



Hazard Communication Program



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SECTION 1

Hazard Communication Program Implementation

1.1 INTRODUCTION

It is the policy of Carter & Carter for each active jobsite to have implemented the Carter & Carter Hazard Communication Program. This includes completing the following checklist, as well as storing the written Hazard Communication (HAZ-COM) Manual onsite, preferably in the main job trailer in a conspicuous location. A Carter & Carter HAZ-COM Manual should be prepared specifically for each jobsite and should be kept current. The Master Carter & Carter HAZ-COM Manual will be kept at the main office in Auburn, Alabama and will be kept current. Any update to the Master HAZ-COM Manual will be reflected in the Field HAZ-COM Manuals within one month of the update.

1.2 CHECKLIST

Implementation Checklist for _____
Job Name

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



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Carter & Carter HAZ-COM Manual

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2.1 GENERAL COMPANY POLICIES

This manual is intended to comply with the OSHA Hazard Communication Standard, Title 29 Code of Federal Regulations 1926.59, the requirements of which are defined to be identical to those set forth at 1910.1200 which is included in this Manual as Appendix A Specifically, the company intends to achieve this compliance by providing for each Carter & Carter employee the following:

- A complete list of hazardous chemicals used by the company and likely to be used by the company on any company jobsite,
- Description and use of Material Safety Data Sheets (MSDSs),
- Assurance that all containers are properly labeled, and
- Appropriate training in the handling and safe use of hazardous chemicals that are necessary in the performance of company work.

The company hazard communication (HAZ-COM) program applies to all work operations within the company where any employee may be exposed to a hazardous substance either under normal working conditions or during emergency situations.

The Safety and Health Manager is the HAZ-COM Program Coordinator. He or she is the Carter & Carter representative who has overall responsibility for the program's implementation. The Safety and Health Manager will review and update the program as necessary. Copies of the complete Carter & Carter Hazard Communication Program Manual, as discussed in Section 2.2, may be obtained from the Safety and Health Manager at any time.

Under the HAZ-COM program, Carter & Carter employees will be informed of:

- The form and content of the Hazard Communication Standard,
- The hazardous properties of chemicals with which employees may work or come into contact,
- Procedures or safe handling of the various chemicals and materials required in the performance of their responsibilities,
- Measures of personal protection that can be taken against these chemicals, and
- The hazards associated with the performance of certain tasks that are not commonly experienced by employees.

2.2 CARTER & CARTER HAZARD COMMUNICATION PROGRAM MANUAL

The Carter & Carter Hazard Communication Program Manual is a separate manual prepared and maintained by Carter & Carter that contains this introduction and the actual copies of all Material Safety Data Sheets (MSDSs) for each of the products as listed in the following sections, and as supplemented to keep the list current. The MSDSs in this manual are for all products *provided* and used by the company either on a routine basis, occasionally, or on a special case as required by a particular project.

Each copy of the HAZ-COM manual is to be maintained and kept current by the Safety and Health Manager. A copy of the current HAZ-COM manual is to be kept on each Carter & Carter jobsite. They are to be available to all Carter & Carter employees at any time from every Project Manager and from the Carter & Carter Safety and Health Manager.



The HAZ-COM manual is an integral part of the Carter & Carter safety and loss control effort, and must be referred to and used by every Carter & Carter employee in every relevant capacity on every Carter & Carter jobsite.

On multi-employer work sites where there exists any possibility of exposure of other employees to chemicals or substances used by Carter & Carter, sharing of the relevant Hazard Communication Program information is required. On certain projects, project management may be required to submit the specific MSDSs to the client to be retained on the jobsite as part of the client's safety program. On such projects, that effort will be considered by Carter & Carter as redundant to the HAZ-COM procedures required by this section of the company Safety & Loss Control Program Manual. In no case will any such separate procedures be allowed to replace the procedures required herein.

Contact the Carter & Carter Safety and Health Manager for additional information on use and availability of the HAZ-COM manual.

2.3 LIST OF HAZARDOUS CHEMICALS

The Safety and Health Manager will make a list of hazardous chemicals provided by Carter & Carter and related work practices used within the company, and will update the list as necessary. The list of chemicals identifies all Carter & Carter-provided chemicals used on all Carter & Carter jobsites by Carter & Carter employees. It must be noted here that most, if not all, hazardous substances on Carter & Carter jobsites are provided by other contractors, and thus, the complete list of hazardous chemicals shall be comprised by the HAZ-COM manuals provided by each subcontractor, as detailed in Sections 2.8 and 2.9.

The list is located in the job trailer, and a master list will be maintained by and is available from the Safety and Health Manager. The current list is included in Tabbed Section 3.

2.4 MATERIAL SAFETY DATA SHEETS (MSDSs)

Material Safety Data Sheets (MSDSs) will provide each employee with the specific information on chemicals that Carter & Carter employees may use or come in contact with during the course of their employment. The Safety and Health Manager will maintain the *Carter & Carter Hazard Communication Program Manual*, which is a three-ring binder containing an MSDS on every substance on the list of hazardous chemicals included in Section 2.9 of this Safety & Loss Control Program Manual.

Each respective MSDS will be a fully completed OSHA Form 174 or its equivalent. A blank OSHA Form 174 is provided and can be used if deemed necessary. The Safety and Health Manager will ensure that the list of MSDSs in the job trailer is maintained and current.

The Safety and Health Manager is responsible for acquiring and updating all MSDSs. He or she will contact the chemical manufacturer vendor if additional research is necessary, or if an MSDS has not been provided within the initial shipment of the respective materials. All new procurements for the company must be cleared by the Safety and Health Manager. A master list of MSDSs is available at any time from the Safety and Health Manager.

OSHA specifies the information to be included on an MSDS, but does not prescribe the specific format for an MSDS.

OSHA requires that each MSDS must include the following information at a minimum:



1. Chemical identity.
2. Hazardous ingredients.
3. Physical and chemical characteristics.
4. Fire and explosion hazard data.
5. Reactivity data.
6. Health hazards.
7. Precautions for safe handling and use.
8. Control measures.

2.5 LABELS AND OTHER FORMS OF WARNING

The Safety and Health Manager will ensure that hazardous chemicals are maintained in their original labels as required by OSHA, and updated as necessary.

Each label must include:

- The chemical identity
- Appropriate hazard warning
- Name and address of the manufacturer or other responsible party

The Safety and Health Manager will refer to the corresponding MSDS in order to assist Carter & Carter employees in verifying label information.

At all times, chemicals will be maintained and transported in their original packaging that includes the labeling described above. If chemicals are transferred from a labeled container to a portable container intended for immediate use, no labels are required on the portable container.

2.6 PERFORMANCE OF NON-ROUTINE TASKS

When Carter & Carter employees are required to perform any tasks that may be hazardous that are not routinely performed by the company or the employee, a special training session will be conducted to inform affected and potentially affected employees regarding the hazardous chemicals to which the employee might be exposed, and the proper precautions necessary to reduce or eliminate the possibility of exposure.

Any employee being asked or directed to perform any task that he or she is unfamiliar, and that may involve possible exposure to a chemical, should immediately inform the employee's supervisor. The supervisor must then arrange for relevant training prior to requiring the employee to perform the task. It is the Safety and Health Manager's responsibility to either conduct the required training, or to arrange for qualified personnel to conduct the training.

2.7 CARTER & CARTER EMPLOYEE TRAINING

2.7.1 General

Everyone who works with or is potentially exposed to hazardous chemicals will receive initial training by the Safety and Health Manager, or someone appointed by the Safety and Health Manager, on the hazard communication Standard and the safe use of those hazardous chemicals. Whenever a new hazard is introduced, additional training will be provided.



The regular safety meetings will be used to review the information presented in the initial training. Foremen and other supervisors will be trained regarding the hazards and the purposes of the various protective measures, in order that they will be available to answer any questions from employees and be able to provide daily monitoring of safe practices.

If there are any questions regarding hazardous chemicals, every employee is to contact his or her immediate supervisor before any contact is made with the chemicals.

Training will emphasize:

- The summary of the Hazard Communication Standard and this written program.
- The chemical and physical properties of each hazardous material (such as flash point, reactivity, etc.), and methods that can be used to protect against the release of or other exposure to chemicals (including chemicals in unlabeled pipes).
- The physical hazards of chemicals (such as potential for fires, explosion, etc.).
- The health standards, including warning signs and symptoms associated with exposure to chemicals, and any medical conditions known to be aggravated by exposure to the chemical.
- All procedures to protect against exposure to hazards (such as personal protective equipment required, proper use and maintenance, work practices or methods to ensure proper use and handling of chemicals, and procedures for emergency response).
- The safe work procedures to be followed by each employee in order to assure protection when cleaning hazardous chemical spills and leaks.
- The locations of the company HAZ-COM manuals, including all MSDSs, instruction on reading and interpreting the information on both labels and MSDSs, and how employees may obtain additional hazard information.

The Safety and Health Manager or his or her designee will review the company's employee training program and advise on training or retraining needs. Retraining is required only when a hazard changes or when a new hazard is introduced into the work place, but it is the policy of Carter & Carter to provide training on an ongoing basis in the safety and loss control program's Safety Meetings in order to enhance the effectiveness of the total Program.

As part of the assessment of the training program, the Safety and Health Manager will obtain input from the employees regarding the training that they have received and their suggestions for improving any part of the entire training effort.

The most important aspects of training with respect to chemicals and the HAZ-COM standard are to ensure that Carter & Carter employees:

- Are aware when they are exposed to hazardous chemicals, and of the conditions of such exposure.
- Have the ability to read and use package labels and Material Safety Data Sheets.
- Follow all appropriate protective measures and company procedures as established.

As part of the ongoing OSHA inspection and enforcement efforts, it can be expected that OSHA Compliance Officers will talk with company employees specifically in order to determine if:



- They have received training with respect to chemicals identification and the Hazard Communication standard;
- They are aware that they are exposed to hazardous chemicals;
- They are aware of the locations in which they can obtain specific information on labels and MSDSs.

2.7.2 Training Program Outline

This section provides a guide to topics and format to be used by the Safety and Health Manager or his or her designee in the ongoing MSDS training of Carter & Carter employees.

1. Introduction

- a. Reasons for training
 - i. Hazard Communication Standard
 - ii. Providing for the employees' health and safety
- b. Description of the HAZ-COM standard requirements
 - i. Material Safety Data Sheets
 - ii. Availability of MSDSs to all employees
 - iii. Labeling requirements of every container
 - iv. Provide a written program for the use of all company employees
 - v. Provide information updates to all employees on a regular basis
 - vi. Provide relevant training to all employees on the safe use and handling of chemicals

2. Information to employees

- a. Location(s) of posted information
 - i. List of HAZ-COM standard requirements
 - ii. List of operations that involve hazardous chemicals
 - iii. List of locations where data sheets and copies of the HAZ-COM manual can be found
 - iv. List of all hazardous chemicals in all office, shop, and jobsite locations
 - v. Information regarding monitoring devices and/or alarms that are in use, as well as the methods and observations that may be used to detect the presence or release of hazardous chemicals

3. Material Safety Data Sheets

- a. Locations
- b. Reading and understanding Material Safety Data Sheets
 - i. Reviewing properly completed data sheets as examples

4. Review of all chemicals that are in each company work area. Highlighting of their hazards, detection methods, and employee protection methods



- a. Chemical name
 - i. Hazards
 - 1) Flammability
 - 2) Reactivity
 - 3) Toxicity by contact
 - 4) Toxicity by inhalation
 - 5) Cancer suspect?
 - 6) Reproductive problems?
 - 7) Irritating?
 - 8) Causes burns?
 - 9) Other hazards?
 - ii. Detecting the presence of the chemical
 - 1) In the air?
 - 2) On the skin?
 - 3) By alarms and monitoring devices?
 - 4) What level of chemical is hazardous?
 - 5) What symptoms indicate overexposure?
 - iii. Preventing overexposure to chemicals
 - 1) Monitoring of air
 - 2) Ventilation
 - 3) Personal protective equipment provided
 - 4) Medical surveillance
 - 5) Mechanized processes to avoid contact
 - iv. Personal protective measures that should be taken by the employee
 - 1) Equipment for normal use
 - 2) Equipment for foreseeable emergency
 - 3) How to obtain equipment
 - 4) Instruction on the use of equipment

NOTE TO TRAINER: Repeat the instructions below for each chemical present in the work area. Chemicals with the same hazard properties that are used in the same way may be combined.

5. Labeling plan description

- a. Responsibilities to ensure that labels are affixed
- b. Employees' responsibilities
- c. What to do if an improperly labeled contained is discovered
- d. What, if any, disciplinary action will be taken against offenders
- e. Referring to the data sheet after reading the labels

6. Foreseeable emergencies and employee self-protection

- a. Description of possible emergencies, such as fuel fires, or equipment rollovers
- b. Description of measures that employees should take in various emergency situations, such as evacuation or use of personal protective equipment



7. Summary of information and availability to employees

- a. Package labels
- b. Data sheets
- c. Company individuals who are available to answer further questions, and provide additional information

2.7.3 Hazard Communication Training Log

The *Carter & Carter Hazard Communication Training Log* appearing at the end of this section is to be used to record attendance of employees at training programs presented by the Carter & Carter with respect to hazard communications and the HAZ-COM standard.

The record is to be maintained by the Safety and Health Manager, and kept current at all times.

2.8 EMPLOYEES OF SEPARATE CONTRACTORS AND SUBCONTRACTORS

Upon notification by responsible company project management or superintendents, the company Safety and Health Manager or a Project Manager will advise outside subvendors in person of:

- Any chemical hazards that may be encountered in the normal course of their work on the respective jobsite,
- The labeling system in use for hazardous materials,
- The protective measures to be taken by all subvendor employees,
- The safe handling requirements and procedures to be used, and
- The location and availability of all Material Safety Data Sheets (MSDSs).

Each separate contractor or subcontractor bringing any chemical on-site must provide Carter & Carter with their own contractor-specific HAZ-COM manual containing appropriate hazard information on all substances, including the labels used and the precautionary measures to be taken in working with these chemicals, *and all necessary MSDSs*. All subcontractor HAZ-COM manuals will be stored on-site alongside the Carter & Carter HAZ-COM manual.

2.9 CURRENT LISTING OF MSDSs

Carter & Carter does not regularly bring hazardous substances onto its jobsites nor can its employees be expected to regularly encounter hazardous substances brought on site by Carter & Carter. As such, Carter & Carter will primarily rely on its subcontractors' listings and MSDSs which are incorporated into their respective HAZ-COM manuals which are all stored together on-site. However, in the event that Carter & Carter does introduce a potentially hazardous substance not previously introduced on-site by any subcontractor, and this substance is not described in any of the subcontractors' HAZ-COM manuals, Carter & Carter will list the MSDS in the following tabbed-section. In the tabbed-section following the listing of Carter & Carter-unique MSDSs are the actual MSDSs for those products.



A copy of the actual MSDSs for each product is contained in the Carter & Carter Hazard Communication Program Manual being maintained by the Carter & Carter Safety and Health Manager.

Check with the office of the Safety and Health Manager for a current listing, and if any information is needed for items not listed.

2.10 EMERGENCY FIRST AID--PETROLEUM, CONCRETE/CEMENT, AND ASPHALT PRODUCTS

2.10.1 Overview

The information contained in this section is very basic. It is intended to be used in providing *emergency* first aid for conditions of contact with petroleum, concrete/cement, and asphalt based materials.

Although the Material Safety Data Sheets (MSDSs) have the information necessary to inform trained medical specialists in the treatment of an emergency, the situation may occur when an employee may need to quickly know first aid facts, and be able to administer care that may be essential in saving a life.

Please read the few items below very carefully. Fortunately, many people may find that this information, as well as any CPR and first aid certification training, may become surprisingly automatic in the event of a real emergency. Above all, remember not to panic in the event of any emergency. Stay calm, in order to preserve the greatest opportunity to be effective in bringing an emergency under control.

In all cases, get immediate professional medical attention as soon as the emergency measures have been taken.

As a supplement, it may be advisable to use the separate topics below as additional subjects of Superintendent's Tailgate Safety Meetings. These short, regular meetings can be an excellent forum for routinely bringing this information to the attention of all company employees.

2.10.2 Petroleum Products

Examples: Gasoline, Diesel Fuel, Kerosene, Mineral Spirits, Etc.

1. ***Never induce vomiting*** when a petroleum-based product has been ingested.
 - a. Vomiting may cause aspiration of liquid into lungs, risking chemical pneumonia, as well as intestinal or central nervous system effects.
2. If swallowed, give ***water*** or ***milk*** if available.
3. Should spontaneous vomiting occur, monitor breathing.
 - a. If not breathing, institute CPR. Have someone contact 911 for assistance.
4. Although petroleum asphalt is a petroleum product, ingestion is not likely, and it has a low order of acute oral toxicity. The main danger would be accumulation of hydrogen sulfide gas.
 - a. If inhaled, move the person to fresh air.
 - b. If the person is not breathing, administer CPR and contact 911 for assistance.



2.10.3 Concrete and Cement Products

1. Eyes
 - a. Flush immediately and repeatedly with water.
2. Skin
 - a. Wash exposed skin areas promptly with water

2.10.4 Asphalt Products

1. Hot asphalt causes severe burns.
 - a. ***Do not attempt to remove hot asphalt.***
 - b. Follow the cooling process below while awaiting emergency personnel or transportation to the hospital.
 - c. Natural separation will occur within 48 to 72 hours.
 - d. For more rapid removal, leave up to the physician.
2. Eyes
 - a. Flush gently with large amounts of water
 - b. Immediately call a physician.
3. Skin
 - a. Cool the hot asphalt and affected parts of the body immediately in this order of preference. Do not apply ice.
 - 1) Completely submerge affected area in ice water.
 - 2) Completely submerge affected area in tap water.
 - 3) Place affected area under running water.

Use any available water cooler than body temperature, while trying to get to the hospital. The injured person should not drive to the hospital himself or herself. Avoid inhalation of fumes--use in well ventilated areas.

2.11 SAMPLE MSDS LETTERS

2.11.1 General Description

The sample letters that follow are designed as a convenience to all Carter & Carter employees to use whenever communications regarding MSDSs and their distribution are required. They may be used by any company employee who is charged with the responsibility to secure MSDSs and/or communicate information regarding MSDSs to any project participant.

Each should be retyped on company letterhead. Copies of each completed letter are to be maintained in the appropriate project files, and distributed to the Safety and Health Manager.

2.11.2 Sample MSDS Info Letter--Carter & Carter to Subcontractor

The sample letter that follows may be used when Carter & Carter is operating as the prime contractor, either as a general contractor or construction manager on a project. The letter is to be sent to subcontractors or trade contractors under the direct control of Carter & Carter, where Carter & Carter is acting as the controlling member of the project team. In this capacity, Carter



& Carter is responsible for the assembly of all such information, and for the establishment of a consolidated file that is accessible by all project participants (sample letter on next page).



**** LETTERHEAD ****

(Date)

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

(To each Subcontractors or Trade Contractor)

RE: (Project Name)
(Project Number)

SUBJ: Material Safety Data Sheets and List of Hazardous Chemicals

Dear Mr./Ms. (*Subcontractor Project Manager*):

Please find enclosed the complete list of hazardous chemicals identified to date that Carter & Carter and all subcontractors (*trade contractors*) are using or may use on the referenced jobsite. This information is being provided to you as required by law.

Please immediately provide the list of all hazardous chemicals as required by your subcontract and by law that your company will use or may use on the referenced project, along with two copies of the Material Safety Data Sheets (MSDSs) for each material.

This information will be consolidated with that of all other project participants, and will be maintained in the Hazardous Chemicals and Materials File at the Carter & Carter jobsite field office. It will be available at all times to all project participants to review and copy as may be necessary.

Thank you for your cooperation.

Very truly yours,

Carter & Carter

cc: Safety and Health Manager



2.11.3 MSDS Info Letter--Carter & Carter to Fire Department

The sample letter that follows may be used when Carter & Carter is operating as the prime contractor; either as a general contractor or construction manager on a project. The letter is intended as an informational notice to be sent to the local fire department station that is nearest to the jobsite. It may be combined with a more complete letter of introduction, or may be used by itself if a more regular line of communication has already been established between the project staff and the local fire department personnel (sample letter on next page).



**** LETTERHEAD ****

(Date)

(To fire department station nearest to the jobsite)

RE: (Project Name)
(Project Number)

SUBJ: Material Safety Data Sheets and List of Hazardous Chemicals

Dear Captain (*Fire Department Captain*):

Please find enclosed the complete list of hazardous chemicals identified to date that Carter & Carter and all subcontractors (*trade contractors*) are using or may use on the referenced jobsite.

This material is being provided to you for informational purposes.

Please feel free to contact me at (telephone number) or at the above address at any time if you require any additional information.

Thank you for your consideration.

Very truly yours,

Carter & Carter

cc: Safety and Health Manager



2.11.4 MSDS Request Letter

The sample letter that follows may be used in the effort by Carter & Carter to secure Material Safety Data Sheets (MSDSs) from chemical or other product manufacturers who have either neglected to provide the MSDSs with their product shipments, or to secure the respective MSDSs prior to any particular product shipment (sample letter on next page).



**** LETTERHEAD ****

(Date)

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

(To each product manufacturer of a chemical or other substance to be used on the project)

RE: *(Project Name)*

RE: *(Project Number)*

SUBJ: Material Safety Data Sheets
(List Products)

Dear Mr./Ms. *(Individual)*:

Please forward to my attention the Material Safety Data Sheet (MSDS) for each of the subject products identified above which are intended to be used on the referenced project. Please be sure that the information is in form and content as required by the Federal Hazard Communication Standard.

If any of the *subject* products are not *subject* to the Federal Hazard Communication Standard and are therefore not required to have an MSDS on file at the project site, please provide your written confirmation of this fact.

Thank you for your consideration.

Very truly yours,

Carter & Carter

cc: Safety and Health Manager



2.12 ADDITIONAL INFORMATION

All Carter & Carter employees or their designated representatives can obtain further information on this written program, the Hazard Communication Standard, applicable MSDSs, and chemical information lists at the office of the Safety and Health Manager.

In emergency situations, always call a 911 and/or doctor as appropriate, as quickly as possible. Use your judgment as to the necessity of any emergency procedure.

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?
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Health Hazards (*Acute and Chronic*)

Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
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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 (<i>General</i>)	Other

Protective Gloves	Eye Protection
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Other Protective Clothing or Equipment

Work/Hygienic Practices



APPENDIX 1

OSHA Hazard Communication Standard

29 CFR 1910.1200 Hazard Communication

(a)"Purpose."

(a)(1)The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(a)(2)This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of 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."

(b)(1)This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule.)

(b)(2)This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(b)(3)This section applies to laboratories only as follows:

(b)(3)(i)Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(3)(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 during each workshift to laboratory employees when they are in their work areas;

(b)(3)(iii)Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section; and,



(b)(3)(iv) Laboratory employers that ship hazardous chemicals are considered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f)(1) of this section, and that a material safety data sheet is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.

(b)(4) In work operations where employees only handle chemicals in sealed containers which are not opened under normal conditions of use (such as are found in marine cargo handling, warehousing, or retail sales), this section applies to these operations only as follows:

(b)(4)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;

(b)(4)(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 as soon as possible for sealed containers of hazardous chemicals received without a material safety data sheet if an employee requests the material safety data sheet, and shall ensure that the material safety data sheets are readily accessible during each work shift to employees when they are in their work area(s); and,

(b)(4)(iii) Employers shall ensure that employees are provided with information and training in accordance with paragraph (h) of this section (except for the location and availability of the written hazard communication program under paragraph (h)(2)(iii) of this section), to the extent necessary to protect them in the event of a spill or leak of a hazardous chemical from a sealed container.

(b)(5) This section does not require labeling of the following chemicals:

(b)(5)(i) Any pesticide as such term is defined in the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(ii) Any chemical substance or mixture as such terms are defined in the Toxic Substances Control Act (15 U.S.C. 2601 et seq.), when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Environmental Protection Agency;

(b)(5)(iii) Any food, food additive, color additive, drug, cosmetic, or medical or veterinary device or product, including materials intended for use as ingredients in such products (e.g. flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) or the Virus-Serum-Toxin Act of 1913 (21 U.S.C. 151 et seq.), and regulations issued under those Acts, when they are subject to the labeling requirements under those Acts by either the Food and Drug Administration or the Department of Agriculture;

(b)(5)(iv) Any distilled spirits (beverage alcohols), wine, or malt beverage intended for nonindustrial use, as such terms are defined in the Federal Alcohol Administration Act (27 U.S.C. 201 et seq.) and regulations issued under that Act, when subject to the labeling requirements of that Act and labeling regulations issued under that Act by the Bureau of Alcohol, Tobacco, and Firearms;

(b)(5)(v) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, when subject to a consumer product safety standard or labeling requirement of those Acts, or regulations issued under those Acts by the Consumer Product Safety Commission; and,

(b)(5)(vi) Agricultural or vegetable seed treated with pesticides and labeled in accordance with the Federal Seed Act (7 U.S.C. 1551 et seq.) and the labeling regulations issued under that Act by the Department of Agriculture.

(b)(6) This section does not apply to:



(b)(6)(i) Any hazardous waste as such term is defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6901 et seq.), when subject to regulations issued under that Act by the Environmental Protection Agency;

(b)(6)(ii) Any hazardous substance as such term is defined by the Comprehensive Environmental Response, Compensation and Liability ACT (CERCLA) (42 U.S.C. 9601 et seq.) when the hazardous substance is the focus of remedial or removal action being conducted under CERCLA in accordance with the Environmental Protection Agency regulations.

(b)(6)(iii) Tobacco or tobacco products;

(b)(6)(iv) Wood or wood products, including lumber which will not be processed, where the chemical manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility (wood or wood products which have been treated with a hazardous chemical covered by this standard, and wood which may be subsequently sawed or cut, generating dust, are not exempted);

(b)(6)(v) Articles (as that term is defined in paragraph (c) of this section);

(b)(6)(vi) Food or alcoholic beverages which are sold, used, or prepared in a retail establishment (such as a grocery store, restaurant, or drinking place), and foods intended for personal consumption by employees while in the workplace;

(b)(6)(vii) Any drug, as that term is defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.), when it is in solid, final form for direct administration to the patient (e.g., tablets or pills); drugs which are packaged by the chemical manufacturer for sale to consumers in a retail establishment (e.g., over-the-counter drugs); and drugs intended for personal consumption by employees while in the workplace (e.g., first aid supplies);

(b)(6)(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace;

(b)(6)(ix) Any consumer product or hazardous substance, as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 1261 et seq.) respectively, where the employer can show that it is used in the workplace for the purpose intended by the chemical manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended;

(b)(6)(x) Nuisance particulates where the chemical manufacturer or importer can establish that they do not pose any physical or health hazard covered under this section;

(b)(6)(xi) Ionizing and nonionizing radiation; and,

(b)(6)(xii) Biological hazards.

(c) "Definitions."

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

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

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



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

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

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

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

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

"Compressed gas" means:

- (i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 deg. F (21.1 deg. C); or
- (ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130 deg. F (54.4 deg. C) regardless of the pressure at 70 deg. F (21.1 deg. C); or
- (iii) A liquid having a vapor pressure exceeding 40 psi at 100 deg. F (37.8 deg. C) as determined by ASTM D-323-72.

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

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

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

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

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

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

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

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



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

- (i) "Aerosol, flammable" means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;
- (ii) "Gas, flammable" means: (A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or
(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;
- (iii) "Liquid, flammable" means any liquid having a flashpoint below 100 deg. F (37.8 deg. C), except any mixture having components with flashpoints of 100 deg. F (37.8 deg. C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.
- (iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

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

- (i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 deg. F (37.8 deg. C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or
- (ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100 deg. F (37.8 deg. C), or that contain suspended solids, or that have a tendency to form a surface film under test; or
- (iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)).

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

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

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

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

"Health hazard" means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.



"Identity" means any chemical or common name which is indicated on the material safety data sheet (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, blend, extract, generate, emit, or repackage.

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

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

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

"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.

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

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

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



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

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

(d)"Hazard determination."

(d)(1)Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.

(d)(2)Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section. Appendix A shall be consulted for the scope of health hazards covered, and Appendix B shall be consulted for the criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.

(d)(3)The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:

(d)(3)(i)29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

(d)(3)(ii)"Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment," American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.

(d)(4)Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:

(d)(4)(i)National Toxicology Program (NTP), "Annual Report on Carcinogens" (latest edition);

(d)(4)(ii)International Agency for Research on Cancer (IARC) "Monographs" (latest editions); or

(d)(4)(iii)29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

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

(d)(5)The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:

(d)(5)(i)If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;

(d)(5)(ii)If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which is considered to be a carcinogen under paragraph (d)(4) of this section;



(d)(5)(iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and,

(d)(5)(iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard.

(d)(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.

(e) "Written hazard communication program."

(e)(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

(e)(1)(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

(e)(1)(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(e)(2) "Multi-employer workplaces." Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(e)(2)(i) The methods the employer will use to provide the other employer(s) on-site access to material safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(e)(2)(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(e)(2)(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(e)(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(e)(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.1020 (e).

(e)(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.



(f)"Labels and other forms of warning."

(f)(1)The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:

(f)(1)(i)Identity of the hazardous chemical(s);

(f)(1)(ii)Appropriate hazard warnings; and

(f)(1)(iii)Name and address of the chemical manufacturer, importer, or other responsible party.

(f)(2)

(f)(2)(i)For solid metal (such as a steel beam or a metal casting), solid wood, or plastic items that are not exempted as articles due to their downstream use, or shipments of whole grain, the required label may be transmitted to the customer at the time of the initial shipment, and need not be included with subsequent shipments to the same employer unless the information on the label changes;

(f)(2)(ii)The label may be transmitted with the initial shipment itself, or with the material safety data sheet that is to be provided prior to or at the time of the first shipment; and,

(f)(2)(iii)This exception to requiring labels on every container of hazardous chemicals is only for the solid material itself, and does not apply to hazardous chemicals used in conjunction with, or known to be present with, the material and to which employees handling the items in transit may be exposed (for example, cutting fluids or pesticides in grains).

(f)(3)Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (49 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

(f)(4)If the hazardous chemical is regulated by OSHA in a substance-specific health standard, the chemical manufacturer, importer, distributor or employer shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard.

(f)(5)Except as provided in paragraphs (f)(6) and (f)(7) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:

(f)(5)(i)Identity of the hazardous chemical(s) contained therein; and,

(f)(5)(ii)Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

(f)(6)The employer may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(5) of this section to be on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.

(f)(7)The employer is not required to label portable containers into which hazardous chemicals are transferred from labeled containers, and which are intended only for the immediate use of the employee who performs the transfer.



For purposes of this section, drugs which are dispensed by a pharmacy to a health care provider for direct administration to a patient are exempted from labeling.

(f)(8)The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(f)(9)The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(f)(10)The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.

(f)(11)Chemical manufacturers, importers, distributors, or employers who become newly aware of any significant information regarding the hazards of a chemical shall revise the labels for the chemical within three months of becoming aware of the new information. Labels on containers of hazardous chemicals shipped after that time shall contain the new information. If the chemical is not currently produced or imported, the chemical manufacturer, importers, distributor, or employer shall add the information to the label before the chemical is shipped or introduced into the workplace again.

(g)"Material safety data sheets."

(g)(1)Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.

(g)(2)Each material safety data sheet shall be in English (although the employer may maintain copies in other languages as well), and shall contain at least the following information:

(g)(2)(i)The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:

(g)(2)(i)(A)If the hazardous chemical is a single substance, its chemical and common name(s);

(g)(2)(i)(B)If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,

(g)(2)(i)(C)If the hazardous chemical is a mixture which has not been tested as a whole:

(g)(2)(i)(C)(1)The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater; and,

(g)(2)(i)(C)(2)The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredient(s) could be released from the mixture in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees; and,

(g)(2)(i)(C)(3)The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;

(g)(2)(ii)Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);

(g)(2)(iii)The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;



(g)(2)(iv)The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;

(g)(2)(v)The primary route(s) of entry;

(g)(2)(vi)The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;

(g)(2)(vii)Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions), or by OSHA;

(g)(2)(viii)Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;

(g)(2)(ix)Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;

(g)(2)(x)Emergency and first aid procedures;

(g)(2)(xi)The date of preparation of the material safety data sheet or the last change to it; and,

(g)(2)(xii)The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

(g)(3)If no relevant information is found for any given category on the material safety data sheet, the chemical manufacturer, importer or employer preparing the material safety data sheet shall mark it to indicate that no applicable information was found.

(g)(4)Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.

(g)(5)The chemical manufacturer, importer or employer preparing the material safety data sheet shall ensure that the information recorded accurately reflects the scientific evidence used in making the hazard determination. If the chemical manufacturer, importer or employer preparing the material safety data sheet becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.

(g)(6)

(g)(6)(i)Chemical manufacturers or importers shall ensure that distributors and employers are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated;

(g)(6)(ii)The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the distributor or employer prior to or at the time of the shipment;



(g)(6)(iii) If the material safety data sheet is not provided with a shipment that has been labeled as a hazardous chemical, the distributor or employer shall obtain one from the chemical manufacturer or importer as soon as possible; and,

(g)(6)(iv) The chemical manufacturer or importer shall also provide distributors or employers with a material safety data sheet upon request.

(g)(7)

(g)(7)(i) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and employers with their initial shipment and with the first shipment after a material safety data sheet is updated;

(g)(7)(ii) The distributor shall either provide material safety data sheets with the shipped containers, or send them to the other distributor or employer prior to or at the time of the shipment;

(g)(7)(iii) Retail distributors selling hazardous chemicals to employers having a commercial account shall provide a material safety data sheet to such employers upon request, and shall post a sign or otherwise inform them that a material safety data sheet is available;

(g)(7)(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide material safety data sheets upon the request of the employer at the time of the over-the-counter purchase, and shall post a sign or otherwise inform such employers that a material safety data sheet is available;

(g)(7)(v) If an employer without a commercial account purchases a hazardous chemical from a retail distributor not required to have material safety data sheets on file (i.e., the retail distributor does not have commercial accounts and does not use the materials), the retail distributor shall provide the employer, upon request, with the name, address, and telephone number of the chemical manufacturer, importer, or distributor from which a material safety data sheet can be obtained;

(g)(7)(vi) Wholesale distributors shall also provide material safety data sheets to employers or other distributors upon request; and,

(g)(7)(vii) Chemical manufacturers, importers, and distributors need not provide material safety data sheets to retail distributors that have informed them that the retail distributor does not sell the product to commercial accounts or open the sealed container to use it in their own workplaces.

(g)(8) The employer shall maintain in the workplace copies of the required material safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access, microfiche, and other alternatives to maintaining paper copies of the material safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

(g)(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(g)(10) 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).



(g)(1) 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 1910.1020(e). The Director shall also be given access to material safety data sheets in the same manner.

(h) "Employee information and training."

(h)(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.

(h)(2) "Information." Employees shall be informed of:

(h)(2)(i) The requirements of this section;

(h)(2)(ii) Any operations in their work area where hazardous chemicals are present; and,

(h)(2)(iii) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.

(h)(3) "Training." Employee training shall include at least:

(h)(3)(i) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(h)(3)(ii) The physical and health hazards of the chemicals in the work area;

(h)(3)(iii) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(h)(3)(iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) "Trade secrets."

(i)(1) The chemical manufacturer, importer, or employer may withhold the specific chemical identity, including the chemical name and other specific identification of a hazardous chemical, from the material safety data sheet, provided that:

(i)(1)(i) The claim that the information withheld is a trade secret can be supported;

(i)(1)(ii) Information contained in the material safety data sheet concerning the properties and effects of the hazardous chemical is disclosed;

(i)(1)(iii) The material safety data sheet indicates that the specific chemical identity is being withheld as a trade secret; and,

(i)(1)(iv) The specific chemical identity is made available to health professionals, employees, and designated representatives in accordance with the applicable provisions of this paragraph.



(i)(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need or a confidentiality agreement. The chemical manufacturer, importer, or employer may require a written statement of need and confidentiality agreement, in accordance with the provisions of paragraphs (i)(3) and (4) of this section, as soon as circumstances permit.

(i)(3) In non-emergency situations, a chemical manufacturer, importer, or employer shall, upon request, disclose a specific chemical identity, otherwise permitted to be withheld under paragraph (i)(1) of this section, to a health professional (i.e. physician, industrial hygienist, toxicologist, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

(i)(3)(i) The request is in writing;

(i)(3)(ii) The request describes with reasonable detail one or more of the following occupational health needs for the information:

(i)(3)(ii)(A) To assess the hazards of the chemicals to which employees will be exposed;

(i)(3)(ii)(B) To conduct or assess sampling of the workplace atmosphere to determine employee exposure levels;

(i)(3)(ii)(C) To conduct pre-assignment or periodic medical surveillance of exposed employees;

(i)(3)(ii)(D) To provide medical treatment to exposed employees;

(i)(3)(ii)(E) To select or assess appropriate personal protective equipment for exposed employees;

(i)(3)(ii)(F) To design or assess engineering controls or other protective measures for exposed employees; and,

(i)(3)(ii)(G) To conduct studies to determine the health effects of exposure.

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

(i)(3)(iii)(A) The properties and effects of the chemical;

(i)(3)(iii)(B) Measures for controlling workers' exposure to the chemical;

(i)(3)(iii)(C) Methods of monitoring and analyzing worker exposure to the chemical; and,

(i)(3)(iii)(D) Methods of diagnosing and treating harmful exposures to the chemical;

(i)(3)(iv) The request includes a description of the procedures to be used to maintain the confidentiality of the disclosed information; and,

(i)(3)(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(6) of this section, except as authorized by the terms of the agreement or by the chemical manufacturer, importer, or employer.



(i)(4)The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:

(i)(4)(i)May restrict the use of the information to the health purposes indicated in the written statement of need;

(i)(4)(ii)May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,

(i)(4)(iii)May not include requirements for the posting of a penalty bond.

(i)(5)Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.

(i)(6)If the health professional, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

(i)(7)If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:

(i)(7)(i)Be provided to the health professional, employee, or designated representative, within thirty days of the request;

(i)(7)(ii)Be in writing;

(i)(7)(iii)Include evidence to support the claim that the specific chemical identity is a trade secret;

(i)(7)(iv)State the specific reasons why the request is being denied; and,

(i)(7)(v)Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.

(i)(8)The health professional, employee, or designated representative whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.

(i)(9)When a health professional, employee, or designated representative refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:

(i)(9)(i)The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;

(i)(9)(ii)The health professional, employee, or designated representative has supported the claim that there is a medical or occupational health need for the information; and,

(i)(9)(iii)The health professional, employee or designated representative has demonstrated adequate means to protect the confidentiality.

(i)(10)

(i)(10)(i)If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a "bona fide" trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.



(i)(10)(ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unauthorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(i)(11) If a citation for a failure to release specific chemical identity information is contested by the chemical manufacturer, importer, or employer, the matter will be adjudicated before the Occupational Safety and Health Review Commission in accordance with the Act's enforcement scheme and the applicable Commission rules of procedure. In accordance with the Commission rules, when a chemical manufacturer, importer, or employer continues to withhold the information during the contest, the Administrative Law Judge may review the citation and supporting documentation "in camera" or issue appropriate orders to protect the confidentiality of such matters.

(i)(12) Notwithstanding the existence of a trade secret claim, a chemical manufacturer, importer, or employer shall, upon request, disclose to the Assistant Secretary any information which this section requires the chemical manufacturer, importer, or employer to make available. Where there is a trade secret claim, such claim shall be made no later than at the time the information is provided to the Assistant Secretary so that suitable determinations of trade secret status can be made and the necessary protections can be implemented.

(i)(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is a trade secret.

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

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

29 CFR 1910.1200 App A – Health hazard definitions

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 (Z129.1-1988) - 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 hazard 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. However, this is not intended to be an exclusive categorization scheme. If there are available scientific data that involve other animal species or test methods, they must also be evaluated to determine the applicability of the HCS.

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 (LD(50)) 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 (LD(50)) 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 (LC(50)) 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 (LD(50)) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

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

(c) A chemical that has a median lethal concentration (LC(50)) 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 hemato-poietic 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 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

29 CFR 1910.1200 App B – Hazard determination

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) of this section 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. In addition, however, all available scientific data on carcinogenicity must be evaluated in accordance with the provisions of this Appendix and the requirements of the rule.
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. In vitro studies alone generally do not form the basis for a definitive finding of hazard under the HCS since they have a positive or negative result rather than a statistically significant finding.

The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

29 CFR 1910.1200 App D – Definition of “trade secret”

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.

29 CFR 1910.1200 App E – Guidelines for employer compliance

The Hazard Communication Standard (HCS) is based on a simple concept - that employees have both a need and a right to know the hazards and identities of the chemicals they are exposed to when working. They also need to know what protective measures are available to prevent adverse effects from occurring. The HCS is designed to provide employees with the information they need.

Knowledge acquired under the HCS will help employers provide safer workplaces for their employees. When employers have information about the chemicals being used, they can take steps to reduce exposures, substitute less hazardous materials, and establish proper work practices. These efforts will help prevent the occurrence of work-related illnesses and injuries caused by chemicals.

The HCS addresses the issues of evaluating and communicating hazards to workers. Evaluation of chemical hazards involves a number of technical concepts, and is a process that requires the professional judgment of experienced experts. That's why the HCS is designed so that employers who simply use chemicals, rather than produce or import them, are not required to evaluate the hazards of those chemicals. Hazard determination is the responsibility of the producers and importers of the materials. Producers and importers of chemicals are then required to provide the hazard information to employers that purchase their products.

Employers that don't produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers. This appendix is a general guide for such employers to help them determine what's required under the rule. It does not supplant or substitute for the regulatory provisions, but rather provides a simplified outline of the steps an average employer would follow to meet those requirements.

1. "Becoming Familiar With The Rule."

OSHA has provided a simple summary of the HCS in a pamphlet entitled "Chemical Hazard Communication," OSHA Publication Number 3084. Some employers prefer to begin to become familiar with the rule's requirements



by reading this pamphlet. A copy may be obtained from your local OSHA Area Office, or by contacting the OSHA Publications Office at (202) 523-9667.

The standard is long, and some parts of it are technical, but the basic concepts are simple. In fact, the requirements reflect what many employers have been doing for years. You may find that you are already largely in compliance with many of the provisions, and will simply have to modify your existing programs somewhat. If you are operating in an OSHA-approved State Plan State, you must comply with the State's requirements, which may be different than those of the Federal rule. Many of the State Plan States had hazard communication or "right-to-know" laws prior to promulgation of the Federal rule. Employers in State Plan States should contact their State OSHA offices for more information regarding applicable requirements.

The HCS requires information to be prepared and transmitted regarding all hazardous chemicals. The HCS covers both physical hazards (such as flammability), and health hazards (such as irritation, lung damage, and cancer). Most chemicals used in the workplace have some hazard potential, and thus will be covered by the rule.

One difference between this rule and many others adopted by OSHA is that this one is performance-oriented. That means that you have the flexibility to adapt the rule to the needs of your workplace, rather than having to follow specific, rigid requirements. It also means that you have to exercise more judgment to implement an appropriate and effective program.

The standard's design is simple. Chemical manufacturers and importers must evaluate the hazards of the chemicals they produce or import. Using that information, they must then prepare labels for containers, and more detailed technical bulletins called material safety data sheets (MSDS).

Chemical manufacturers, importers, and distributors of hazardous chemicals are all required to provide the appropriate labels and material safety data sheets to the employers to which they ship the chemicals. The information is to be provided automatically. Every container of hazardous chemicals you receive must be labeled, tagged, or marked with the required information. Your suppliers must also send you a properly completed material safety data sheet (MSDS) at the time of the first shipment of the chemical, and with the next shipment after the MSDS is updated with new and significant information about the hazards.

You can rely on the information received from your suppliers. You have no independent duty to analyze the chemical or evaluate the hazards of it.

Employers that "use" hazardous chemicals must have a program to ensure the information is provided to exposed employees. "Use" means to package, handle, react, or transfer. This is an intentionally broad scope, and includes any situation where a chemical is present in such a way that employees may be exposed under normal conditions of use or in a foreseeable emergency.

The requirements of the rule that deal specifically with the hazard communication program are found in this section in paragraphs (e), written hazard communication program; (f), labels and other forms of warning; (g), material safety data sheets; and (h), employee information and training. The requirements of these paragraphs should be the focus of your attention. Concentrate on becoming familiar with them, using paragraphs (b), scope and application, and (c), definitions, as references when needed to help explain the provisions.

There are two types of work operations where the coverage of the rule is limited. These are laboratories and operations where chemicals are only handled in sealed containers (e.g., a warehouse). The limited provisions for these workplaces can be found in paragraph (b) of this section, scope and application. Basically, employers having these types of work operations need only keep labels on containers as they are received; maintain material safety data sheets that are received, and give employees access to them; and provide information and training for employees. Employers do not have to have written hazard communication programs and lists of chemicals for these types of operations.

The limited coverage of laboratories and sealed container operations addresses the obligation of an employer to the workers in the operations involved, and does not affect the employer's duties as a distributor of chemicals. For



example, a distributor may have warehouse operations where employees would be protected under the limited sealed container provisions. In this situation, requirements for obtaining and maintaining MSDSs are limited to providing access to those received with containers while the substance is in the workplace, and requesting MSDSs when employees request access for those not received with the containers. However, as a distributor of hazardous chemicals, that employer will still have responsibilities for providing MSDSs to downstream customers at the time of the first shipment and when the MSDS is updated. Therefore, although they may not be required for the employees in the work operation, the distributor may, nevertheless, have to have MSDSs to satisfy other requirements of the rule.

2. "Identify Responsible Staff"

Hazard communication is going to be a continuing program in your facility. Compliance with the HCS is not a "one shot deal." In order to have a successful program, it will be necessary to assign responsibility for both the initial and ongoing activities that have to be undertaken to comply with the rule. In some cases, these activities may already be part of current job assignments. For example, site supervisors are frequently responsible for on-the-job training sessions. Early identification of the responsible employees, and involvement of them in the development of your plan of action, will result in a more effective program design. Evaluation of the effectiveness of your program will also be enhanced by involvement of affected employees.

For any safety and health program, success depends on commitment at every level of the organization. This is particularly true for hazard communication, where success requires a change in behavior. This will only occur if employers understand the program, and are committed to its success, and if employees are motivated by the people presenting the information to them.

3. "Identify Hazardous Chemicals in the Workplace."

The standard requires a list of hazardous chemicals in the workplace as part of the written hazard communication program. The list will eventually serve as an inventory of everything for which an MSDS must be maintained. At this point, however, preparing the list will help you complete the rest of the program since it will give you some idea of the scope of the program required for compliance in your facility.

The best way to prepare a comprehensive list is to survey the workplace. Purchasing records may also help, and certainly employers should establish procedures to ensure that in the future purchasing procedures result in MSDSs being received before a material is used in the workplace.

The broadest possible perspective should be taken when doing the survey. Sometimes people think of "chemicals" as being only liquids in containers. The HCS covers chemicals in all physical forms - liquids, solids, gases, vapors, fumes, and mists - whether they are "contained" or not. The hazardous nature of the chemical and the potential for exposure are the factors which determine whether a chemical is covered. If it's not hazardous, it's not covered. If there is no potential for exposure (e.g., the chemical is inextricably bound and cannot be released), the rule does not cover the chemical.

Look around. Identify chemicals in containers, including pipes, but also think about chemicals generated in the work operations. For example, welding fumes, dusts, and exhaust fumes are all sources of chemical exposures. Read labels provided by suppliers for hazard information. Make a list of all chemicals in the workplace that are potentially hazardous. For your own information and planning, you may also want to note on the list the location(s) of the products within the workplace, and an indication of the hazards as found on the label. This will help you as you prepare the rest of your program.

Paragraph (b) of this section, scope and application, includes exemptions for various chemicals or workplace situations. After compiling the complete list of chemicals, you should review paragraph (b) of this section to determine if any of the items can be eliminated from the list because they are exempted materials. For example, food, drugs, and cosmetics brought into the workplace for employee consumption are exempt. So rubbing alcohol in the first aid kit would not be covered.



Once you have compiled as complete a list as possible of the potentially hazardous chemicals in the workplace, the next step is to determine if you have received material safety data sheets for all of them. Check your files against the inventory you have just compiled. If any are missing, contact your supplier and request one. It is a good idea to document these requests, either by copy of a letter or a note regarding telephone conversations. If you have MSDSs for chemicals that are not on your list, figure out why. Maybe you don't use the chemical anymore. Or maybe you missed it in your survey. Some suppliers do provide MSDSs for products that are not hazardous. These do not have to be maintained by you.

You should not allow employees to use any chemicals for which you have not received an MSDS. The MSDS provides information you need to ensure proper protective measures are implemented prior to exposure.

4. "Preparing and Implementing a Hazard Communication Program"

All workplaces where employees are exposed to hazardous chemicals must have a written plan which describes how the standard will be implemented in that facility. Preparation of a plan is not just a paper exercise - all of the elements must be implemented in the workplace in order to be in compliance with the rule. See paragraph (e) of this section for the specific requirements regarding written hazard communication programs. The only work operations which do not have to comply with the written plan requirements are laboratories and work operations where employees only handle chemicals in sealed containers. See paragraph (b) of this section, scope and application, for the specific requirements for these two types of workplaces.

The plan does not have to be lengthy or complicated. It is intended to be a blueprint for implementation of your program - an assurance that all aspects of the requirements have been addressed.

Many trade associations and other professional groups have provided sample programs and other assistance materials to affected employers. These have been very helpful to many employers since they tend to be tailored to the particular industry involved. You may wish to investigate whether your industry trade groups have developed such materials.

Although such general guidance may be helpful, you must remember that the written program has to reflect what you are doing in your workplace. Therefore, if you use a generic program it must be adapted to address the facility it covers. For example, the written plan must list the chemicals present at the site, indicate who is to be responsible for the various aspects of the program in your facility, and indicate where written materials will be made available to employees.

If OSHA inspects your workplace for compliance with the HCS, the OSHA compliance officer will ask to see your written plan at the outset of the inspection. In general, the following items will be considered in evaluating your program.

The written program must describe how the requirements for labels and other forms of warning, material safety data sheets, and employee information and training, are going to be met in your facility. The following discussion provides the type of information compliance officers will be looking for to decide whether these elements of the hazard communication program have been properly addressed:

A. "Labels and Other Forms of Warning"

In-plant containers of hazardous chemicals must be labeled, tagged, or marked with the identity of the material and appropriate hazard warnings. Chemical manufacturers, importers, and distributors are required to ensure that every container of hazardous chemicals they ship is appropriately labeled with such information and with the name and address of the producer or other responsible party. Employers purchasing chemicals can rely on the labels provided by their suppliers. If the material is subsequently transferred by the employer from a labeled container to another container, the employer will have to label that container unless it is subject to the portable container exemption. See paragraph (f) of this section for specific labeling requirements.



The primary information to be obtained from an OSHA-required label is an identity for the material, and appropriate hazard warnings. The identity is any term which appears on the label, the MSDS, and the list of chemicals, and thus links these three sources of information. The identity used by the supplier may be a common or trade name ("Black Magic Formula"), or a chemical name (1,1,1,-trichloroethane). The hazard warning is a brief statement of the hazardous effects of the chemical ("flammable," "causes lung damage"). Labels frequently contain other information, such as precautionary measures ("do not use near open flame"), but this information is provided voluntarily and is not required by the rule. Labels must be legible, and prominently displayed. There are no specific requirements for size or color, or any specified text.

With these requirements in mind, the compliance officer will be looking for the following types of information to ensure that labeling will be properly implemented in your facility:

1. Designation of person(s) responsible for ensuring labeling of in-plant containers;
2. Designation of person(s) responsible for ensuring labeling of any shipped containers;
3. Description of labeling system(s) used;
4. Description of written alternatives to labeling of in-plant containers (if used); and,
5. Procedures to review and update label information when necessary.

Employers that are purchasing and using hazardous chemicals - rather than producing or distributing them - will primarily be concerned with ensuring that every purchased container is labeled. If materials are transferred into other containers, the employer must ensure that these are labeled as well, unless they fall under the portable container exemption (paragraph (f)(7) of this section). In terms of labeling systems, you can simply choose to use the labels provided by your suppliers on the containers. These will generally be verbal text labels, and do not usually include numerical rating systems or symbols that require special training. The most important thing to remember is that this is a continuing duty - all in-plant containers of hazardous chemicals must always be labeled. Therefore, it is important to designate someone to be responsible for ensuring that the labels are maintained as required on the containers in your facility, and that newly purchased materials are checked for labels prior to use.

B. "Material Safety Data Sheets"

Chemical manufacturers and importers are required to obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Distributors are responsible for ensuring that their customers are provided a copy of these MSDSs. Employers must have an MSDS for each hazardous chemical which they use. Employers may rely on the information received from their suppliers. The specific requirements for material safety data sheets are in paragraph (g) of this section. There is no specified format for the MSDS under the rule, although there are specific information requirements. OSHA has developed a non-mandatory format, OSHA Form 174, which may be used by chemical manufacturers and importers to comply with the rule. The MSDS must be in English. You are entitled to receive from your supplier a data sheet which includes all of the information required under the rule. If you do not receive one automatically, you should request one. If you receive one that is obviously inadequate, with, for example, blank spaces that are not completed, you should request an appropriately completed one. If your request for a data sheet or for a corrected data sheet does not produce the information needed, you should contact your local OSHA Area Office for assistance in obtaining the MSDS.

The role of MSDSs under the rule is to provide detailed information on each hazardous chemical, including its potential hazardous effects, its physical and chemical characteristics, and recommendations for appropriate protective measures. This information should be useful to you as the employer responsible for designing protective programs, as well as to the workers. If you are not familiar with material safety data sheets and with chemical terminology, you may need to learn to use them yourself. A glossary of MSDS terms may be helpful in this regard. Generally speaking, most employers using hazardous chemicals will primarily be concerned with MSDS information regarding hazardous effects and recommended protective measures. Focus on the sections of the MSDS that are applicable to your situation.

MSDSs must be readily accessible to employees when they are in their work areas during their workshifts. This may be accomplished in many different ways. You must decide what is appropriate for your particular workplace. Some employers keep the MSDSs in a binder in a central location (e.g., in the pick-up truck on a construction site). Others, particularly in workplaces with large numbers of chemicals, computerize the information and provide access through



terminals. As long as employees can get the information when they need it, any approach may be used. The employees must have access to the MSDSs themselves - simply having a system where the information can be read to them over the phone is only permitted under the mobile worksite provision, paragraph (g)(9) of this section, when employees must travel between workplaces during the shift. In this situation, they have access to the MSDSs prior to leaving the primary worksite, and when they return, so the telephone system is simply an emergency arrangement.

In order to ensure that you have a current MSDS for each chemical in the plant as required, and that employee access is provided, the compliance officers will be looking for the following types of information in your written program:

1. Designation of person(s) responsible for obtaining and maintaining the MSDSs;
2. How such sheets are to be maintained in the workplace (e.g., in notebooks in the work area(s) or in a computer with terminal access), and how employees can obtain access to them when they are in their work area during the work shift;
3. Procedures to follow when the MSDS is not received at the time of the first shipment;
4. For producers, procedures to update the MSDS when new and significant health information is found; and,
5. Description of alternatives to actual data sheets in the workplace, if used.

For employers using hazardous chemicals, the most important aspect of the written program in terms of MSDSs is to ensure that someone is responsible for obtaining and maintaining the MSDSs for every hazardous chemical in the workplace. The list of hazardous chemicals required to be maintained as part of the written program will serve as an inventory. As new chemicals are purchased, the list should be updated. Many companies have found it convenient to include on their purchase orders the name and address of the person designated in their company to receive MSDSs.

C. "Employee Information and Training"

Each employee who may be "exposed" to hazardous chemicals when working must be provided information and trained prior to initial assignment to work with a hazardous chemical, and whenever the hazard changes. "Exposure" or "exposed" under the rule 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." See paragraph (h) of this section for specific requirements. Information and training may be done either by individual chemical, or by categories of hazards (such as flammability or carcinogenicity). If there are only a few chemicals in the workplace, then you may want to discuss each one individually. Where there are large numbers of chemicals, or the chemicals change frequently, you will probably want to train generally based on the hazard categories (e.g., flammable liquids, corrosive materials, carcinogens). Employees will have access to the substance-specific information on the labels and MSDSs.

Information and training is a critical part of the hazard communication program. Information regarding hazards and protective measures are provided to workers through written labels and material safety data sheets. However, through effective information and training, workers will learn to read and understand such information, determine how it can be obtained and used in their own workplaces, and understand the risks of exposure to the chemicals in their workplaces as well as the ways to protect themselves. A properly conducted training program will ensure comprehension and understanding. It is not sufficient to either just read material to the workers, or simply hand them material to read. You want to create a climate where workers feel free to ask questions. This will help you to ensure that the information is understood. You must always remember that the underlying purpose of the HCS is to reduce the incidence of chemical source illnesses and injuries. This will be accomplished by modifying behavior through the provision of hazard information and information about protective measures. If your program works, you and your workers will better understand the chemical hazards within the workplace. The procedures you establish regarding, for example, purchasing, storage, and handling of these chemicals will improve, and thereby reduce the risks posed to employees exposed to the chemical hazards involved. Furthermore, your workers' comprehension will also be increased, and proper work practices will be followed in your workplace.

If you are going to do the training yourself, you will have to understand the material and be prepared to motivate the workers to learn. This is not always an easy task, but the benefits are worth the effort. More information regarding appropriate training can be found in OSHA Publication No. 2254 which contains voluntary training guidelines prepared by OSHA's Training Institute. A copy of this document is available from OSHA's Publications Office at



(202) 219-4667. In reviewing your written program with regard to information and training, the following items need to be considered:

1. Designation of person(s) responsible for conducting training;
2. Format of the program to be used (audiovisuals, classroom instruction, etc.);
3. Elements of the training program (should be consistent with the elements in paragraph (h) of this section); and,
4. Procedure to train new employees at the time of their initial assignment to work with a hazardous chemical, and to train employees when a new hazard is introduced into the workplace.

The written program should provide enough details about the employer's plans in this area to assess whether or not a good faith effort is being made to train employees. OSHA does not expect that every worker will be able to recite all of the information about each chemical in the workplace. In general, the most important aspects of training under the HCS are to ensure that employees are aware that they are exposed to hazardous chemicals, that they know how to read and use labels and material safety data sheets, and that, as a consequence of learning this information, they are following the appropriate protective measures established by the employer. OSHA compliance officers will be talking to employees to determine if they have received training, if they know they are exposed to hazardous chemicals, and if they know where to obtain substance-specific information on labels and MSDSs.

The rule does not require employers to maintain records of employee training, but many employers choose to do so. This may help you monitor your own program to ensure that all employees are appropriately trained. If you already have a training program, you may simply have to supplement it with whatever additional information is required under the HCS. For example, construction employers that are already in compliance with the construction training standard (29 CFR 1926.21) will have little extra training to do.

An employer can provide employees information and training through whatever means are found appropriate and protective. Although there would always have to be some training on-site (such as informing employees of the location and availability of the written program and MSDSs), employee training may be satisfied in part by general training about the requirements of the HCS and about chemical hazards on the job which is provided by, for example, trade associations, unions, colleges, and professional schools. In addition, previous training, education and experience of a worker may relieve the employer of some of the burdens of informing and training that worker. Regardless of the method relied upon, however, the employer is always ultimately responsible for ensuring that employees are adequately trained. If the compliance officer finds that the training is deficient, the employer will be cited for the deficiency regardless of who actually provided the training on behalf of the employer.

D. "Other Requirements"

In addition to these specific items, compliance officers will also be asking the following questions in assessing the adequacy of the program:

- Does a list of the hazardous chemicals exist in each work area or at a central location?
 - Are methods the employer will use to inform employees of the hazards of non-routine tasks outlined?
 - Are employees informed of the hazards associated with chemicals contained in unlabeled pipes in their work areas?
 - On multi-employer worksites, has the employer provided other employers with information about labeling systems and precautionary measures where the other employers have employees exposed to the initial employer's chemicals?
 - Is the written program made available to employees and their designated representatives?
- If your program adequately addresses the means of communicating information to employees in your workplace, and provides answers to the basic questions outlined above, it will be found to be in compliance with the rule.

5. "Checklist for Compliance"

The following checklist will help to ensure you are in compliance with the rule:

- Obtained a copy of the rule. _____
- Read and understood the requirements. _____
- Assigned responsibility for tasks. _____
- Prepared an inventory of chemicals. _____



- Ensured containers are labeled. _____
- Obtained MSDS for each chemical. _____
- Prepared written program. _____
- Made MSDSs available to workers. _____
- Conducted training of workers. _____
- Established procedures to maintain current program. _____
- Established procedures to evaluate effectiveness. _____

6. "Further Assistance"

If you have a question regarding compliance with the HCS, you should contact your local OSHA Area Office for assistance. In addition, each OSHA Regional Office has a Hazard Communication Coordinator who can answer your questions. Free consultation services are also available to assist employers, and information regarding these services can be obtained through the Area and Regional offices as well.

The telephone number for the OSHA office closest to you should be listed in your local telephone directory. If you are not able to obtain this information, you may contact OSHA's Office of Information and Consumer Affairs at (202) 219-8151 for further assistance in identifying the appropriate contacts.



APPENDIX 2

MSDS Glossary

The following glossary presents brief explanations of acronyms and common terms frequently used by chemical manufacturers in their MSDS's.

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

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

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

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

Adenocarcinoma A tumor with glandular (secreting) elements.

Adenosis Any disease of a gland.

Adhesion A union of two surfaces that are normally separate.

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

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

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

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

Allergic Reaction An abnormal physiological response to chemical or physical stimuli.



Amenorrhea Absence of menstruation.

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

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

Antidote A remedy to relieve, prevent, or counteract the effects of a poison.

API American Petroleum Institute is a organization of the petroleum industry.

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

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

Asphyxiant A vapor or gas that can cause unconsciousness or death by suffocation (lack of oxygen). Most simple asphyxiants are harmful to the body only when they become so concentrated that they reduce 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.

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.

Asymptomatic Showing no symptoms.

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

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

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

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



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

BCM Blood-clotting mechanism effects.

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

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

Biopsy Removal and examination of tissue from the living body.

BLD Blood effects.

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

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

Propane	- 44°F
Anhydrous Ammonia	- 28°F
Butane	31°F
Gasoline	100°F
Allyl Chloride	113°F
Ethylene Glycol	387°F

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

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

Bulk Density Mass of powdered or granulated solid material per unit of volume.

C Centigrade, a unit of temperature.

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



ca Approximately.

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

Carcinogen A substance or agent capable of causing or producing cancer in mammals, including humans. A chemical is considered to be a carcinogen if

- (a) It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen; or
- (b) It is listed as a carcinogen or potential carcinogen in the **Annual Report on Carcinogens** published by the National Toxicology Program (NTP) (latest edition); or
- (c) It is regulated by OSHA as a carcinogen.

Carcinogenicity The ability to produce cancer.

Carcinoma A malignant tumor. A form of cancer.

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

Caustic See Alkali.

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

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

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

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

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

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



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

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

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

CHEMTREC Chemical Transportation Emergency Center is a national center established by the Chemical Manufacturers Association (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.

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

Chronic Exposure Long-term contact with a substance.

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

Clean Air Act See CAA.

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

CMA Chemical Manufactures Association. See CHEMTREC.

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

CO₂ Carbon dioxide is a heavy, colorless gas that 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 nontoxic (although high concentrations, especially in confined spaces, can create hazardous oxygen-deficient environments).

COC Cleveland Open Cup is a flash point test method.



Combustible A term used by NFPA, DOT, and others to classify certain liquids that will burn, on the basis of flash points. Both NFPA and DOT generally define “combustible liquids” as having a flash point of 100°F (37.8°C) or higher but below 200°F (93.3°C). Also see “flammable.” Nonliquid 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 makes up ninety-nine (99) percent or more of the total volume of the mixture.

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

Compressed Gas:

- (a) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 pounds per square inch (psi) at 70°F (21.1°C); or
- (b) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130°F (54.4°C) regardless of the pressure at 70°F (21.1°C); or
- (c) A liquid having a vapor pressure exceeding 40 psi at 100°F (37.8°C) as determined by ASTM D-323-72.

Conc See Concentration.

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

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

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

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

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 HCS, pipes or piping systems are not considered to be containers.

Corrosive A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the DOT in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue



at the site of contact following an exposure period of 4 hours. This term shall not refer to action on inanimate surfaces.

CPSC Consumer Products Safety Commission has responsibility for regulating hazardous materials when they appear in consumer goods. For CPSC purposes, hazards are defined in the Hazardous Substances Act and the Poison Prevention Packaging Act of 1970.

Curettage Cleansing of a diseased surface.

Cutaneous Toxicity See "Dermal Toxicity."

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

Cyst A sac containing a liquid. Most cysts are harmless.

Cytology The scientific study of cells.

Decomposition Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay, or other processes) into parts or elements or simpler compounds.

Density The mass (weight) per unit volume of a substance. For example, lead is much more dense than aluminum.

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

Dermal Relating to the skin.

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

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

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

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

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

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



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

Dysmenorrhea Painful menstruation.

Dysplasia An abnormality of development.

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

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

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

Endocrine glands Glands that regulate body activity by secreting hormones.

Endometrium The mucous membrane lining the uterus.

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

EPA U.S. Environmental Protection Agency.

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

Epithelium The covering of internal and external surfaces of the body.

Estrogen Principal female sex hormone.

Evaporation Rate The rate at which a material will vaporize (evaporate) when compared to the known rate of vaporization of a standard material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The designated standard material is usually normal butyl acetate (NBUAC or n-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 = 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 by inhalation, ingestion, skin contact, absorption, or any other course; includes potential (accidental or possible) exposure.

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

Eye Protection Recommended safety glasses, chemical splash goggles, face 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°F and freezes at 32°F.

f/cc Fibers per cubic centimeter of air.

FDA U.S. Food and Drug Administration.

Fetal Pertaining to the fetus.

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

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

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

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

Flammable A chemical that includes one of the following categories:

- (a) "Aerosol, flammable." An aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of 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 explosive as defined in 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A solid is a flammable solid if, when tested by the method



described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one tenth of an inch per second along its major axis.

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

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

- (a) Tagliabue Closed Tester (see American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24 1979 [ASTM D56-79]).
- (b) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 [ASTM D93-79]).
- (c) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester [ASTM D 3278-78]).

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

Formula The scientific expression of the chemical composition of a material (e.g., water is H₂O, sulfuric acid is H₂SO₄, sulfur dioxide is SO₂).

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

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

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

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

Genetic Pertaining to or carried by genes. Hereditary.

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

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

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

Gynecology The study of the reproductive organs in women.



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

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

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

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

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

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

Hematoma A blood clot under the surface of the skin.

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

Hematuria The presence of blood in the urine.

Hepatotoxin A substance that causes injury to the liver.

Highly toxic A chemical in any of the following categories:

- (a) A chemical with a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- (b) A chemical with a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino 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 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Hormones Act as chemical messengers to body organs.



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

IARC International Agency for Research on Cancer.

Ignitable Capable of being set afire.

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

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

Ingestion Taking in by the mouth.

Inhal See inhalation.

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

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

Insol See insoluble.

Insoluble Incapable of being dissolved in a liquid.

Intrauterine Within the uterus.

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

Irritating As defined by DOT, a property of 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.

kg Kilogram is a metric unit of weight, about 2.2 U.S. pounds. Also see "g/kg," "9," and "mg."

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

Lacrimation Secretion and discharge of tears.

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

Lactation The secretion of milk by the breasts.

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



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

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 parts of material per million parts of air, by volume (ppm) for gases and vapors, or as micrograms of material per liter of air (g/L) or milligrams of material per cubic meter of air (mg/m³) for dusts and mists, as well as for gases and vapors.

LD Lethal dose is the quantity of a substance being tested 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 a material expected to kill 50 percent of a group of test animals. The LD₅₀ dose is usually expressed as milligrams or grams of material per kilogram of animal body weight (mg/kg or g/kg). The material may be administered by mouth or applied to the skin.

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

Lesion Any damage to a tissue.

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

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

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

m³ Cubic meter is a metric measure of volume, approximately 35.3 cubic feet or 1.3 cubic yards.

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

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

Mammary Pertaining to the breast.

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



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

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

Menorrhagia Excessive menstruation.

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

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

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

Meter A unit of length; equivalent to 39.37 inches.

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

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

mg/m³ Milligrams per cubic meter is a unit for expressing concentrations of dusts, gases, or mists in air.

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

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

Mld Mild

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

mmHg Millimeters (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/m³.

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.

N₂ Nitrogen is a colorless, odorless, and tasteless gas that will not burn and will not support combustion. The earth's atmosphere (air) is about 78 percent nitrogen. At higher concentrations, nitrogen can displace oxygen and become a lethal asphyxiant. See Asphyxiant.

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

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

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

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

Neo See neoplasia.

Neonatal The first 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 to the spill.

ng nanogram, one-billionth of a gram.

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

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

Non-Sparking Tools Tools made from berylliumcopper or aluminum-bronze greatly reduce the possibility of igniting dusts, gases, or flammable vapors. Although these tools may emit some sparks when striking metal, the sparks have a low heat content and are not likely to ignite most flammable liquids.

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

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

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

NTP National Toxicology Program. The NTP publishes an Annual Report on Carcinogens.

Odor A description of the smell of the substance.

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

Olfactory Relating to the sense of smell.

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

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

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



Organogenesis The formation of organs during development.

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

Ovary The female sex gland in which ova are formed .

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

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

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. The agent may (1) provide the oxygen to the substance being oxidized (in which case the agent has to be oxygen or contain oxygen), or (2) it may receive electrons being transferred from .the substance undergoing oxidation (chlorine is a good oxidizing agent for electron-transfer purposes, even though it contains no oxygen).

Pathologic Pertaining to or caused by disease.

Pathology Scientific study of alterations produced by disease.

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

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

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

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

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



PMCC Pensky-Martens Closed Cup. See Flashpoint.

Pneumoconiosis A condition of the lung in which there is permanent 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 such a reaction that takes place at a rate that releases large amounts of energy. If hazardous polymerization can occur with a given material, the 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 particulate 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 Edema Fluid in the lungs.

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



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

Reactive See Unstable.

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

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

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

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

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

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

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

Sarcoma A tumor that is often malignant.

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

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

SETA Setaflash Closed Tester. See Flashpoint.



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

Skn Skin.

"Skin" A notation (sometimes used with PEL or TLV exposure data) that indicates 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.

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

SO_x Oxides of sulfur.

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

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

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

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

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



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

Squamous Scaly or platelike.

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

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

Stenosis Narrowing of a body passage or opening.

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

Subcutaneous Beneath the layers of the skin.

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

Sys System or systemic.

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

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

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

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

- (a) **Hepatotoxins:** Chemicals that produce liver damage.
Signs & Symptoms: Jaundice; liver enlargement.
Chemicals: Carbon tetrachloride; nitrosamines.
- (b) **Nephrotoxins:** Chemicals that produce kidney damage.
Signs & Symptoms: Edema; proteinuria.
Chemicals: Halogenated hydrocarbons; uranium.
- (c) **Neurotoxins:** Chemicals that produce their primary toxic effects on the nervous system
Signs & Symptoms: Narcosis; behavioral changes; decrease in motor functions.
Chemicals: Mercury, carbon disulfide.



- (d) Agents that act on blood hematopoietic system: Decrease hemoglobin function; deprive the body tissues of oxygen.
Signs & Symptoms: Cyanosis; loss of consciousness.
Chemicals: Carbon monoxide; cyanides
- (e) Agents that damage the lung: Chemicals that irritate or damage the pulmonary tissue.
Signs & Symptoms: Cough, tightness in chest, shortness of breath.
Chemicals: Silica; asbestos.
- (f) Reproductive toxins: Chemicals that adversely affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs & Symptoms: Birth defects; sterility.
Chemicals: Lead; DBCP
- (g) Cutaneous hazards: Chemicals that affect the dermal layer of the body.
Signs & Symptoms: Defatting of the skin; rashes; irritation.
Chemicals: Ketones; chlorinated compounds.
- (h) Eye hazards: Chemicals that affect the eye or visual capacity.
Signs & Symptoms: Conjunctivitis; corneal damage.
Chemicals: Organic solvents; acids.

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

TCC Tag (Tagliabue) Closed Cup. See Flashpoint.

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

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

Temp Temperature.

Ter See Teratogen.

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

Tfx Toxic effect(s).

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

TLV-TWA: The allowable Time-Weighted Average concentration for a normal 8-hour workday or 80-hour workweek.

TLV-STEL: The Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period (maximum of four such periods per day, with at



least 60 minutes between exposure periods, and provided the daily TLV-TWA is not exceeded).

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

TOC Tag Open Cup. See Flashpoint.

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

Toxic A chemical falling within any of the following categories:

- (a) A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- (b) A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
- (c) A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

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

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

Trade Name The trademark name or commercial trade name for a material or product.

Transplacental An agent that causes physical defects in the developing embryo.

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

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

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

ug Microgram, one-millionth of a gram.



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

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

USDA U.S. Department of Agriculture.

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

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

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

1. Vapor pressure of a substance at 100°F will always be higher than the vapor pressure of the substance at 68°F (20°C).
2. Vapor pressures reported on MSDS's in mmHg are usually very low pressures; 760 mmHg is equivalent to 14.7 pounds per square inch.
3. The lower the boiling point of a substance, the higher its vapor pressure.

Ventilation See General Exhaust, Local Exhaust, and Mechanical Exhaust.

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

Viscosity The tendency of a fluid to resist internal flow without regard to its density.

Volatility A measure of how quickly a substance forms a vapor at ordinary temperatures.

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

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



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

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

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



APPENDIX 3

States with Approved Plans

If your facility is located in an OSHA-approved State-plan state, you must comply with the Hazard Communication requirements of the state. OSHA approved state plans are required to promulgate standards that are "at least as effective" as the Federal rule, but they may differ in some respects. This Appendix provides information regarding the appropriate state offices to contact for more information.

State Plan States*

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

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

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

Connecticut Department of Labor, 200 Folly Brook Boulevard, Wethersfield, CT 06109, (203) 566-5123

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

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

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

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

Maryland Division of Labor and Industry, Department of Licensing and Regulation, 501 St. Paul Place, Baltimore, MD 21202-2272, (301) 333-4176

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

Michigan Department of Public Health, 3500 North Logan Street, P.O. Box 30195, Lansing, MI 48909, (517) 335-8022

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



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 Environmental Improvement Division, Health and Environment Department, P.O. Box 968, Santa Fe, NM 87504-0968, (505) 827-2850

New York Department of Labor, One Main Street, Brooklyn, NY 11201, (718) 797-7281

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

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

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

South Carolina Department of Labor, 3600 Forest Drive, P.O. Box 11329 Columbia, SC 29211-1329, (803) 734-9594

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

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

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

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

Virginia Department of Labor and Industry, P.O. Box 12064, Richmond, VA 23241-0064, (804) 786-2376

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

Wyoming Department of Occupational Health and Safety, 604 East 25th Street, Cheyenne, WY 82002, (307) 777-7786 or 777-7787

*These states and territories operate their own OSHA-approved job safety and health programs (the Connecticut and New York plans cover public employees only and OSHA currently is exercising concurrent private-sector Federal enforcement authority in California).



APPENDIX 4

OSHA/State Consultation Project Directory

Consultation programs provide free services to employers requesting help in (1) identifying and correcting specific hazards, (2) improving their safety and health programs, and/or need further assistance in training and education. Funded by OSHA and delivered by well-trained professional staff of state governments, consultation services are comprehensive, and include an appraisal of all workplace hazards, practices, and job safety and health programs; conferences and agreements with management; assistance in implementing recommendations; and a follow-up appraisal to ensure that any required corrections are made.

In a typical review of a company's operation, the consultant will examine the structural condition of the building, check equipment (such as forklifts), examine storage conditions, check control of toxic substances and other environmental hazards, and confer with management about employee supervision and job training. The ultimate benefits of a successful consultation experience may include a highly effective safety and health program as well as recognition by OSHA.

For more information on consultation programs, contact the appropriate office in your state listed in this Appendix.

Office and Address

ALABAMA

Safe State Program, University of Alabama, 432 Martha Parham West, P.O. Box 870388, Tuscaloosa, Alabama 35487, (205) 348-3033 (205) 348-3049 FAX

E-mail: bweems@ccs.ua.edu

Website: <http://bama.ua.edu/~deip/safest.html>

ALASKA

Consultation Section, ADOL/AKOSH, 3301 Eagle Street, P.O. Box 107022, Anchorage, Alaska 99510, (907) 269-4957 (907) 269-4950 FAX

E-mail: cliff_hustead@labor.state.ak.us

Website: <http://www.labor.state.ak.us/lss/oshhome.htm>

ARIZONA

Consultation & Training, Industrial Commission of Arizona, Division of Occupational Safety & Health, 800 West Washington, Phoenix, Arizona 85007-9070, (602) 542-1695 (602) 542-1614 FAX

E-mail: pat.ryan@osha.gov

ARKANSAS

OSHA Consultation, Arkansas Department of Labor, 10421 West Markham, Little Rock, Arkansas 72205, (501) 682-4522 (501) 682-4532 FAX

E-mail: clark.thomas@osha.gov

Website: <http://www.state.ar.us/labor/serv01.htm>

**CALIFORNIA**

CAL/OSHA Consultation Service, Department of Industrial Relations, 2424 Arden Way, Suite 485, Sacramento, California 95825, (916) 263-5765 (916) 263-5768 FAX

E-mail: InfoCons@hq.dir.ca.gov

Website: <http://www.dir.ca.gov/DOSH/consultation.html>

COLORADO

Colorado State University, Occupational Safety & Health Section, 115 Environmental Health Building, Fort Collins, Colorado 80523, (970) 491-6151 (970) 491-7778 FAX

E-mail: del.sandfort@lamar.colostate.edu

Website: <http://www.bernardino.colostate.edu/enhealth/7c1.html>

CONNECTICUT

Connecticut Department of Labor, Division of Occupational Safety & Health, 38 Wolcott Hill Road, Wethersfield, Connecticut 06109, (860) 566-4550 (860) 566-6916 FAX

E-mail: donald.heckler@osha.gov

Website: <http://www.ctdol.state.ct.us/osha/osha.htm>

DELAWARE

Delaware Department of Labor, Division of Industrial Affairs Occupational Safety & Health, 4425 Market Street, Wilmington, Delaware 19802, (302) 761-8219 (302) 761-6601 FAX

E-mail: ttrznadel@state.de.us

Website: <http://www.state.de.us/labor/aboutdoMndustrialaffairs.html>

DISTRICT OF COLUMBIA

Program available only for employers within the District of Columbia, DC Department of Employment Services, Office of Occupational Safety & Health, 77 P Street, N.E., 2nd Floor, Washington, D.C. 20002 (202) 671-1800 (202) 671-3018 FAX

E-mail: jcates@osha.gov

FLORIDA

University of South Florida, Safety Florida Consultation Program, Department of Environmental & Occupational Health, College of Public Health, 4003 East Fowler Avenue, Tampa, Florida 33617, (813) 974-9962 (813) 974-9973 FAX

E-mail: cvespi@hsc.usf.edu

Website: <http://www.safetyflorida.usf.edu>

GEORGIA

Georgia Institute of Technology, 21(d) Onsite Consultation Program, 151 6th Street NW, O'Keefe Building, Room 025, Atlanta, Georgia 30332-0837, (404) 894-8276 (404) 894-8275 FAX

E-mail: daniel.ortiz@gtri.gatech.edu

Website: <http://www.oshainfo.gatech.edu/>

**GUAM**

OSHA Onsite Consultation, Dept. of Labor, Government of Guam, 107 F Street, Tiyam, Guam 96931, (671) 475-0136 (671) 477-9503 FAX

E-mail: terrybadley@osha.gov

Website: <http://mail.admin.gov.gu/webdol/oshacompl.htm>

HAWAII

Consultation & Training Branch, Department of Labor & Industrial Relations, 830 Punchbowl Street, Honolulu, Hawaii 96813, (808) 586-9100 (808) 586-9104 FAX

E-mail: ellen.kondo@osha.gov

Website: <http://www.state.hi.us/dlir/hiosh/consult.htm>

IDAHO

Boise State University Occupational Safety & Health Program, 191 0 University Drive, Boise, Idaho 83725-1825, (208) 426-3283 (208) 426-4411 FAX

E-mail: lhill@boisestate.edu

Website: <http://www2.boisestate.edu/ehs/Consultation.htm>

ILLINOIS

Illinois Onsite Consultation, Industrial Service Division, Department of Commerce & Community Affairs, State of Illinois Center, Suite 3-400, 100 West Randolph Street, Chicago, Illinois 60601, (312) 814-2337 (312) 814-7238 FAX

E-mail: sfryzel@commerce.state.il.us

Website: <http://www.commerce.state.il.us/Services/SmallBusiness/OSHA/OSHAhome.htm>

INDIANA

Bureau of Safety, Education & Training, Division of Labor, Room W195, 402 West Washington, Indianapolis, Indiana 46204-2287, (317) 232-268 (317) 232-3790 FAX

E-mail: cmack@col.state.in.us

Website: <http://www.state.in.us/labor/>

IOWA

Iowa Workforce Development & Labor Services, Bureau of Consultation & Education, 1000 East Grand, Des Moines, Iowa 50319, (515) 281-7629 (515) 281-5522 FAX

E-mail: steve.slater@osha.gov

Website: <http://www.state.ia.us/iwd/labor/index.htm>

KANSAS

Kansas 7(c)(1) Consultation Program, Kansas Dept. of Human Resources, 512 South West 6th Street, Topeka, Kansas 66603-3150, (785) 296-4386 (785) 296-1775 FAX

E-mail: rudy.leutzinger@osha.gov

**KENTUCKY**

Kentucky Labor Cabinet, Division of Education & Training, Kentucky OSH Program, 1047 U.S. Highway 127, South Frankfort, Kentucky 40601, (502) 564-3070 (502) 564-4769 FAX
E-mail: arussell@mail.lab.state.ky.us
Website: <http://www.kylabor.net/kyosh/oshcons.htm>

LOUISIANA

7(c)(1) Consultation Program, Louisiana Department of Labor, 1001 N. 23rd Street, Room 230, PO. Box 94094, Baton Rouge, Louisiana 70804-9094, (225) 342-9601 (225) 342-5158 FAX
E-mail: cmills@ldol.state.la.us

MAINE

Maine Bureau of Labor Standards, Workplace Safety & Health Division, State House Station #45, Augusta, Maine 04333-0045, (207) 624-6463 (207) 624-6449 FAX
E-mail: david.e.wacker@state.me.us
Website: <http://janus.state.me.us/labor/consult.htm>

MARYLAND

MOSH Consultation Services, 312 Marshall Avenue, Room 600, Laurel, Maryland 20707, (410) 880-6131 (301) 880-6369 FAX
E-mail: andrew.alcarese@osha.gov
Website: <http://www.dllr.state.md.us/labor/mosh.html>

MASSACHUSETTS

Division of Occupational Safety & Health, Dept. of Workforce Development, 1001 Watertown Street, West Newton, Massachusetts 02165, (617) 727-3982 (617) 727-4581 FAX
E-mail: joe.lamalva@state.ma.us
Website: <http://www.state.ma.us/dos/Consult/Consult.htm>

MICHIGAN

Department of Consumer & Industry Services, 7150 Harris Drive, Lansing, Michigan 48909 (517) 322-1809 (517) 322-1374 FAX
E-mail: ayalew.kanno@cis.state.mi.us
Website: <http://www.cis.state.mi.us/bsr/divisions/set/setcon.htm>

MINNESOTA

Department of Labor & Industry, Consultation Division, 443 LaFayette Road, Saint Paul, Minnesota 55155, (651) 284-5060 (651) 297-1953 FAX
E-mail: james.collins@state.mn.us
Website: <http://www.doli.state.mn.us/mnosha.html>

MISSISSIPPI

Mississippi State University, Center for Safety & Health, 106 Crosspark Drive, Suite C, Pearl, Mississippi 39208, (601) 939-2047 (601) 939-6742 FAX
E-mail: kelly.tucker@osha.gov
Website: <http://www.msstate.edu/dept/csh>

**MISSOURI**

Onsite Consultation Program, Division of Labor Standards, Dept. of Labor & Industrial Relations, 3315 West Truman Boulevard, Post Office Box 449, Jefferson City, Missouri 65109, (573) 751-3403 (573) 751-3721 FAX

E-mail: laborstandards@dolir.state.mo.us

Website: <http://www.dolir.state.mo.us/ls/onsitelindex.html>

MONTANA

Department of Labor & Industry, Bureau of Safety, PO Box 1728, Helena, Montana 59624-1728, (406) 444-6418 (406) 444-9396 FAX

E-mail: smahalik@state.mt.us

Website: <http://erd.dli.state.mt.us/Safety/SBhome.htm>

NEBRASKA

Nebraska Workforce Development, Office of Safety & Labor Standards, State Office Building, Lower Level, 301 Centennial Mall S, Lincoln, Nebraska 68509-5024, (402) 471-4717 (402) 471-5039 FAX

E-mail: ediedrichs@dol.state.ne.us

Website: <http://www.dol.state.ne.us/safety/7cl.htm>

NEVADA

Safety Consultation & Training Section, Division of Industrial Relations, Department of Business & Industry, 1301 Green Valley Parkway, Henderson, Nevada 89074, (702) 486-9140 (702) 990-0362 FAX

E-mail: jan.rosenberg@osha.gov

Website: <http://4safenv.state.nv.us>

NEW HAMPSHIRE

New Hampshire Dept of Health & Human Services, 6 Hazen Drive, Concord, New Hampshire 03301 -6527, (603) 271-2024 (603) 271-2667 FAX

E-mail: stephen.beyer@osha.gov

Website: <http://www.dhhs.state.nh.us/CommPublicHealth/oshcs.nsf/vMain>

NEW JERSEY

New Jersey Department of Labor, Division of Public Safety & Occupational Safety & Health, 225 E. State Street, 8th Floor West, PO. Box 953, Trenton, New Jersey 08625-0953, (609) 292-3923 (609) 292-4409 FAX

E-mail: carol.farley@osha.gov

Website: <http://www.state.nj.us/labor/consult.htm>

**NEW MEXICO**

New Mexico Environment Department, Occupational Health & Safety Bureau, 525 Camino de Los Marquez, Suite 3, PO Box 26110, Santa Fe, New Mexico 87502, (505) 827-4230 (505) 827-4422 FAX

E-mail: Kevin_Koch@nmenv.state.nm.us

Website: http://www.nmenv.state.nm.us/env_prot.html

NEW YORK

Division of Safety & Health, State Office Campus, Building 12, Room 130, Albany, New York 12240, (518) 457-2238 (518) 457-3454 FAX

E-mail: james.rush@osha.gov

Website: <http://www.labor.state.ny.us/html/employer/p469.html>

NORTH CAROLINA

Bureau of Consultative Services, NC Department of Labor--OSHA Division, 4 West Edenton Street, Raleigh, North Carolina 27601-1092, (919) 807-2899 (919) 807-2902 FAX

E-mail: wjoyner@mail.dol.state.nc.us

Website: <http://www.dol.state.nc.us/osha/consult/consult.htm>

NORTH DAKOTA

North Dakota Department of Health/Consolidated Labs, Environmental Health Sectioni, 1200 Missouri Avenue, Room 304, Bismarck, North Dakota 58504, (701) 328-5188 (701) 328-5200 FAX

E-mail: agilliss@state.nd.us

Website: <http://www.ehs.health.state.nd.us/ndhd/envIRON/ee/oshc/index.htm>

OHIO

On-Site Consultation Program, Bureau of Occupational Safety & Health, LAWS Division / Ohio Dept. of Commerce, 50 W. Broad Street, Suite 2900, Columbus, Ohio 43215, (800) 282-1425 or (614) 644-2631 (614) 644-3133 FAX

E-mail: wes.hohl@perrp.com.state.oh.us

Website: <http://198.234.41.214/w3/webpo2.nsf?Opendatabase>

OKLAHOMA

Oklahoma Department of Labor, OSHA Division, 4001 North Lincoln Boulevard, Oklahoma City, Oklahoma 73105-5212, (405) 528-1500 (405) 528-5751 FAX

E-mail: diana.jones1@osha.gov

Website: <http://www.state.ok.us/-okdol/osha/index.htm>

OREGON

Oregon OSHA, Department of Consumer & Business Services, 350 Winter Street, N.E., Room 430, Salem, Oregon 97310, (503) 378-3272 (503) 378-5729 FAX

E-mail: michelle.cattanach@state.or.us

Website: <http://www.orosha.org/>

**PENNSYLVANIA**

Indiana University Pennsylvania, Room 21 0 Walsh Hall, 302 East Walk, Indiana, Pennsylvania 15705-1087, (724) 357-2561 (724) 357-2385 FAX

E-mail: john.engler@osha.gov

Website: <http://www.iup.edu/sa/osha/index.html>

PUERTO RICO

Occupational Safety & Health Office, Department of Labor & Human Resources, 21st Floor, 505 Munoz Rivera Avenue, Hato Rey, Puerto Rico 00918, (787) 754-2171 (787) 767-6051 FAX

E-mail: mvelez@osha.gov

RHODE ISLAND

OSH Consultation Program, Division of Occupational Health & Radiation Control, Rhode Island Department of Health, 3 Capital Hill, Providence, Rhode Island 02908, (401) 222-2438 (401) 222-2456 FAX

E-mail: safesite@doh.state.ri.us

Website: <http://www.state.ri.us/dohrad.htm>

SOUTH CAROLINA

South Carolina Department of Labor, Licensing & Regulation, 3600 Forest Drive, P.O. Box 11329, Columbia, South Carolina 29204, (803) 734-9614 (803) 734-9741 FAX

E-mail: bob.peck@osha.gov

Website: <http://www.llr.state.sc.us/oshavol.htm>

SOUTH DAKOTA

South Dakota State University, Engineering Extension, West Hall, Box 510, 907 Harvey Dunn Street, Brookings, South Dakota 57007-0597, (605) 688-4101 (605) 688-6290 FAX

E-mail: james_manning@sdstate.edu

TENNESSEE

OSHA Consultation Services Division, Tennessee Department of Labor, 3rd floor, Andrew Johnson Tower, 710 James Robertson Parkway, Nashville, Tennessee 37243-0659, (615) 741-7155 (615) 532-2997 FAX

E-mail: jcothron@mail.state.tn.us

Website: <http://www.state.tn.us/labor/toshcons.html>

TEXAS

Workers' Health & Safety Division, Texas Workers' Compensation Commission, Southfield Building, 4000 South I H 35, Austin, Texas 78704, (512) 804-4640 (512) 804-4601 FAX, OSHCON Request Line: (800) 687-7080

E-mail: jimmy.harper@twcc.state.tx.us

Website: <http://twcc.state.tx.us/services/oshcon.html>

**UTAH**

State of Utah Labor Commission, Workplace Safety & Health, Consultation Services, 160 East 300 South, Salt Lake City, Utah 84114-6650, (801) 530-6901 (801) 530-6992 FAX

E-mail: icmain.nanderso@state.ut.us

Website:

http://www.labor.state.ut.us/Utah_Occupationa_Safety__Hea/Consultation_Services/consultation_services.html

VERMONT

Vermont Department of Labor & Industry, Division of Occupational Safety & Health, National Life Building, Drawer 20, Montpelier, Vermont 05602-3401, (802) 828-2765 (802) 828-2195 FAX

E-mail: robert.mcleod@labind.state.vt.us

Website: <http://www.state.vt.us/labind/vosha.htm>

VIRGINIA

Virginia Department of Labor & Industry, Occupational Safety & Health, Training & Consultation, 13 South 13th Street, Richmond, Virginia 23219, (804) 786-6359 (804) 786-8418 FAX

E-mail: wer@8doli.state.va.us

Website: <http://www.dli.state.va.us/programs/consultation.htm>

VIRGIN ISLANDS

Division of Occupational Safety & Health, Virgin Islands Department of Labor, 3021 Golden Rock, Christiansted, St. Croix, Virgin Island 00840, (340) 772-1315 (340) 772-4323 FAX

Website: <http://www.gov.vi/vild/>

WASHINGTON

Washington Dept of Labor & Industries, WISHA Services Division, P.O. Box 44649, Olympia, Washington 98504, (360) 902-5443 (360) 902-5459 FAX

E-mail: jame235@lni.wa.gov

Website: <http://www.wa.gov/lni/wisha/wisha.htm>

WEST VIRGINIA

West Virginia Department of Labor, Capitol Complex Building #6, 1800 East Washington Street, Room B-749, Charleston, West Virginia 25305, (304) 558-7890 (304) 558-3797 FAX

E-mail: jburgess@labor.state.wv.us

Website: <http://www.state.wv.us/labor/sections.htm>

WISCONSIN (Health)

Wisconsin Department of Health & Family Services, Division of Public Health, 1 West Wilson Street, Room B157, Madison, WI 53701-2659, (608) 266-9383 (608) 266-1550

FAX E-mail: terry.moen@osha.gov

Website: http://www.dhfs.state.wi.us/dph_boh/OSHA_Cons/index.htm

**WISCONSIN (Safety)**

Wisconsin Department of Commerce, Bureau of Marketing, Advocacy & Technology,
Development, Bureau of Manufacturing & Assessment, N14 W23833 Stone Ridge Drive Suite
B100, Waukesha, Wisconsin 53188-1125, (262) 523-3044 (800) 947-0553 (262) 523-3046 FAX
E-mail: jim.lutz@osha.gov
Website: <http://www.commerce.state.wi.us/MT/MT-FAX-0928.html>

WYOMING

Wyoming Department of Employment, Workers' Safety & Compensation Division, Herschler
Building, 2 East, 122 West 25th Street, Cheyenne, Wyoming 82002, (307) 777-7786 (307) 777-
3646 FAX
E-mail: sfostel@misc.state.wy.us Website:
<http://wydoe.state.wy.us/wscd/osha/evtap.htm>

Other Relevant Addresses**Consultation Training Coordination**

OSHA Training Institute, 1555 Times Drive, Des Plaines, IL 60018, (312) 297-4810

Laboratory Services Agreement

Wisconsin Occupational Health Laboratory, 979 Jonathon Drive, Madison, Wisconsin 53713,
(608) 263-8807