

INDUSTRIAL HYGIENE

BULLETIN
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September 28, 1984

OSHA HAZARD COMMUNICATION STANDARD

OVERVIEW

On November 25, 1983, the Occupational Safety and Health Administration published a Final Standard on Hazard Communication in the workplace. The primary purpose of the Hazard Communication Standard is to ensure that all chemicals are evaluated to determine their hazard and that this information be transmitted to all employers and employees in the manufacturing sector.

Some twenty-seven states have already implemented Hazard Communication/Right-to-Know laws dealing with the same subject. Attached, please find a list of those states. Whether the federal OSHA Standard will preempt the state laws is a question that cannot be answered, at this time. In any event, REYNOLDS' objective is to put into motion a mechanism that will allow compliance with the federal program, as well as comply with local and state laws.

The OSHA Standard defines hazardous substances as:

- A. Those regulated by OSHA in Subpart Z (1910.1000);
- B. Those identified as carcinogens by the International Agency for Research on Cancer (IARC) or the National Toxicology Program (NTP); and
- C. Those included on the TLV (Threshold Limit Value) list of the American Conference of Governmental Industrial Hygienists (ACGIH).

The state laws provide assorted definitions for the term "hazardous substances." Some are more stringent and others, more lenient. The federal definition, however, will serve as the primary guideline for the REYNOLDS program.

This new standard requires chemical manufacturers and employers to provide information to their employees and customers regarding hazardous chemicals, by means of a Hazard Communication Program. This includes labels, Material Safety Data Sheets, and employee training. In addition, distributors of hazardous chemicals are required to ensure that the containers they distribute are properly labeled and that Material Safety Data Sheets are provided to customers.

In order to convey the Hazard Communication Standard to REYNOLDS' plants and subsidiaries, it is necessary to divide our compliance effort into two major areas of responsibility: (1) As an employer, and (2) As a manufacturer.

Employer responsibilities include a written Hazard Communication Program, acquisition of Material Safety Data Sheets on hazardous products used in our facilities, workplace labeling of hazardous materials, and providing employees with information and training on hazardous chemicals--by May 25, 1986.

Manufacturer responsibilities include hazard determination on REYNOLDS' products, product/container labeling, and development of Material Safety Data Sheets on our hazardous products--by November 25, 1985.

The following instructions should allow the development of an effective Hazard Communication/Right-to-Know Program:

EMPLOYER RESPONSIBILITIES IN WRITTEN HAZARD COMMUNICATION PROGRAM

Under the OSHA Hazard Communication rule, employers are required to prepare a written Hazard Communication Program, outlining all relevant programs and procedures necessary to provide hazardous chemical information and training to employees and contractors. This program should consist of the following:

A. Material Safety Data Sheets

Material Safety Data Sheets (MSDS) are the basic reference source of safety and health information on chemicals purchased for use within our facilities. They serve as a cornerstone of the REYNOLDS METALS COMPANY Hazard Communication Program. Corporate and plant Purchasing Departments have developed procedures to acquire Material Safety Data Sheets on purchased stock items. Procedures include a form letter to the vendor, requesting MSDS on specific products, and a general MSDS request statement on the bottom of our purchase orders. Also included is a followup request to vendors who fail to respond with MSDS on hazardous chemicals. Such items include raw materials, product additives, laboratory chemicals, etc.

In order to ensure that MSDS are complete and reflect current, accurate data, a copy should be forwarded to the Corporate Industrial Hygiene Department. If the MSDS is found to be technically unacceptable, then follow-up efforts will be initiated to obtain the necessary information.

B. Material Safety Data Sheet Accessibility

Material Safety Data Sheets for all chemicals must be readily available to employees at any time during each workshift. This may be accomplished by placing the Material Safety Data Sheets in a binder, placing them in a single location, so they may be referenced throughout the workshift. No copies of Material Safety Data Sheets are to be made, without clearance from the Corporate Law and Industrial Hygiene Departments.

C. Hazardous Chemical List

The Corporate Industrial Hygiene Department, with the assistance of the plant, will develop a program to identify and maintain a list of all raw materials used, stored, or otherwise present in the workplace. The Industrial Hygiene Department has purchased software to develop and maintain the hazardous chemical list for each plant. This list will be developed from the MSDS, as well as from an inventory furnished by the plant. This completed inventory then would provide the initial listing of chemical substances that must be considered under the OSHA hazardous chemical list.

Procedures should be established to ensure that the chemical list is reviewed periodically and updated.

D. Workplace Labeling of Chemicals

All containers of hazardous chemicals in the workplace must be labeled, tagged, or marked with the appropriate chemical identity and hazard warning. Minimum label requirements include chemical identity and hazard warning, where appropriate. REYNOLDS' code numbers are sufficient to fulfill the requirement of "chemical identity," if there are specific Material Safety Data Sheets available for those codes. Process containers, reactor vessels, pipes, etc. containing hazardous chemicals must also carry a hazard warning. If hazardous material is transferred from its original container, then the receiving container must also be labeled with the chemical identity and hazard warning.

E. Employee Information and Training

The OSHA Hazard Communication Standard requires that the employer provide employees with information and training on hazardous chemicals. The REYNOLDS program requires employees to be trained about the nature of the hazards they may encounter on their jobs and those protective measures they may utilize to help in the control of their exposures. Training is required before an employee's initial job assignment and when there is a change in hazard as a result of a new chemical being introduced into the workplace. Training programs will be developed by the Corporate Industrial Hygiene Department for each plant, to meet this requirement.

F. Contractor Information

The OSHA Hazard Communication Standard requires that outside contractors be advised of hazardous chemicals to which their employees may be exposed in performing work in RMC facilities. Such information should be communicated to the outside contractor before initiation of the work project. Any written communication to the contractor should be reviewed by the Corporate Law and Industrial Hygiene Departments prior to transmittal to a contractor.

MANUFACTURER RESPONSIBILITIES

The OSHA Hazard Communication Standard requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, to label each container of hazardous chemicals leaving the workplace, and to obtain or develop and provide Material Safety Data Sheets for these hazardous products. In the OSHA Standard, manufacturers are defined as any employer covered by SIC Codes 20 through 39. As a result, REYNOLDS is included under the OSHA Hazard Communication Rule. Therefore, the following steps are to be carried out, regarding the manufacture and distribution of REYNOLDS' products that might be characterized as hazardous:

A. Hazard Determination

The Corporate Medical Department has the responsibility to determine the hazard potential associated with REYNOLDS' products. A Material Screening and Evaluation Committee has been established to evaluate the hazard potential associated with REYNOLDS' products. The Committee includes representatives from Industrial Hygiene, Toxicology, Environmental Control, Safety, Fire Prevention, Purchasing, Quality Assurance, and Risk Management.

B. Product Labeling

The product label is the initial information an employee or a customer has, regarding a specific product. Product labels are written or graphic communications affixed to containers, bags, boxes, drums, cans, etc. The content of the product label is to identify the hazardous chemical, the appropriate hazard warning, and the name and address of the manufacturer or the seller. Product labeling will be the responsibility of the Corporate Toxicologist and will be coordinated through Product Quality Assurance.

C. Material Safety Data Sheets

The OSHA Hazard Communication Standard specifies that chemical manufacturers and importers must obtain or develop Material Safety Data Sheets for each hazardous chemical they produce or import. The Material Safety Data Sheet is recognized as the primary source of instruction on use and handling and provides warnings about the hazards associated with reasonably foreseeable uses of REYNOLDS' products. The Corporate Industrial Hygiene Department has responsibility for developing Material Safety Data Sheets on REYNOLDS' products.

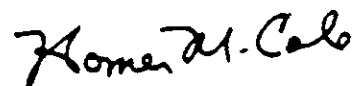
The Material Screening and Evaluation Committee has responsibility for approving Material Safety Data Sheets. Requests for Material Safety Data Sheets should be directed to the Director of Industrial Hygiene, Richmond, to determine whether the specific Material Safety Data Sheet has been developed. If no MSDS has been developed for a specific product, the Director of Industrial Hygiene will initiate an MSDS for that product. As Material Safety Data Sheets are updated, customers will be provided with this information.

D. Trade Secret Disclosure

Where the chemical identity of a product, or one or more of its components, is listed as a trade secret on the Material Safety Data Sheet, it must be held in confidence, to preserve the trade secret status. Under certain conditions, trade secret information must be released during an emergency to a qualified physician or nurse. In a non-emergency situation, a qualified health professional must request the information, in writing.

In order to facilitate compliance with the OSHA Hazard Communication Standard, it is recommended that a contact person be appointed at each plant, to coordinate the gathering of the necessary information. Please provide the Corporate Industrial Hygiene Department with the name of the person to be responsible at your facility, at your earliest convenience.

If you have any question with regard to this bulletin or the OSHA Hazard Communication Standard, please advise.



Homer M. Cole
Director
Industrial Hygiene

Enc.: OSHA Hazard Communication Standard
List of States with Hazard Communication/
Right-to-Know Laws

Distribution: EH-1
RD-01
RD-70
BP-54-Tab 5
MP-15

STATES WITH HAZARD COMMUNICATION/RIGHT-TO-KNOW LAWS

Alaska	Missouri
California	Nebraska
Connecticut	Nevada
Delaware	New Jersey
Georgia	New York
Hawaii	North Dakota
Illinois	Ohio
Indiana	Oregon
Louisiana	Pennsylvania
Maine	Rhode Island
Maryland	Texas
Massachusetts	West Virginia
Michigan	Wisconsin
Minnesota	

Should you have interest in a specific state's regulations, please contact the Corporate Industrial Hygiene Department.

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1910.1200—HAZARD COMMUNICATION

(a) Purpose.

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

(2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating and communicating chemical hazards to employees in the manufacturing sector, and to preempt any state law pertaining to this subject. Any state which desires to assume responsibility in this area may only do so under the provisions of § 18 of the Occupational Safety and Health Act (29 U.S.C. 651 et. seq.) which deals with state jurisdiction and state plans.

(b) Scope and application.

(1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers in SIC Codes 20 through 39 (Division D, Standard Industrial Classification Manual) 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 in SIC Codes 20-39.

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

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

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

(ii) Employers shall maintain any material safety data sheets that are received with incoming shipments of hazardous chemicals, and ensure that they are readily accessible to laboratory employees; and,

(iii) Employers shall ensure that laboratory employees are apprised of the hazards of the chemicals in their workplaces in accordance with paragraph (h) of this section.

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

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

(ii) Any food, food additive, color additive, drug, or cosmetic, including materials intended for use as ingredients in such products (e.g., flavors and fragrances), as such terms are defined in the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 301 et seq.) and regulations issued under that Act, when they are subject to the labeling re-

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quirements of that Act and labeling regulations issued under that Act by the Food and Drug Administration;

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

(iv) Any consumer product or hazardous substance as those terms are defined in the Consumer Product Safety Act (15 U.S.C. 2051 et seq.) and Federal Hazardous Substances Act (15 U.S.C. 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.

(5) This section does not apply to:

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

(ii) Tobacco or tobacco products;

(iii) Wood or wood products;

(iv) Articles; and,

(v) Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace.

(c) Definitions.

"Article" means a manufactured item:

(i) Which is formed to a specific shape or design during manufacture;

(ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and

(iii) which does not release, or otherwise result in exposure to, a hazardous chemical under normal conditions of use.

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

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

"Chemical manufacturer" means an employer in SIC Codes 20 through 39 with a workplace where chemical(s) are produced for use or distribution.

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

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

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

"Compressed gas" means:

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

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

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

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"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 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 manufacturing purchasers.

"Employee" means a worker employed by an employer in a workplace in SIC Codes 20 through 39 who may be exposed to hazardous chemicals under normal operating conditions or foreseeable emergencies, including, but not limited to production workers, line supervisors, and repair or maintenance personnel. Office workers, ground maintenance personnel, security personnel or non-resident management are generally not included, unless their job performance routinely involves potential exposure to hazardous chemicals.

"Employer" means a person engaged in a business within SIC Codes 20 through 39 where chemicals are either used, or are produced for use or distribution.

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

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

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

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

(ii) "Gas, flammable" means:

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

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

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

(iv) "Solid, flammable" means a solid, other than a blasting agent or explosive as defined in § 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

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of less than 45 Saybolt Universal Seconds (SUS) at 100°F (37.8°C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

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

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

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

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

"Hazard warning" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazards of the chemical(s) in the container(s).

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

"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 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 manufacturing purchasers within the United States.

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

"Manufacturing purchaser" means an employer with a workplace classified in SIC Codes 20 through 39 who purchases a hazardous chemical for use within that workplace.

"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

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either of itself or through the release of oxygen or other gases.

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

"Produce" means to manufacture, process, formulate, or repackage.

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

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

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

"Trade secret" means any confidential formula, pattern, process, device, information or compilation of information (including chemical name or other unique chemical identifier) 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.

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

"Use" means to package, handle, react, or transfer.

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

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

"Workplace" means an establishment at one geographical location containing one or more work areas.

(d) Hazard determination.

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

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

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

(i) CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

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

The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of the standard.

(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemi-

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cal is a carcinogen or potential carcinogen for hazard communication purposes:

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

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

(iii) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

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

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

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

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

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

(iv) If the 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 per-

cent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health hazard to employees in those concentrations, the mixture shall be assumed to present the same hazard.

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

(e) Written hazard communication program.

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

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

(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; and,

(iii) The methods the employer will use to inform any contractor employers with employees working in the employer's workplace of the hazardous chemicals their employees may be exposed to while performing their work, and any suggestions for appropriate protective measures.

(2) The employer may rely on an existing hazard communication program to comply with

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these requirements, provided that it meets the criteria established in this paragraph (e).

(3) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.20(e).

(f) Labels and other forms of warning.

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

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

(ii) Appropriate hazard warnings; and

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

(2) 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 (18 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

(3) 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.

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

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

(ii) Appropriate hazard warnings.

(5) 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)(4) 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.

(6) 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.

(7) 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.

(8) 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.

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

(g) Material safety data sheets.

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

(2) Each material safety data sheet shall be in English and shall contain at least the following information.

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

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- (a) If the hazardous chemical is a single substance, its chemical and common name(s);
- (b) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,
- (c) If the hazardous chemical is a mixture which has not been tested as a whole:
 - (1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d)(4) of this section shall be listed if the concentrations are 0.1% or greater; and,
 - (2) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;
- (ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);
- (iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;
- (iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;
- (v) The primary route(s) of entry;
- (vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;
- (vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) *Annual Report on Carcinogens* (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) *Mono-graphs* (latest editions), or by OSHA;
- (viii) Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks;
- (ix) Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the material safety data sheet, such as appropriate engineering controls, work practices, or personal protective equipment;
- (x) Emergency and first aid procedures;
- (xi) The date of preparation of the material safety data sheet or the last change to it; and,
- (xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.
- (3) If 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.
- (4) Where complex mixtures have similar hazards and contents (i.e. the chemical ingredients are essentially the same, but the specific composition varies from mixture to mixture), the chemical manufacturer, importer or employer may prepare one material safety data sheet to apply to all of these similar mixtures.
- (5) The chemical manufacturer, importer or employer preparing the material safety data

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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 becomes newly aware of any significant information regarding the hazards of a chemical, or ways to protect against the hazards, this new information shall be added to the material safety data sheet within three months. If the chemical is not currently being produced or imported the chemical manufacturer or importer shall add the information to the material safety data sheet before the chemical is introduced into the workplace again.

(6) Chemical manufacturers or importers shall ensure that distributors and manufacturing purchasers of hazardous chemicals are provided an appropriate material safety data sheet with their initial shipment, and with the first shipment after a material safety data sheet is updated. The chemical manufacturer or importer shall either provide material safety data sheets with the shipped containers or send them to the manufacturing purchaser prior to or at the time of the shipment. If the material safety data sheet is not provided with the shipment, the manufacturing purchaser shall obtain one from the chemical manufacturer, importer, or distributor as soon as possible.

(7) Distributors shall ensure that material safety data sheets, and updated information, are provided to other distributors and manufacturing purchasers of hazardous chemicals.

(8) The employer shall maintain copies of the required material safety data sheets for each hazardous chemical in the workplace, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s).

(9) 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).

(10) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.20(e). The Director shall also be given access to material safety data sheets in the same manner.

(h) **Employee information and training.** Employers shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area.

(1) **Information.** Employees shall be informed of:

(i) The requirements of this section;

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

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

(2) **Training.** Employee training shall include at least:

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

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

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

(iv) The details of the hazard communication program developed by the employer, including an explanation of the labeling system and

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the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

(i) Trade secrets.

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

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

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

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

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

(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first-aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need 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.

(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, or epidemiologist) providing medical or other occupational health services to exposed employee(s) if:

(i) the request is in writing;

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

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

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

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

(d) To provide medical treatment to exposed employees;

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

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

(g) To conduct studies to determine the health effects of exposure.

(iii) The request explains in detail why the disclosure of the specific chemical identity is essential and that, in lieu thereof, the disclosure of the following information would not enable the health professional to provide the occupational health services described in paragraph (ii) of this section:

(a) The properties and effects of the chemical;

(b) Measures for controlling workers' exposure to the chemical;

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

(d) Methods of diagnosing and treating harmful exposures to the chemical;

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

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- (v) The health professional, and the employer or contractor of the health professional's services (i.e., downstream employer, labor organization, or individual employer), agree in a written confidentiality agreement that the health professional 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.
- (4) The confidentiality agreement authorized by paragraph (i)(3)(iv) of this section:
- (i) May restrict the use of the information to the health purposes indicated in the written statement of need;
 - (ii) May provide for appropriate legal remedies in the event of a breach of the agreement, including stipulation of a reasonable pre-estimate of likely damages; and,
 - (iii) May not include requirements for the posting of a penalty bond.
- (5) Nothing in this standard is meant to preclude the parties from pursuing non-contractual remedies to the extent permitted by law.
- (6) If the health professional 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 prior to, or at the same time as, such disclosure.
- (7) If the chemical manufacturer, importer, or employer denies a written request for disclosure of a specific chemical identity, the denial must:
- (i) Be provided to the health professional within thirty days of the request;
 - (ii) Be in writing;
 - (iii) Include evidence to support the claim that the specific chemical identity is a trade secret;
- (iv) State the specific reasons why the request is being denied; and,
- (v) Explain in detail how alternative information may satisfy the specific medical or occupational health need without revealing the specific chemical identity.
- (8) The health professional whose request for information is denied under paragraph (i)(3) of this section may refer the request and the written denial of the request to OSHA for consideration.
- (9) When a health professional refers the denial to OSHA under paragraph (i)(8) of this section, OSHA shall consider the evidence to determine if:
- (i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;
 - (ii) The health professional has supported the claim that there is a medical or occupational health need for the information; and,
 - (iii) The health professional has demonstrated adequate means to protect the confidentiality.
- (10)
- (i) If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a *bona fide* trade secret, or that it is a trade secret but the requesting health professional has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.
 - (ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unau-

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thorized disclosure of a trade secret specific chemical identity, the Assistant Secretary may issue such orders or impose such additional limitations or conditions upon the disclosure of the requested chemical information as may be appropriate to assure that the occupational health services are provided without an undue risk of harm to the chemical manufacturer, importer, or employer.

(11) If, following the issuance of a citation and any protective orders, the chemical manufacturer, importer, or employer continues to withhold the information, the matter is referable to the Occupational Safety and Health Review Commission for enforcement of the citation. In accordance with Commission rules, the Administrative Law Judge may review the citation and supporting documentation *in camera* or issue appropriate protective orders.

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

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

(i) **Effective dates.** Employers shall be in compliance with this section within the following time periods:

(1) Chemical manufacturers and importers shall label containers of hazardous chemicals leaving their workplaces, and provide material safety data sheets with initial shipments by November 25, 1985.

(2) Distributors shall be in compliance with all provisions of this section applicable to them by November 25, 1985.

(3) Employers shall be in compliance with all provisions of this section by May 25, 1986, in-

cluding initial training for all current employees.

APPENDIX A TO § 1910.1200—HEALTH HAZARD DEFINITIONS (MANDATORY)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g. flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body—such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees—such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in nonoccupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

There have been many attempts to categorize effects and to define them in various ways. Generally, the terms "acute" and "chronic" are used to delineate between effects on the basis of severity or duration. "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration. "Chronic" effects generally occur as a result of long-term exposure, and are of long duration.

The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling of Hazardous Industrial Chemicals (Z129.1-1982)—irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects which may occur as a result of occupational exposure, such as, for example, narcosis.

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obvious 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.

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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:

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 chemicals.

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 and Symptoms:	Jaundice; liver enlargement.
Chemicals:	Carbon tetrachloride; nitrosamines.
b. Nephrotoxins:	Chemicals which produce kidney damage.
Signs and Symptoms:	Edema; proteinuria.
Chemicals:	Halogenated hydrocarbons; uranium.
c. Neurotoxins:	Chemicals which produce their primary toxic effects on the nervous system.
Signs and Symptoms:	Narcosis; behavioral changes; decrease in motor functions.
Chemicals:	Mercury; carbon disulfide.
d. Agents which act on the blood of hematopoietic system:	Decreases hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms:	Cyanosis; loss of consciousness.
Chemicals:	Carbon monoxide; cyanides.
e. Agents which damage the lung:	Chemicals which irritate or damage the pulmonary tissue.

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Signs and 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 and Symptoms:	Birth defects; sterility.
Chemicals:	Lead; DBCP.
g. Cutaneous hazards:	Chemical which affect the dermal layer of the body.
Signs and Symptoms:	Defatting of the skin; rashes; irritation.
Chemicals:	Ketones; chlorinated compounds.
h. Eye hazards:	Chemicals which affect the eye or visual capacity.
Signs and Symptoms:	Conjunctivitis; corneal damage.
Chemicals:	Organic solvents; acids.

APPENDIX B TO § 1910.1200—HAZARD DETERMINATION (MANDATORY)

The quality of a hazard communication program is largely dependent upon the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance-oriented. Chemical manufacturers, importers, and employers evaluating chemicals are not required to follow any specific methods for determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported in accordance with the criteria set forth in this Appendix.

Hazard evaluation is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance-orientation of the hazard determination does diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, the following criteria shall be used in making hazard determinations that meet the requirements of this standard.

1. **Carcinogenicity:** As described in paragraph (d)(4) and Appendix A of this section, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen will be considered conclusive evidence for purposes of this section.

2. **Human data:** Where available, epidemiological studies and case reports of adverse health effects shall be considered in the evaluation.

3. **Animal data:** Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations shall be used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).

4. **Adequacy and reporting of data.** The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, shall be a sufficient basis for a hazard determination and reported on any material safety data sheet. The

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

APPENDIX C TO § 1910.1200—INFORMATION SOURCES (ADVISORY)

The following is a list of available data sources which the chemical manufacturer, importer, or employer may wish to consult to evaluate the hazards of chemicals they produce or import:

— Any information in their own company files such as toxicity testing results or illness experience of company employees.

— Any information obtained from the supplier of the chemical, such as material safety data sheets or product safety bulletins.

— Any pertinent information obtained from the following source list (latest editions should be used):

- Condensed Chemical Dictionary*
Van Nostrand Reinhold Co., 135 West 50th Street, New York, NY 10020
- The Merck Index: An Encyclopedia of Chemicals and Drugs*
Merck and Company, Inc., 126 E. Lincoln Avenue, Rahway, NJ 07065
- IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man*
Geneva: World Health Organization, International Agency for Research on Cancer, 1972-1977. (Multivolume work), 49 Sheridan Street, Albany, New York
- Industrial Hygiene and Toxicology*, by F. A. Patty
John Wiley & Sons, Inc., New York, NY (Five volumes)
- Clinical Toxicology of Commercial Products*
Gleason, Gosselin and Hodge
- Casarett and Doull's Toxicology: The Basic Science of Poisons*
Doull, Klaassen, and Amdur, Macmillan Publishing Co., Inc., New York, NY
- Industrial Toxicology*, by Alice Hamilton and Harriet L. Hardy
Publishing Sciences Group, Inc., Acton, MA
- Toxicology of the Eye*, by W. Morton Grant

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Charles C. Thomas, 301-327 East Lawrence Avenue,
Springfield, IL

Recognition of Health Hazards in Industry

William A. Burgess, John Wiley and Sons, 605 Third
Avenue, New York, NY 10158

Chemical Hazards of the Workplace

Nick H. Proctor and James P. Hughes, J. P. Lipincott
Company, 6 Winchester Terrace, New York, NY 10022

Handbook of Chemistry and Physics

Chemical Rubber Company, 18901 Cranwood Parkway,
Cleveland, OH 44128

*Threshold Limit Values for Chemical Substances and
Physical Agents in the Workroom Environment with
Intended Changes*

American Conference of Governmental Industrial Hy-
gienists, 6500 Glenway Avenue, Bldg. D-5,
Cincinnati, OH 4521

Note.—The following documents are on sale by the Su-
perintendent of Documents, U.S. Government Printing
Office, Washington, D.C. 20402.

Occupational Health Guidelines

NIOSH/OSHA (NIOSH Pub. No. 81-123)

NIOSH/OSHA Pocket Guide to Chemical Hazards

NIOSH Pub. No. 78-210

Registry of Toxic Effects of Chemical Substances

U.S. Department of Health and Human Services, Public
Health Service, Center for Disease Control, National
Institute for Occupational Safety and Health (NIOSH
Pub. No. 80-102)

The Industrial Environment—Its Evaluation and Control

U.S. Department of Health and Human Services, Public
Health Service, Center for Disease Control, National
Institute for Occupational Safety and Health (NIOSH
Pub. No. 74-117)

*Miscellaneous Documents—National Institute for Occu-
pational Safety and Health*

1. Criteria for a recommended standard *** Occupa-
tional Exposure to "_____"
2. Special Hazard Reviews
3. Occupational Hazard Assessment
4. Current Intelligence Bulletins

Bibliographic Data Bases*Service Provider and File Name*

Bibliographic Retrieval Services (BRS), Corporation
Park, Bldg. 702, Scotia, New York 12302

AGRICOLA
BIOSIS PREVIEWS
CA CONDENSATES
CA SEARCH

DRUG INFORMATION

MEDLARS

MEDOC

NTIS

POLLUTION ABSTRACTS

SCIENCE CITATION INDEX

SSIE

Lockheed—DIALOG, Lockheed Missiles & Space Compa-
ny, Inc., P.O. Box 44481, San Francisco, CA 94144

AGRICOLA

BIOSIS PREV. 1972-PRESENT

BIOSIS PREV. 1969-71

CA CONDENSATES 1970-71

CA SEARCH 1972-76

CA SEARCH 1977-PRESENT

CHEMNAME

CONFERENCE PAPERS INDEX

FOOD SCIENCE & TECH. ABSTR.

FOODS ADLIBRA

INTL. PHARMACEUTICAL ABSTR.

NTIS

POLLUTION ABSTRACTS

SCISEARCH 1978-PRESENT

SCISEARCH 1974-77

SSIE CURRENT RESEARCH

SDC—ORBIT, SDC Search Service, Department No.
2230, Pasadena, CA 91051

AGRICOLA

BIOCODES

BIOSIS BIO6973

CAS6771/CAS7276

CAS77

CHEMDEN

CONFERENCE

ENVIROLINE

LABORDOC

NTIS

POLLUTION

SSIE

Chemical Information System (CIS), Chemical Informa-
tion Systems Inc., 7215 Yorke Road, Baltimore, MD
21212

Structure & Nomenclature Search System

Acute Toxicity (RTECS)

Clinical Toxicology of Commercial Products

Oil and Hazardous Materials Technical Assistance
Data System

National Library of Medicine, Department of Health and
Human Services, Public Health Service, National In-
stitutes of Health, Bethesda, MD 20209

Toxicology Data Bank (TDB)

MEDLIN

TOXLINE

CANCERLIT

RTECS