SIC 56.....	99,022	1,004,666	5	50,233
SIC 57.....	93,338	714,264	5	35,713
SIC 58.....	309,650	5,479,633	25	1,369,908
SIC 59.....	281,694	2,133,614	20	426,723
SIC 60.....	24,949	1,681,408	5	84,070
SIC 61.....	43,408	733,201	5	35,660
SIC 62.....	17,995	346,214	5	17,311
SIC 63.....	30,139	1,190,103	5	59,505
SIC 64.....	96,706	536,223	5	26,811
SIC 65.....	191,400	1,077,550	5	53,878
SIC 66.....	2,937	13,752	5	688
SIC 67.....	15,792	138,488	5	6,924
SIC 70.....	44,697	1,273,343	25	318,336
SIC 72.....	158,272	1,068,670	50	534,335
SIC 73.....	284,684	4,092,820	50	2,046,410
SIC 75.....	121,431	713,798	50	356,899
SIC 76.....	57,900	316,365	60	189,819
SIC 78.....	15,338	216,806	30	65,042
SIC 79.....	58,064	757,287	20	151,457
SIC 80.....	365,758	6,167,808	60	3,700,745
SIC 81.....	119,861	670,317	5	33,516
SIC 82.....	23,280	1,174,052	10	117,405
SIC 83.....	66,380	1,182,651	5	59,133
SIC 84.....	1,592	39,021	25	9,755
SIC 86.....	83,774	724,283	5	36,214
SIC 89.....	117,155	1,200,885	5	60,044
Totals.....	4,503,879	58,890,236		18,391,096

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 3.—ESTIMATED BENEFITS OF HAZARD COMMUNICATION

[Millions of 1985 dollars]

Type of injury/illness	Benefits—Year			
	1	20	40	TPV
HUMAN CAPITAL APPROACH				
NLWD:				
Lost earnings.....	0.7	1.3	2.5	9.3
Medical costs.....	1.7	4.6	13.4	30.3
LWD:				
Lost earnings.....	15.2	28.3	57.1	209.3

TABLE 3.—ESTIMATED BENEFITS OF HAZARD COMMUNICATION—Continued

[Millions of 1985 dollars]

Type of injury/illness	Benefits—Year			
	1	20	40	TPV
Medical costs	10.9	29.2	86.5	192.2
Chronic:				
Lost earnings	20.5	722.8	1,365.8	2,967.5
Medical costs	2.8	143.4	404.1	582.8
Cancer:				
Lost earnings	0	651.6	1,309.6	1,735.2
Medical costs	0	298.9	806.4	875.8
Fatalities: Lost earnings	4.4	7.3	13.0	56.6
Total	56.3	1,887.3	4,158.3	6,659.1
WILLINGNESS-TO-PAY APPROACH				
NLWD	59.6	107.8	211.9	804.5
LWD	374.4	686.4	1,371.1	5,099.8
Chronic	61.7	2,173.7	4,121.6	8,924.3
Cancer	0	14,529.0	29,651.2	38,812.0
Fatalities	72.9	123.4	255.3	946.9
Total	568.7	17,620.7	35,581.2	54,587.4

Source: JACA Corporation Report.

TABLE 4.—INJURIES, ILLNESSES, AND FATALITIES AVERTED BY HAZARD COMMUNICATION IN THE NONMANUFACTURING SECTOR

Year	1	20	40	Commulative total
FEDERAL AND STATE STANDARDS COMBINED				
NLWD	17,000	30,800	60,600	1,354,500
LWD	10,700	19,600	39,200	865,800
Chronic	150	6,200	11,800	230,100
Cancer cases	0	8,200	17,000	286,500
Cancer deaths	0	4,100	8,500	143,300
Noncancer deaths	0	20	80	1,260
IMPACT OF FEDERAL STANDARD ALONE				
NLWD	8,800	16,000	31,400	702,000
LWD	5,500	10,200	20,300	448,500
Chronic	78	3,200	6,100	119,200
Cancer cases	0	4,248	8,806	148,400
Cancer deaths	0	2,100	4,400	74,200
Noncancer deaths	0	10	41	653

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 5.—SUMMARY OF HAZARD COMMUNICATION COSTS

[Millions of 1985 dollars]

Year	Total	State	OHSA
1	1,284.5	597.3	687.2
20	214.5	101.3	113.2
40	384.0	184.0	200.0

TABLE 5.—SUMMARY OF HAZARD COMMUNICATION COSTS—Continued

[Millions of 1985 dollars]

Year	Total	State	OHSA
Total present value	2,926.4	1,356.3	1,570.1

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 6.—SUMMARY OF FEDERAL HCS COSTS BY PROVISION

(Millions of 1985 dollars)

Year	Main- tain MSDS's	Label- ing	Writ- ten	Train- ing	Provide MSDS's	Totals
1.....	44.9	12.8	137.4	472.9	19.3	687.2
20.....	6.0	20.3	5.7	78.7	2.5	113.2
40.....	13.3	35.2	9.4	136.5	5.6	200.0
TPV.....	84.8	170.9	170.9	1054.6	88.9	1570.1

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 7.—SUMMARY OF HCS COSTS PER ESTABLISHMENT NOT IN COMPLIANCE WITH HCS

[1985 dollars]

Industry	First year		Second year	
	Average costs per establish- ment	Average costs per exposed employee	Average costs per establish- ment	Average costs per exposed employee
SIC 01.....	502	45	32	3
SIC 02.....	475	59	23	3
SIC 07.....	490	100	28	6
SIC 08.....	358	54	26	4
SIC 09.....	304	242	6	5
SIC 13.....	497	38	72	5
SIC 15.....	150	31	12	3
SIC 16.....	225	18	34	3
SIC 17.....	169	32	14	3
SIC 40.....	603	86	51	7
SIC 41.....	285	76	11	3
SIC 42.....	273	98	12	4
SIC 44.....	442	30	55	4
SIC 45.....	892	40	72	3
SIC 46.....	461	40	55	5
SIC 47.....	398	115	15	4
SIC 48.....	319	50	15	2
SIC 49.....	798	35	64	3
SIC 50.....	472	238	14	7
SIC 51.....	700	234	32	11
SIC 52.....	335	68	20	4
SIC 53.....	372	50	27	4
SIC 54.....	323	82	18	5
SIC 55.....	437	68	31	5
SIC 56.....	265	149	6	3
SIC 57.....	288	190	6	4
SIC 58.....	337	76	17	4
SIC 59.....	321	184	7	4
SIC 60.....	410	61	21	3
SIC 61.....	217	76	9	3
SIC 62.....	312	79	18	5
SIC 63.....	250	46	16	3
SIC 64.....	236	155	5	3
SIC 65.....	306	186	8	5
SIC 66.....	238	181	5	4
SIC 67.....	415	167	12	5
SIC 70.....	408	57	37	5
SIC 72.....	500	148	16	5
SIC 73.....	444	62	43	6
SIC 75.....	381	130	14	5
SIC 76.....	325	99	15	5
SIC 78.....	351	83	26	6
SIC 79.....	346	117	20	7
SIC 80.....	581	57	57	6
SIC 81.....	242	153	7	5
SIC 82.....	287	46	10	2
SIC 83.....	337	132	11	4
SIC 84.....	608	99	39	8
SIC 86.....	273	149	6	3

TABLE 7.—SUMMARY OF HCS COSTS PER ESTABLISHMENT NOT IN COMPLIANCE WITH HCS—Continued
[1985 dollars]

Industry	First year		Second year	
	Average costs per establishment	Average costs per exposed employee	Average costs per establishment	Average costs per exposed employee
SIC 89.....	312	146	10	5

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 8.—ANALYSIS OF POST-TAX FIRST-YEAR COMPLIANCE COSTS
[1985 dollars]

Industry	Average annual revenue per establishment	Average cost as a percent of revenue per establishment	Average net income per establishment	Average post-tax cost per establishment	Post tax cost as a percent of net income per establishment
SIC 01.....	2,794,100	0.018	103,382	377	0.35
SIC 02.....	11,275,400	0.004	417,190	356	0.09
SIC 07.....	286,600	0.171	7,165	368	5.13
SIC 08.....	1,689,100	0.021	42,228	268	0.64
SIC 09.....	797,500	0.038	19,938	228	1.14
SIC 13.....	6,185,800	0.008	346,405	373	0.11
SIC 15.....	816,700	0.018	19,601	113	0.57
SIC 16.....	1,419,700	0.016	56,788	169	0.30
SIC 17.....	372,400	0.045	10,800	127	1.17
SIC 40.....	2,584,100	0.023	111,116	453	0.41
SIC 41.....	411,400	0.069	13,165	214	1.62
SIC 42.....	730,100	0.037	21,903	205	0.94
SIC 44.....	2,214,300	0.020	141,715	331	0.23
SIC 45.....	5,900,000	0.015	70,800	669	0.94
SIC 46.....	20,569,600	0.002	1,069,619	346	0.03
SIC 47.....	831,900	0.048	14,974	299	1.99
SIC 48.....	5,347,900	0.006	390,397	239	0.06
SIC 49.....	16,269,000	0.005	732,105	599	0.08
SIC 50.....	1,866,900	0.025	28,004	354	1.26
SIC 51.....	3,371,500	0.021	57,316	525	0.92
SIC 52.....	793,800	0.042	20,639	251	1.22
SIC 53.....	5,702,000	0.007	136,848	279	0.20
SIC 54.....	2,089,700	0.015	25,076	242	0.96
SIC 55.....	2,018,100	0.022	16,129	327	2.03
SIC 56.....	507,600	0.052	19,796	199	1.00
SIC 57.....	371,400	0.078	11,513	216	1.68
SIC 58.....	383,500	0.088	11,122	252	2.27
SIC 59.....	829,100	0.039	20,728	241	1.16
SIC 60.....	14,970,800	0.003	509,007	307	0.06
SIC 61.....	2,585,300	0.008	41,355	163	0.39
SIC 62.....	1,858,900	0.017	135,554	234	0.17
SIC 63.....	12,911,400	0.002	438,988	187	0.04
SIC 64.....	220,400	0.107	15,869	177	1.11
SIC 65.....	338,400	0.090	27,749	230	0.83
SIC 66.....	661,600	0.036	54,251	178	0.33
SIC 67.....	798,300	0.052	167,643	311	0.19
SIC 70.....	607,000	0.067	34,599	306	0.88
SIC 72.....	228,500	0.219	10,283	375	3.64
SIC 73.....	531,600	0.084	21,264	333	1.57
SIC 75.....	351,800	0.108	8,785	286	3.25
SIC 76.....	187,100	0.174	7,671	244	3.18
SIC 78.....	815,900	0.043	31,820	263	0.83
SIC 79.....	782,100	0.044	51,619	260	0.50
SIC 80.....	198,200	0.293	6,342	438	6.87
SIC 81.....	455,000	0.053	10,032	182	1.81
SIC 82.....	NA	0.168	NA	215	NA
SIC 83.....	NA	1.783	NA	252	NA
SIC 83.....	NA	1.763	NA	252	NA
SIC 84.....	NA	0.094	NA	458	NA
SIC 86.....	NA	1.007	NA	205	NA

TABLE 8.—ANALYSIS OF POST-TAX FIRST-YEAR COMPLIANCE COSTS—Continued

[1985 dollars]

Industry	Average annual revenue per establishment	Average cost as a percent of revenue per establishment	Average net income per establishment	Average post-tax cost per establishment	Post tax cost as a percent of net income per establishment
SIC 09	290,500	0.107	11,039	234	2.12

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES

SIC code	Total number of establishments	Number of establishments with 1 to 19 employees	Percent of establishments with 1 to 19 employees
01.....	31,739	27,440	86
02.....	10,994	9,574	87
07.....	65,704	61,928	94
08.....	2,117	1,852	87
09.....	2,160	2,088	97
13.....	31,572	26,037	82
15.....	186,012	154,819	93
16.....	44,702	37,484	84
17.....	320,208	294,850	92
40.....	18,538	15,758	85
41.....	15,287	11,998	79
42.....	94,561	80,822	85
44.....	8,348	6,917	83
45.....	8,691	6,514	75
46.....	959	724	75
47.....	30,783	28,420	92
48.....	10,319	8,612	84
49.....	15,571	10,922	70
50.....	189,451	133,233	79

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES—Continued

SIC code	Total number of establishments	Number of establishments with 1 to 19 employees	Percent of establishments with 1 to 19 employees
51.....	191,745	168,562	87
52.....	66,756	60,097	90
53.....	14,809	8,963	60
54.....	137,393	114,738	84
55.....	173,902	152,920	88
56.....	28,181	23,874	85
57.....	23,582	20,474	87
58.....	309,650	241,282	78
59.....	244,849	227,803	93
60.....	12,475	6,318	51
61.....	12,912	9,561	74
62.....	4,380	3,079	70
63.....	10,998	7,263	66
64.....	17,577	15,608	89
65.....	32,714	28,099	86
66.....	524	488	93
67.....	2,790	2,239	80
70.....	44,697	34,693	78

TABLE 9.—ESTABLISHMENTS WITH FEWER THAN TWENTY EMPLOYEES—Continued

SIC code	Total number of establishments	Number of establishments with 1 to 19 employees	Percent of establishments with 1 to 19 employees
72.....	158,272	149,812	95
73.....	284,684	249,553	88
75.....	121,431	116,344	96
76.....	57,800	55,543	96
78.....	15,338	13,314	87
79.....	50,981	42,916	84
80.....	365,758	338,396	93
81.....	21,210	18,659	88
82.....	18,661	11,197	60
83.....	23,148	17,068	74
84.....	1,592	1,250	79
86.....	19,757	16,416	83
89.....	28,103	23,179	82

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

* From Chapter 5 of the JACA Report (4).

* Column 2 divided by Column 1.

TABLE 10.—ANALYSIS OF IMPACT ON SMALLEST VERSUS LARGEST ESTABLISHMENTS

[Comparing average costs as a percent of revenue]

SIC code	Average cost as a percent of revenue per establishment 250+ employees	Average cost as a percent of revenue per establishment 1-19 employees	Difference in cost as a percent of revenue due to size of establishments
01.....	0.003	0.044	0.040
02.....	0.001	0.009	0.008
07.....	0.038	0.189	0.151
08.....	0.007	0.018	0.011
09.....	0.002	0.021	0.019
13.....	0.002	0.035	0.033
15.....	0.003	0.044	0.042
16.....	0.007	0.064	0.057
17.....	0.017	0.055	0.048
40.....	0.008	0.082	0.075
41.....	0.007	0.248	0.240
42.....	0.007	0.103	0.096
44.....	0.007	0.060	0.053
45.....	0.009	0.105	0.096
46.....	0.000	0.174	0.174
47.....	0.003	0.101	0.098
48.....	0.002	0.041	0.039

TABLE 10.—ANALYSIS OF IMPACT ON SMALLEST VERSUS LARGEST ESTABLISHMENTS—Continued

[Comparing average costs as a percent of revenue]

SIC code	Average cost as a percent of revenue per establishment 250+ employees	Average cost as a percent of revenue per establishment 1-19 employees	Difference in cost as a percent of revenue due to size of establishments
49	0.002	0.049	0.047
50	0.003	0.037	0.034
51	0.006	0.038	0.032
52	0.008	0.046	0.038
53	0.002	0.029	0.026
54	0.002	0.054	0.052
55	0.006	0.044	0.038
56	0.002	0.104	0.102
57	0.003	0.117	0.114
58	0.008	0.158	0.150
59	0.003	0.055	0.051
60	0.001	0.012	0.011
61	0.000	0.038	0.038
62	0.003	0.028	0.025
63	0.000	0.069	0.069
64	0.002	0.179	0.177
65	0.005	0.124	0.119
66	0.001	0.054	0.053
67	0.003	0.096	0.093
70	0.021	0.283	0.262
72	0.007	0.346	0.339
73	0.028	0.204	0.175
75	0.004	0.151	0.148
76	0.099	0.205	0.106
78	0.007	0.113	0.106
79	0.016	0.071	0.055
80	0.269	0.370	0.101
81	0.118	0.077	-0.041
82	0.025	0.915	0.890
83	0.428	2.293	1.865
84	0.033	0.259	0.226
86	0.035	2.109	2.074
89	0.008	0.210	0.202

Source: U.S. Department of Labor, OSHA, Office of Regulatory Analysis.

OSHA is amending Parts 1910, 1915, 1917, 1918, 1926, and 1928 of Title 29 of the Code of Federal Regulations as follows:

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

1. The authority citation for Subpart Z of Part 1910 continues to read as follows:

Authority: Secs. 8, 8, Occupational Safety and Health Act (29 U.S.C. 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754); 8-76 (41 FR 25059); or 9-83 (48 FR 35736) as applicable; and 29 CFR Part 1911.

Section 1910.1000 Tables Z-1, Z-2, Z-3 also issued under 5 U.S.C. 553.

Section 1910.1000 not issued under 29 CFR Part 1911, except for "Arsenic" and "Cotton Dust" listings in Table Z-1.

Section 1910.1001 not issued under Sec. 107 of Contract Work Hours and Safety Standards Act, 40 U.S.C. 333.

Section 1910.1002 not issued under 29 U.S.C. 655 or 29 CFR Part 1911; also issued under 5 U.S.C. 553.

Sections 1910.1003 through 1910.1018 also issued under 29 U.S.C. 653.

Section 1910.1025 also issued under 29 U.S.C. 653 and 5 U.S.C. 553.

Section 1910.1043 also issued under 5 U.S.C. 551 *et seq.*

Sections 1910.1045 and 1910.1047 also issued under 29 U.S.C. 653.

Sections 1910.1200, 1910.1499 and 1910.1500 also issued under 5 U.S.C. 553.

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT

2. The authority citation for Part 1915 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754); 8-76

(41 FR 25059), or 9-83 (48 FR 35736), as applicable; 29 CFR Part 1911.

Section 1915.99 also issued under 5 U.S.C. 553.

PART 1917—MARINE TERMINALS

3. The authority citation for Part 1917 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 8754); 8-76 (41 FR 25059), or 9-83 (48 FR 35736), as applicable; 29 CFR Part 1911.

Section 1917.28 also issued under 5 U.S.C. 553.

PART 1918—SAFETY AND HEALTH REGULATIONS FOR LONGSHORING

4. The authority citation for Part 1918 is revised to read as follows:

Authority: Sec. 41, Longshore and Harbor Workers' Compensation Act (33 U.S.C. 941).

secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 6754), 6-76 (41 FR 25059), or 9-83 (48 FR 35738), as applicable.

Section 1918.90 also issued under 5 U.S.C. 553 and 29 CFR Part 1911.

PART 1926—SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

5. The authority citation for Subpart D of Part 1926 is revised to read as follows:

Authority: Sec. 107, Contract Work Hours and Safety Standards Act (Construction Safety Act) (40 U.S.C. 333); secs. 4, 6, 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 653, 655, 657); Secretary of Labor's Order No. 12-71 (36 FR 6754), 6-70 (41 FR 25059), or 9-83 (48 FR 35738), as applicable.

Section 1926.59 also issued under 5 U.S.C. 553 and 29 CFR Part 1911.

PART 1926—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR AGRICULTURE

6. The authority citation for Part 1926 is revised to read as follows:

Authority: Secs. 6 and 8, Occupational Safety and Health Act of 1970 (29 U.S.C. 655, 657); Secretary of Labor's Orders 12-71 (36 FR 6754), 6-76 (41 FR 25059), or 9-83 (48 FR 35738), as applicable; 29 CFR Part 1911.

Section 1926.21 also issued under 5 U.S.C. 553.

PARTS 1910, 1915, 1917, 1918, 1926 and 1926—[AMENDED]

7. Parts 1910, 1915, 1917, 1918, and 1926 are amended by revising § 1910.1200 as set forth below, and by adding §§ 1915.99, 1917.28, 1918.90, and 1926.59 to contain the identical text of the revised § 1910.1200, including Appendices A, B, C, and D of 1910.1200:

§ — Hazard communication.

(a) *Purpose.* (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 hazard 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, material safety data sheets and employee training.

(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 the 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 material 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.* (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, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers.

(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.

(3) This section applies to laboratories only as follows:

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

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees; and,

(iii) Employers shall ensure that laboratory employees are apprised of the hazards of the chemicals in their workplaces in accordance with paragraph (h) of this section.

(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:

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

(ii) Employers shall maintain copies of any material safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtain a material safety data sheet 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 material safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(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)(1)(iii)), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(5) This section does not require labeling of the following chemicals:

(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;

(ii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device, 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.*) and regulations issued under that Act, when they are subject to the labeling requirements under that Act by the Food and Drug Administration;

(iii) 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; and,

(iv) 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. 1201 *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.

- (6) This section does not apply to:
- (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;
 - (ii) Tobacco or tobacco products;
 - (iii) Wood or wood products;
 - (iv) Articles;
 - (v) Food, drugs, cosmetics, or alcoholic beverages in a retail establishment which are packaged for sale to consumers;
 - (vi) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace;
 - (vii) 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 demonstrate it is used in the workplace in the same manner as normal consumer use, and which use results in a duration and frequency of exposure which is not greater than exposures experienced by consumers; and
 - (viii) 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 (i.e. tablets or pills).

(c) *Definitions.*

"Article" means a manufactured item: (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 does not release, or otherwise result in exposure to, a hazardous chemical, under normal conditions of use.

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

"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 °F (21.1 °C); or
- (ii) 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
- (iii) A liquid having a vapor pressure exceeding 40 psi at 100 °F (37.8 °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 to a hazardous chemical in the course of employment through any route of entry (inhalation, ingestion, skin contact or absorption, etc.), and includes potential (e.g. accidental or possible) exposure.

"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 °F (37.8 °C), except any mixture having components with flashpoints of 100 °F (37.8 °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 § 190.109(e), 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 °F (37.8 °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 °F (37.8 °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 hazard(s) of the chemical(s) in the container(s).

"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 (MSDS) for the chemical. The identity used shall permit cross-references to be made among the required list of hazardous chemicals, the label and the MSDS.

"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 (MSDS)" 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, or repackage.

"Pyrophoric" means a chemical that will ignite spontaneously in air at a temperature of 130 °F (54.4 °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, 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.

(d) *Hazard determination.* (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.

(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.

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

(i) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

(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.

(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:

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

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

(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.

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

(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;

(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;

(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,

(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 hazard to employees in those concentrations, the mixture shall be assumed to present the same hazard.

(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.

(e) *Written hazard communication program.* (1) Employers shall develop, implement, and maintain at the workplace, a written hazard communication program for their workplaces which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

(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,

(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.

(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:

(i) The methods the employer will use to provide the other employer(s) with a copy of the material safety data sheet, or to make it available at a central location in the workplace, for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(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,

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

(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).

(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 1910.20(e).

(f) *Labels and other forms of warning.*

(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:

(i) Identity of the hazardous chemical(s);

(ii) Appropriate hazard warnings; and

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

(2) For solid metal (such as a steel beam or a metal casting) that is not exempted as an article due to its downstream use, 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. 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. This exception to requiring labels on every container of hazardous chemicals is only for the solid metal itself and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the metal and to which employees handling the metal may be exposed (for example, cutting fluids or lubricants).

(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.

(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.

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

- (i) Identity of the hazardous chemical(s) contained therein; and
- (ii) Appropriate hazard warnings.

(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.

(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.

(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.

(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.

(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.

(g) *Material safety data sheets.* (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 for each hazardous chemical which they use.

(2) Each material safety data sheet shall be in English and shall contain at least the following information:

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

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

(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,

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

(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)(4) of this section shall be listed if the concentrations are 0.1% or greater; and,

(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 hazard to employees; and,

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

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

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

(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;

(v) The primary route(s) of entry;

(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;

(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;

(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;

(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;

(x) Emergency and first aid procedures;

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

(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.

(3) If not 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.

(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.

(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.

(6) 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. The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the employer prior to or at the time of the shipment. If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the employer shall obtain one from the chemical manufacturer, importer, or distributor as soon as possible.

(7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers. Retail distributors which sell hazardous chemicals to commercial customers 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. Chemical manufacturers, importers, and distributors need not provide material safety data sheets to retail distributors which have informed them that the retail distributor does not sell the product to commercial customers or open the sealed container to use it in their own workplaces.

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

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

(10) Material 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 their work area(s).

(11) Material 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 1910.20 (e). The Director shall also be given access to material safety data sheets in the same manner.

(h) *Employee information and training.* Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

(1) *Information.* Employees shall be informed of:

(i) The requirements of this section;
(ii) Any operations in their work area where hazardous chemicals are present; and,

(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.

(2) *Training.* Employee training shall include at least:

(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.);

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

(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,

(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.* (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) The claim that the information withheld is a trade secret can be supported;

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

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

(iv) The specific chemical identity is made available to health professionals, employees, and designated

representatives in accordance with the applicable provisions of this paragraph.

(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 of 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.

(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) The request is in writing;

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

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

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

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

(D) To provide medical treatment to exposed employees;

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

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

(G) To conduct studies to determine the health effects of exposure.

(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:

(A) The properties and effects of the chemical;

(B) Measures for controlling workers' exposure to the chemical;

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

(D) Methods of diagnosing and treating harmful exposures to the chemical;

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

(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)(8) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.

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

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

(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,

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

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

(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.

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

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

(ii) Be in writing;

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

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

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

(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.

(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:

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

(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,

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

(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.

(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.

(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.

(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.

(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.

(j) *Effective dates.* (1) Chemical manufacturers, importers, and distributors shall ensure that material safety data sheets are provided with the next shipment of hazardous chemicals to employers after September 23, 1987.

(2) Employers in the non-manufacturing sector shall be in compliance with all provisions of this section by May 23, 1988. (Note: Employers in the manufacturing sector (SIC Codes 20 through 39) are already required to be in compliance with this section.)

Appendix A to § — Health Hazard Definitions (Mandatory)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g. flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body—such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees—such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

There have been many attempts to categorize effects and to define them in various ways. Generally, the terms "acute" and "chronic" are used to delineate between effects on the basis of severity or duration. "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration. "Chronic" effects generally occur as a result of long-term exposure, and are of long duration.

The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling of Hazardous Industrial Chemicals (Z129.1-1982)—irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects which may occur as a result of occupational exposure, such as, for example, narcosis.

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obviously a concern in the workplace, but again, do not adequately cover the area of chronic effects, excluding, for example, blood dyscrasias (such as anemia), chronic bronchitis and liver atrophy.

The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them. Appendix B, which is also mandatory, outlines the principles and procedures of hazardous assessment.

For purposes of this section, any chemicals which meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards:

1. **Carcinogen:** 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.

2. **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 U.S. Department of Transportation 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.

3. **Highly toxic:** A chemical falling within any of the following categories:

(a) A chemical that has 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 that has 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 rabbits weighing between two and three kilograms each.

(c) A chemical that has 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 one hour) to albino rats weighing between 200 and 300 grams each.

4. **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 four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

5. **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.

6. **Toxic:** A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD₅₀) 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 (LD₅₀) 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 one hour) to albino rats weighing between 200 and 300 grams each.

7. **Target organ effects.** The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which 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 are not intended to be all-inclusive.

a. **Hepatotoxins:** Chemicals which produce liver damage

Signs & Symptoms: Jaundice; liver enlargement

Chemicals: Carbon tetrachloride; nitrosamines

b. **Nephrotoxins:** Chemicals which produce kidney damage

Signs & Symptoms: Edema; proteinuria

Chemicals: Halogenated hydrocarbons; uranium

c. **Neurotoxins:** Chemicals which produce their primary toxic effects on the nervous system

Signs & Symptoms: Narcosis; behavioral changes; decrease in motor functions

Chemicals: Mercury; carbon disulfide

d. **Agents which act on the blood or hematopoietic system:** Decrease hemoglobin function; deprive the body tissues of oxygen

Signs & Symptoms: Cyanosis; loss of consciousness

Chemicals: Carbon monoxide; cyanides

e. **Agents which damage the lung:** Chemicals which irritate or damage the pulmonary tissue

Signs & Symptoms: Cough; tightness in chest; shortness of breath

Chemicals: Silica; asbestos

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

Signs & Symptoms: Birth defects; sterility

Chemicals: Lead; DBCP

g. **Cutaneous hazards:** Chemicals which affect the dermal layer of the body

Signs & Symptoms: Defatting of the skin; rashes; irritation

Chemicals: Ketones; chlorinated compounds

h. **Eye hazards:** Chemicals which affect the eye or visual capacity

Signs & Symptoms: Conjunctivitis; corneal damage

Chemicals: Organic solvents; acids

Appendix B to § —, Hazard Determination (Mandatory)

The quality of a hazard communication program is largely dependent upon the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance-oriented. Chemical manufacturers, importers, and employers evaluating chemicals are not required to follow any specific methods for

determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported in accordance with the criteria set forth in this Appendix.

Hazard evaluation is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance-orientation of the hazard determination does not diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, the following criteria shall be used in making hazard determinations that meet the requirements of this standard.

1. **Carcinogenicity:** As described in paragraph (d)(4) and Appendix A of this section, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen will be considered conclusive evidence for purposes of this section.

2. **Human data:** Where available, epidemiological studies and case reports of adverse health effects shall be considered in the evaluation.

3. **Animal data:** Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations shall be used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).

4. **Adequacy and reporting of data.** The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, shall be a sufficient basis for a hazard determination and reported on any material safety data sheet. The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

Appendix C to §—Information Sources (Advisory)

The following is a list of available data sources which the chemical manufacturer, importer, distributor, or employer may wish to consult to evaluate the hazards of chemicals they produce or import:

- Any information in their own company files, such as toxicity testing results or illness experience of company employees.
- Any information obtained from the supplier of the chemical, such as material safety data sheets or product safety bulletins.
- Any pertinent information obtained from the following source list (latest editions should be used):

Condensed Chemical Dictionary
Van Nostrand Reinhold Co., 135 West 50th Street, New York, NY 10020.

The Merck Index: An Encyclopedia of Chemicals and Drugs
Merck and Company, Inc., 126 E. Lincoln Ave., Rahway, NJ 07065.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man
Geneva: World Health Organization, International Agency for Research on Cancer, 1972–Present. (Multivolume work). Summaries are available in supplement volumes. 49 Sheridan Street, Albany, NY 12210.

Industrial Hygiene and Toxicology, by F.A. Patty
John Wiley & Sons, Inc., New York, NY (Multivolume work).

Clinical Toxicology of Commercial Products
Cleason, Gosselin, and Hodge

Casarett and Doull's Toxicology: The Basic Science of Poisons
Doull, Klaassen, and Amdur, Macmillan Publishing Co., Inc., New York, NY.

Industrial Toxicology, by Alice Hamilton and Harriet L. Hardy
Publishing Sciences Group, Inc., Acton, MA.

Toxicology of the Eye, by W. Morton Grant
Charles C. Thomas, 301–327 East Lawrence Avenue, Springfield, IL.

Recognition of Health Hazards in Industry
William A. Burgess, John Wiley and Sons, 605 Third Avenue, New York, NY 10158.

Chemical Hazards of the Workplace
Nick H. Proctor and James P. Hughes, J.P. Lipincott Company, 6 Winchester Terrace, New York, NY 10022.

Handbook of Chemistry and Physics
Chemical Rubber Company, 16901 Cranwood Parkway, Cleveland, OH 44128.

Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment and Biological Exposure Indices with Intended Changes
American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Avenue, Bldg. D–5, Cincinnati, OH 45211.

Information on the physical hazards of chemicals may be found in publications of the National Fire Protection Association, Boston, MA.

Note.—The following documents may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

Occupational Health Guidelines
NIOSH/OSHA (NIOSH Pub. No. 81–123)
NIOSH Pocket Guide to Chemical Hazards
NIOSH Pub. No. 85–114

Registry of Toxic Effects of Chemical Substances
NIOSH Pub. No. 80–102

Miscellaneous Documents published by the National Institute for Occupational Safety and Health:

- Criteria documents.
- Special Hazard Reviews.
- Occupational Hazard Assessments.
- Current Intelligence Bulletins.

OSHA's General Industry Standards (29 CFR Part 1910)

NTP Annual Report on Carcinogens and Summary of the Annual Report on Carcinogens.

National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161; (703) 487–4050.

BIBLIOGRAPHIC DATA BASES

Service provider	File name
Bibliographic Retrieval Services (BRS), 1200 Route 7, Latham, NY 12110.	Biosis Previews CA Search Medlars NTIS Hazardline American Chemical Society Journal Excerpta Medica IRCS Medical Science Journal Pre-Med Intl Pharmaceutical Abstracts PubMed Chem Biosis Prev. Files CA Search Files CAS Abstracts Chemical Exposure Chemname Chemsex Files Chemsex Embargo Files Environmental Bibliographies Emerging Research in Progress IRL Life Science Collection NTIS Occupational Safety and Health (NIOSH) Paper Chem CAS Files Chemdex, 2, 3 NTIS
SOC—Orbit, SOC Information Service, 2500 Colorado Avenue, Santa Monica, CA 90406	Hazardous Substances Data Bank (HSDB) Medline Plus Toxline Files Cancer RTECS Chemline Laboratory Hazard Bulletin
National Library of Medicine, Department of Health and Human Services, National Institutes of Health, Bethesda, MD 20809.	CIS/LO Cancernet
Pergamon International Information Corp., 1340 Old Chain Bridge Rd., McLean, VA 22101.	Structure and Nomenclature Search System (SANSS) Acute Toxicity (RTECS) Clinical Toxicology of Commercial Products Oil and Hazardous Materials Technical Assistance Data System CCRIS CESARS MSDS Hazardline
Questel, Inc., 1625 Eye Street, NW., Suite 818, Washington, DC 20006.	
Chemical Information System (CIS), Bureau of National Affairs, 1133 15th Street, NW., Suite 300, Washington, DC 20005	
Occupational Health Services, 400 Plaza Drive, Saugus, NJ 07094	

Appendix D to §—Definition of "Trade Secret" (Mandatory)

The following is a reprint of the *Restatement of Torts* section 757, comment b (1939):

b. **Definition of trade secret.** A trade secret may consist of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it. It may be a formula for a chemical compound, a process of manufacturing, treating or preserving materials, a pattern for a machine or other device, or a list of customers. It differs from other secret information in a business (see § 759 of the *Restatement of Torts* which is not included in this Appendix) in that it is not simply information as to single or ephemeral events in the conduct of the business, as, for example, the amount or

other terms of a secret bid for a contract or the salary of certain employees, or the security investments made or contemplated, or the date fixed for the announcement of a new policy or for bringing out a new model or the like. A trade secret is a process or device for continuous use in the operations of the business. Generally it relates to the production of goods, as, for example, a machine or formula for the production of an article. It may, however, relate to the sale of goods or to other operations in the business, such as a code for determining discounts, rebates or other concessions in a price list or catalogue, or a list of specialized customers, or a method of bookkeeping or other office management.

Secrecy. The subject matter of a trade secret must be secret. Matters of public knowledge or of general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the goods which one markets cannot be his secret. Substantially, a trade secret is known only in the particular business in which it is used. It is not requisite that only the proprietor of the business know it. He may, without losing his protection, communicate it to employees involved in its use. He may likewise communicate it to others pledged to secrecy. Others may also know of it independently, as, for example, when they have discovered the process or formula by independent invention and are keeping it secret. Nevertheless, a substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring the information. An exact definition of a trade secret is not possible. Some factors to be considered in determining whether given information is one's trade secret are: (1) The extent to which the information is known outside of his business; (2) the extent to which it is known by employees and others involved in his business; (3) the extent of measures taken by him to guard the secrecy of the information; (4) the value of the information to him and his competitors; (5) the amount of effort or money expended by him in developing the information; (6) the ease or difficulty with which the information could be properly acquired or duplicated by others.

Novelty and prior art. A trade secret may be a device or process which is patentable; but it need not be that. It may be a device or process which is clearly anticipated in the prior art or one which is merely a mechanical improvement that a good mechanic can make. Novelty and invention are not requisite for a trade secret as they are for patentability. These requirements are essential to patentability because a patent protects against unlicensed use of the patented device or process even by one who discovers it properly through independent research. The patent monopoly is a reward to the inventor. But such is not the case with a trade secret. Its protection is not based on a policy of rewarding or otherwise encouraging the development of secret processes or devices. The protection is merely against breach of faith and reprehensible means of learning another's secret. For this limited protection it is not appropriate to require also the kind of novelty and invention which is a requisite of patentability. The nature of the secret is, however, an important factor in determining the kind of relief that is appropriate against one who is subject to liability under the rule stated in this section. Thus, if the secret consists of a device or process which is a novel invention, one who acquires the secret wrongfully is ordinarily enjoined from further use of it and is required to account for the profits derived from his past use. If, on the other hand, the secret consists of mechanical improvements that a good mechanic can make without resort to the secret, the wrongdoer's liability may be limited to damages, and an injunction against future use of the improvements made with the aid of the secret may be inappropriate.

8. Section 1915.97 would be revised to read as follows:

§ 1915.97 Health and sanitation.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking, except where indicated otherwise.

(a) The employer shall provide all necessary controls, and the employees shall be protected by suitable personal protective equipment against the

hazards identified under § 1915.99 of this part and those hazards for which specific precautions are required in Subparts B, C, and D of this part.

(b) The employer shall provide adequate washing facilities for employees engaged in the application of paints or coatings or in other operations where contaminants can, by ingestion or absorption, be detrimental to the health of the employees. The employer shall encourage good personal hygiene practices by informing the employees of the need for removing surface contaminants by thorough washing of hands and face prior to eating or smoking.

(c) The employer shall not permit employees to eat or smoke in areas undergoing surface preparation or preservation or where shipbreaking operations produce atmospheric contaminants.

(d) The employer shall not permit employees engaged in ship repair work on a vessel to work in the immediate vicinity of uncovered garbage and shall ensure that employees working beneath or on the outboard side of a vessel are not subject to contamination by drainage or waste from overboard discharges.

(e) No minor under 18 years of age shall be employed in shipbreaking or related employments.

9. Section 1928.21 would be amended by adding paragraph (a)(5) as follows:

§ 1928.21 Applicable standards in 29 CFR Part 1910.

(a) * * *

(5) Hazard communication—
§ 1910.1200.

* * *

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Glossary

Absorption - The process by which a substance can be readily taken into the body, for example, some chemicals can be absorbed through unbroken skin.

Acid - A fundamental category of chemicals characterized by having available reactive hydrogen and requiring an alkali to neutralize them. Acids turn litmus paper red and have pH values of 0 to 6. They may cause severe burns.

Acute Effect - Adverse effect which has severe symptoms developing rapidly and coming quickly to a crisis. Compare "Chronic Effect".

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

ACGIH - American Conference of Governmental Industrial Hygienists is an organization of professional personnel in governmental agencies or educational institutions who are employed in occupational safety and health programs.

Adenocarcinoma - A tumor originating in a gland.

Adenosis - Any disease of a gland.

Adhesion - A union of two surfaces that are normally separate.

Aerosol - A fine spray of particles sufficiently small in size to resist settling or sedimentation (for example: smoke or fog).

Air Line Respirator - A respirator that is connected to a compressed breathing air source by a hose. 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 - A substance capable of combining with hydrogen ions. They are also called bases, and 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 a chemical or physical stimuli by a sensitive person.

Alopecia - Loss of hair.

Amenorrhea - Absence of menstruation.

Anaesthesia - Loss of sensitivity to pain.

Anaphylaxis - Extreme sensitivity resulting from prior contact with a chemical or protein.

Anemia - A deficiency of red blood cells.

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

Anhydride - An oxide or compound which when combined with water produces an acid or base.

Anhydrous - Does not contain water.

Anosmia - Loss of the sense of smell.

Anorexia - Loss of appetite.

Anoxia - A lack of oxygen from inhaled air - literally without oxygen. See Hypoxia.

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.

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

API - American Petroleum Institute is a voluntary membership organization of the petroleum industry.

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

Aqueous - A water-based solution.

Argyria - Local or generalized impregnation (gray-blue color) of the body tissues with silver.

Aromatic - Fragrant or of marked odor. Often applied to a group of hydrocarbons and their derivatives, such as benzene, toluene, xylene.

Asphyxia - Unconsciousness due to interference with the oxygen of the blood.

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 oxygen in the air (normally about 21 percent) to dangerous levels (18 percent or lower). Asphyxiation is one of the principal potential hazards of working in confined and enclosed spaces.

Asphyxiation - A condition that causes asphyxia, suffocation. See also Asphyxiant.

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, effects of physical and biological agents and chemicals.

Asthma - A disease characterized by recurring attacks of difficult breathing, wheezing, and cough due to spasmodic contraction of the bronchioles.

Asymptomatic - Showing no symptoms.

Ataxia - Loss of power of muscle coordination.

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

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

Atrophy - A wasting or diminution in the size of a part of the body.

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 dimercaprol - a treatment for toxic inhalations.

Barrier Cream - A cream for use on human skin to protect against injury from contact with specific types of harmful agents.

Base - See Alkali.

BCM - Blood-clotting mechanism effects.

Benign - Not recurrent or not tending to progress.

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

Biohazard - This is a combination of the words biological and hazard; and is used to describe infectious agents presenting a risk or potential risk to the well-being of man or animals either directly through infection, or indirectly through disruption of the environment.

Biologic Half-Life - The time required for a given species, organ, or tissue to eliminate half of a substance which it takes in.

Biopsy - Removal and examination of tissue from the living body.

BLD - Blood effects.

Boiling Point - The temperature at which a liquid changes to vapor state at a given pressure. The boiling point is 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 is to prevent a static discharge (spark) when transferring a flammable liquid from one container to another. The conductive path is provided by clamps which make contact with the charged object and a low resistance flexible cable which allows the charge to equalize. See Grounding.

Bradycardia - A slow heartbeat in which the pulse rate falls below 60. See also Tachycardia.

Breathing Zone - The area of the ambient environment in which a person breathes.

Bronchitis - Inflammation of the bronchial tubes in the lungs.

Buffer - A substance capable in solution of neutralizing both acids and bases and thereby maintaining the original acidity or basicity of the solution.

Bulk Density - Mass of powdered or granulated solid material per unit of volume.

C - Degrees Centigrade, a temperature scale where water boils at 100°C and freezes at 0°C. °C = 5/9 (°F - 32).

"C", or Ceiling - 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 by Congress to regulate/reduce air pollution. CAA is administered by the 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:

- It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen; or
- It is listed as a carcinogen or potential carcinogen in the Annual Report on carcinogens (latest edition), published by the National Toxicology Program (NTP); or
- It is regulated by OSHA as a carcinogen.

Car - Cancer or 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.

Catalyst - A substance which, without changing itself, causes a chemical reaction to proceed faster.

Cataract - A loss of transparency of the crystalline lens of the eye or of its capsule.

Caustic - The ability of an alkali to cause burns. See Alkali.

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

Ceiling Limit - A concentration that is not to be exceeded. See also "C" or Ceiling.

Ceiling Value(s) - A maximum established level which no human exposure should ever exceed.

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.

Cervix - The lower end of the uterus extending into the vagina.

CFR - Code of Federal Regulations. A collection of the regulations that have been promulgated under U.S. Law.

Chemical - Any element, chemical compound or mixture of elements and/or compounds where chemical(s) are distributed.

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 Change (Reaction) - Change of composition in properties due to rearrangement of elements, atoms or molecules.

Chemical Compound - A substance composed of definite proportions by weight of two or more elements, and whose properties differ from those of its elements. Also see Mixture.

Chemical Family - A group of individual elements or compounds with a common general name. Example: ketones, alcohols.

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).

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 (CMA) 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.

Chloracne - An acne-like eruption from contact with chlorinated naphthalenes and polyphenyls acting on sweat glands.

Chronic - Persistent, prolonged, and/or repeated effects which are the result of repeated exposure to low concentrations of a chemical substance over a long period of time. Compare with Acute.

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

Chronic Exposure - Long-term contact with a substance.

Chronic Toxicity - Adverse 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 the Environmental Protection Agency.

CMA - Chemical Manufacturers Association. See CHEMTREC.

CO - Carbon monoxide. 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.

CO₂ - Carbon dioxide is a heavy, colorless gas which is produced by the combustion and decomposition of organic substances and as a byproduct of many chemical processes. CO₂ will not burn and is relatively non-toxic (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.) or higher 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 flashpoint 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 make up ninety-nine percent (99%) or more of the total volume of the mixture.

Common Name - Any identification, such as code name, code number, trade name, brand name, or generic name, other than its chemical name, used to identify a chemical.

Compressed Gas - (a) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 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 alcoholic solution.

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

Confined Space - Any area which 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 eyeballs.

Contact Dermatitis - Caused by contact with a primary irritant, a skin irritant at the area of skin contact.

Container - Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of MSDS or HazCom, pipes or piping systems are not considered to be containers.

Cornea - Transparent structure of the external layer of the eyeball.

Corrosive - A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. 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 diseased surface.

Cutaneous Hazards - Chemicals which irritate the skin.

Cutaneous Toxicity - See Dermal Toxicity.

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

Cyanosis - Blueness of the skin, generally caused by lack of oxygen.

Cyst - A sac containing a liquid. Most cysts are harmless.

Cytology - The scientific study of cells.

DASHO - Designated Agency Safety and Health Official is the executive official of a Federal Department or Agency who is responsible for safety and occupational health matters within a Federal agency, and is so designated or appointed by the head of the agency.

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.

Dermatitis - Inflammation of the skin. Also see Irritant, Sensitizer, and Contact Dermatitis.

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.

Dose - The term used to express the amount of energy or substance absorbed in a unit volume of an organ or individual dose rate is the dose delivered per unit of time.

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

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

Dysfunction - Any abnormality or impairment of an organ.

Dysmenorrhea - Painful menstruation.

Dysplasia - An abnormality of development.

Dyspnea - Labored or difficult breathing, shortness of breath.

Ectopic pregnancy - The fertilized ovum becomes implanted outside of the uterus.

Eczema - A skin disease or disorder; one specific type of dermatitis.

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

Element - A substance composed entirely of one kind of atom. Elements are designated by chemical symbols.

Emphysema - A lung disease in which the presence of air in the connective tissues of the lungs causes swelling or inflammation.

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.

Epistaxis - Nosebleed; hemorrhage from the nose.

Epithelium - The thin membrane covering 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-BuAc), 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 (MEK) = 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, Isobutyl Alcohol = 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 in the course of employment 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 named by its generic name, such as fog, foam, water, etc.

Eye Protection - Recommended safety glasses, chemical splash goggles, face shields, 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° and freezes at 32°. °F = 9/5 (°C) + 32.

f/cc - Fibers per cubic centimeter of air.

FAOOSH - Federal Advisory Council for Occupational Safety and Health is a joint management-labor council that advises the Secretary of Labor on matters relating to the occupational safety and health of federal employees.

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.

FFSHC - Field Federal Safety and Health Councils are organized throughout the country to improve federal safety and health programs at the field level and within a geographic location.

FHCP - Federal Hazard Communication Program.

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 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;
- (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° F (37.8° C) or higher, the total of which make up 99 percent or more of the total volume of mixture.
- (d) "Solid, flammable." A solid, other than a blasting agent or explosives 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 solid is a flammable solid if 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 Tag Closed Tester, Z11.24 1979 [ASTM D56-79J]).
- (b) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 [ASTM D93-79J]).
- (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 or environment.

Formula - The scientific expression of the chemical composition of a material (e.g., water is H₂O, sulfuric acid is H₂SO₄, sulfur dioxide is SO₂).

Fume - Smoke, vapor or gas, especially when irritating or offensive.

Fume Fever - An acute condition caused by a brief high exposure to the freshly generated fumes of metal such as lead or magnesium.

Gangrene - Death of tissue combined with putrefaction.

Gastroenteritis - Inflammation of the stomach and intestines.

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 from conception to birth.

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.

Hazardous Material - A material that is characterized by one or more of the following (1) has a flashpoint below 140°, closed cup, or subject to spontaneous heating; (2) has a threshold limit value below 500 ppm for gases and vapors, below 500 mg/m for fumes, and below 25 mppcf for dusts; (3) single oral dose LD50 or below 500 mg/kg of body weight; (4) is subject to polymerization which results in the release of large amounts of energy; (5) is a strong oxidizing or reducing agent; (6) causes first degree burns to skin in short time exposure, or is systematically toxic on contact with the skin; and/or (7) in the course of normal operations may produce dusts, gases, fumes, vapors, mists, or smoke which have one or more of the above characteristics.

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

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

HCS - Hazard Communication Standard is an OSHA regulation.

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 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.

Hematology - The study of blood.

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.

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

Hepatotoxin - A substance that causes injury to the liver.

Highly Toxic - A chemical falling within 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 rabbits weighing between 2 and 3 kilograms each.
- (c) A chemical that has 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 one hour) to albino rats weighing between 200 and 300 grams each.

HMIS - Hazardous Material Information System is an MSDS file maintained by the Department of Defense and contains MSDSs and transportation data for products purchased by DOD and GSA.

Hormones - Act as chemical messengers to body organs.

Hydrocarbons - Chemicals composed solely of carbon and hydrogen, which are the basic building blocks of all organic chemicals.

Hygroscopic - Readily absorbs moisture from the air.

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

Hypoxia - Insufficient oxygen, especially as applied to body cells.

IARC - International Agency for Research on Cancer.

Ignitable - Capable of being set afire.

Immiscible - Liquids which will not mix with each other but will form 2 separate layers or will result in cloudiness or turbidity.

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 are described as incompatible.

Inflammation - A morbid series of reactions produced in the tissues by an irritant. It is marked by an afflux of blood with exudation of plasma and leukocytes.

Ingestion - Taking in by the mouth.

Inhale - 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.

Inorganic - A term used to designate compounds that generally do not contain carbon. Source matter other than vegetable or animal. Examples are sulfuric acid and salt.

Insol - See Insoluble.

Insoluble - Incapable of being dissolved in a liquid.

Intrauterine - Within the uterus.

Irodocyclitis - Inflammation of both iris and ciliary body of the eye.

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.

Irritating - An irritating material, as defined by DOT, is a liquid or solid substance which, upon contact with fire or when exposed to air, gives off dangerous or intensely irritating fumes (not including poisonous materials). See Poison, Class A and Poison, Class B.

Ischemia - Local and temporary anemia due to the obstruction of the circulation in a part of the body.

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 or volume. A U.S. quart is about 9/10 of a liter.

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

Lacrimation - Secretion and discharge of tears.

Lactation - The secretion of milk by the breasts.

Latent Period - The period of time between exposure and the first manifestation of damage.

Lavage - A washing of a hollow organ, such as the stomach.

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.

LC50 - 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 part 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/m) for dusts and mists, as well as for gases and vapors.

LD - Lethal Dose is the quantity of a substance being tested that will kill.

LDL - Lethal Dose Low, lowest administered dose of a material capable of killing a specified test species.

LD50 - A single dose of material expected to kill 50 percent of a group of test animals. The LD 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.

Lead intoxication - Lead absorption resulting from inhalation of lead dust or fumes, or from swallowing lead dust.

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

Lesion - Any damage to a tissue.

Lethal Concentration - LC - A concentration of a substance that is sufficient to kill a test animal.

Lethal Concentration 50 - LC50 - See LC50.

Lethal Dose LD - An amount of a substance that is sufficient to kill a test animal.

Lethal Dose 50 - LD50 - See LD50.

Leukemia - A disease of the blood marked by persistent increase in white blood cells, associated with changes in the spleen, the bone marrow, or the lymphatic nodes.

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.

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

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

m - 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, often used in describing tumors.

Mammary - Pertaining to the breast.

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

Mechanical Filter Respirator - A respirator used to protect against airborne particulate matter like dusts, mists, metal fumes, 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 from a non-pregnant uterus.

MESA - Mining Enforcement and Safety Administration.

Metabolism - The physical and chemical processes by which living organisms produce the necessary energy to maintain life.

Metastases - 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 which is one thousandth of a gram.

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

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

Micron - Micron is a unit of length equal to one millionth of a meter. A micron is approximately 1/25,000 of an inch.

Mild - Mild.

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 a finely divided liquid is suspended in air.

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

ml - Milliliter is a metric unit of capacity, equal in volume to one cubic centimeter (cc), or approximately 1/16 of a cubic inch. One thousandth of a liter.

Mild - Mild.

mmHg - Millimeters (mm) 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 in mg/m.

MSDS - 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 - 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 which studies cancer causes and prevention as well as diagnosis, treatment, and rehabilitation of cancer patients.

Necrosis - Local death of tissue.

Neo - See Neoplasia.

Neonatal - The first 4 weeks after 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 (alkali or base) to the spill.

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.

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.

NOx - Oxides of nitrogen which are undesirable air pollutants. NOx 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 MSDSs.

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

NTP - National Toxicology Program. The NTP publishes an Annual Report on Carcinogens.

Nystagmus - Spasmic, involuntary motion of the eyeballs, in either a horizontal, vertical or circular pattern.

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.

Oliguria - Scanty or low volume of urine.

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

OFAP - Office of Federal Agency Programs is the organizational unit of OSHA which provides federal agencies with guidance to develop and implement occupational safety and health programs for federal employees.

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 may be considered a structural derivative of hydrogen peroxide.

Organogenesis - The secretion of tissues into different organs in embryonic development.

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

Ovary - The female sex gland in which ova (eggs) are formed.

Overexposure - Exposure to a hazardous material beyond the allowable exposure levels.

Ovulation - The process in which an ovum (egg) is discharged from an ovary.

Ovum - Egg.

Oxidation - A reaction in which a substance combines with oxygen.

Oxidation-Reduction Reaction - A chemical reaction in which an atom or molecule loses electrons to another atom or molecule.

Oxidizer - A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, causing fire either by itself or through the release of oxygen or other gases.

Oxidizing Agent - A chemical or substance that brings about an oxidation reaction.

Papanicolaou Smear (Pap Smear) - Test most commonly used to detect cancer of the uterus and cervix.

Pathologic - Pertaining to or caused by disease.

Pathology - Scientific study of alterations produced by disease.

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

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.

Personal Protective Equipment - PPE - Devices worn by the worker to protect against hazards in the environment. Respirators, gloves, and ear protectors are examples.

pH - The symbol relating 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 - 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 Flash Point.

Pneumoconiosis - A condition of the lung in which there is permanent deposition 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 substances—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 a reaction that takes place at such a rate that large amounts of energy are released. If hazardous polymerization can occur with a given material, the MSDS 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 particular substance in a liquid or solid.

Prenatal - Preceding birth.

psi - Pounds per square inch (for MSDS 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 Agent - Chemicals that may damage the lungs.

Pulmonary Edema - Fluid in the lungs.

Pyrophoric - A chemical that will ignite spontaneously in air at a temperature of 130°F (54.4°C) or below.

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. See also CERCLA.

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 by-products—may occur because of the reactivity of a substance to heating, burning, direct contact with other materials, or other conditions in use or in 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 also Oxidation, Oxidation-Reduction Reaction.

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 - Chemicals which have a negative effect on the reproductive capabilities, including chromosomal damage (mutations) and birth defects to the fetus (teratogenesis).

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

Respirator - A device designed to protect the wearer from the inhalation of contaminated air.

Respiratory Disease - Any disease which affects the lungs or the respiratory tract.

Respiratory Irritants - Any chemical that produces a reversible inflammatory effect on the respiratory system.

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

Safety Can - An OSHA-approved closed container which has the following characteristics: (1) a capacity of not more than 5 gallons (19 liters); (2) a spring-closing lid and spout cover; (3) flash-arresting screen; and (4) designed to safely relieve internal pressure if exposed to fire.

Saturation - The maximum concentration of matter that can be dissolved in a solution at a given temperature.

Sarcoma - A malignant tumor arising in connective tissues such as bone or cartilage.

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 Flash Point.

Silicosis - A disease of the lungs caused by the inhalation of silica dust.

Skin - Skin.

"Skin" - A notation (sometimes used with PEL or TLV exposure data) which indicates that 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 that 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.

SOx - Oxides of sulfur.

Soln - Solution.

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 clean-up methods and re-extinguishing agents and methods for a material.

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

SOx - Oxides of sulfur.

Species - On the MSDSs, 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. Materials with specific gravity greater than 1.0 will sink in water. Most (but not all) flammable liquids have 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 are designed to clean up or contain substances that have spilled or leaked.

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

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

Squamous - Scaly or platelike.

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

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

Stenosis - Narrowing of a body passage or opening.

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

Stupor - Partial or nearly complete unconsciousness.

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 which 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 which 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 also known as methanol or wood alcohol.

Tachycardia - Excessively rapid heartbeat. See also Bradycardia.

Target Organ Effects - The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which 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 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 which act on the hematopoietic system** - Chemicals that decrease hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms - Cyanosis; loss of consciousness
Chemicals - Carbon monoxide; cyanides.
- e. **Agents which damage the lung** - chemicals that irritate or damage the pulmonary tissue.
Signs and Symptoms - Cough, tightness in chest, short of breath.
Chemicals - Silica; asbestos.
- f. **Reproductive toxins** - Chemicals that affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms - Birth defects; sterility.
Chemicals - Lead, Dibutyl chlorophenol (DBCP).
- g. **Cutaneous hazards** - Chemicals which affect the dermal layer of the body.
Signs and Symptoms - Defatting of the skin; rashes; irritation.
Chemicals - Ketones; chlorinated compounds.
- h. **Eye hazards** - Chemicals which affect 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 Flash Point.

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).

Thermal Decomposition - The breakdown of a material when heated.

Threshold Limit Value - TLV and PEL. The Threshold Limit Value (TLV) is a safe exposure level set by the American Conference of Governmental Industrial Hygienists (ACGIH). A Permissible Exposure Limit (PEL) is a similar level set by OSHA. Both refer to airborne concentrations of substances and represent an exposure level under which most people can work consistently for 8 hours a day, 250 days a year, with no harmful effects. Three categories of TLVs are specified:

- 1. **Time Weighted Average (TLV-TWA)** - This is the average concentration of a substance in the air over a 40-hour workweek, which is considered to be safe for most workers.

(b) **Short-Term-Exposure Limit (TLV-STEL)** - This is the maximum concentration to which workers can be exposed for a period up to 15 minutes continuously without suffering from (1) irritation, (2) chronic or irreversible tissue change, or (3) narcosis of sufficient degree to impair self-rescue or reduce work efficiency. No more than four 15-minute exposure periods per day are permitted with at least 60 minutes between those exposure periods.

(c) **Ceiling (TLV-C)** - The concentration that should not be exceeded even momentarily.

NOTE: If any of the above TLVs is exceeded, a potential hazard from that substance is presumed to exist.

Tinnitus - A ringing or singing sound in the ears.

TLV - See Threshold Limit Value.

TOC - TAG Open Cup. See Flash Point.

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

Toxemia - Poisoning by way of the blood stream.

Toxic - A chemical falling within any of the following categories:

(a) A chemical with a median lethal dose (LD50) 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 (LD50) 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 or 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 one hour) to albino rats weighing between 200 and 300 grams each.

Toxic Substance - Any substance which 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 chemical reaction during normal handling or storage.

Unstable Reactive - A chemical that is so reactive that it will react with water, air, or other substances under normal conditions of use, storage, or transport, and which may result in a fire, explosion, or other hazardous reaction.

USDA - U.S. Department of Agriculture.

Uterus - A muscular organ which holds and nourishes the growing fetus.

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 fire or health hazards.

Vapor pressure - The pressure exerted by a saturated vapor above its own liquid in a closed container. When qualifying 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 on MSDSs 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 pressure reported on MSDSs in mmHg are usually very low pressure; 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 Ventilation.

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

Vertigo - A feeling of revolving in space; dizziness, giddiness.

Viscosity - Resistance to flow exhibited by a fluid.

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 flulike symptoms with a metallic taste in the mouth, coughing, weakness, fatigue, muscular pain, and nausea, followed by fever and chills. The onset of symptoms occur four to twelve hours after exposure.