THE OHIO STATE UNIVERSITY

The Ohio State University
Hazard Communication Program
For
The Department of Chemistry

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1.0 Scope

In order to comply with the Public Employment Risk Reduction Program (PERRP) (Ohio House Bill 308 - An Act) and the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard [29 CFR 1910.1200 (Appendix A)], the following model Written Hazard Communication Program has been developed by the Office of Environmental Health and Safety. These laws are designed to protect University employees and contractor employees from the dangers associated with hazardous chemicals to which they maybe exposed at The Ohio State University. This written program includes information on labeling, availability of Material Safety Data Sheets (MSDS's), employer and employee responsibilities and employee training. Specific additions, as outlined in the Hazard Communications User's Guide to this program model must be provided by the college, department or equivalent administrative unit. ALL EMPLOYEES SHALL BE PROVIDED WITH INFORMATION AND TRAINING ON HAZARDOUS CHEMICALS IN THEIR WORK AREA AT THE TIME OF INITIAL ASSIGNMENT AND WHENEVER A NEW HAZARD IS INTRODUCED INTO THEIR WORK AREA.

2.0 University Policy

It is The Ohio State University policy (Appendix B) that all faculty, staff, student employees and contractor employees, who may come in contact with hazardous chemicals in the workplace; receive information concerning the particular dangers which the chemicals pose and methods by which they may deal with such chemicals in a safe manner. In accordance with PERRP, The Ohio State University establishes a hazard communication program for all employees.

3.0 Responsibilities

Responsibilities for general health and safety, as well as the related policies and procedures, are outlined in the University operating manual. This section discusses the responsibilities of the Office of Environmental Health and Safety, Vice Presidents, Deans, Directors, Department Heads, Supervisors and Employees. The appropriate sections of this program shall be reviewed by supervisors, employees and other individuals having responsibility for the use of hazardous chemicals. Specific Hazard Communication Program responsibilities for the various groups include the following:

3.1 Office of Environmental Health and Safety

Provide a model Written Hazard Communication Program for modification and adoption by departments.

- Provide technical assistance to supervisors, workers and contractors concerning the appropriate storage, handling and disposal of hazardous substances.
- Conduct internal audits for compliance with the Hazard Communication Standard.
- Establish and maintain an MSDS system for use by University personnel.
- Develop a general Hazard Communication training program and work with Colleges, Departments **or** equivalent Administrative Units concerning the program delivery.

3.2 Colleges/Departments/Administrative Units

- Maintain department specific Written Hazard Communication program.
- Maintain an inventory of the hazardous chemicals known to be present in the workplace.
- Provide hazard specific training for employees and maintain training records.

- Request assistance from the Office of Environmental Health and Safetyas needed.
- Provide and maintain MSDS's for all hazardous chemicals within their operation.

3.3 Employees

- Follow all health and safety standards, rules and policies.
- Report all hazardous conditions to their supervisor.
- Wear or use prescribed personal protective equipment.
- Report any job-related injuries or illnesses to their supervisor and seek treatment immediately.
- Refrain from the operation of any equipment or instrumentation without proper instruction or authorization.
- Understand the dangers associated with hazardous substances in the workplace, as well as their safe and proper use.
- Request information when unsure about handling procedures for a hazardous substance.

4.0 Hazard Determination

The University will primarily rely upon the safety and health related information found within the Material Safety Data Sheets (MSDS's) which are provided by manufacturers or suppliers of chemicals and chemical containing products. The University will also use other information sources or references for determining the hazard potential of chemicals such as those listed in the Hazard Communication Standard (Appendix A).

5.0 Hazardous Chemical Inventory

A list of all hazardous chemicals or products containing hazardous chemicals used in the work area will be maintained by the College, Department or Administrative Unit, as appropriate. The instructions for completing the inventory list of hazardous chemicals or products are described in Appendix C. The department is responsible for maintaining MSDS's for each of these substances. The list of hazardous chemicals should be routinely reviewed to determine if the information is current. Additions or deletions to the list shall be communicated by the department to all affected employees and contractors.

6.0 Labels and Other Forms of Warning

The Hazard Communication Standard requires that product containers inform employees about the physical and health hazards of the product. The labels must also inform employees of appropriate protective equipment and body organs affected by over exposure. The description of an acceptable hazardous chemical labeling system is provided in Appendix D. Each academic, research or administrative unit must ensure the following.

- Labels for incoming chemical containers are not to be removed or defaced.
- Hazardous chemicals transferred to another container for storage must be approximately labeled (Appendix D).
- Chemicals transferred to new containers must have the new container labeled as discussed previously. Labeling is not required for portable containers into which hazardous chemicals have been transferred as long as the chemical transfer is intended for immediate use by the employee who performs the transfer.

Chemicals that are exempt from Hazard Communication Standard labeling requirements are described in Appendix A.

7.0 Material Safety Data Sheets (MSDS's)

Material Safety Data Sheets (MSDS's) are written documents which are provided by manufacturers for each hazardous chemical or product that they produce, sell, or distribute. Chemical manufacturers and suppliers are mandated by law to provide the MSDS's along with their product to the customer or user. The MSDS contains valuable information about the characteristics, safety and health hazards, protective measures and emergency response procedures for each hazardous chemical or product (e.g., Appendix E). Each academic, research or administrative department must maintain a current file of MSDS's for all products containing hazardous chemicals used or located in their area. The MSDS's shall be readily accessible to University employees and University contractors. The Office of Environmental Health and Safety will provide assistance to the departments in obtaining MSDS'S. MSDS's (Appendix E) must be completed by the individual(s), who synthesize chemicals that are transferred outside group or unit.

Each Lab Supervisor is responsible for maintaining MSDS's for chemicals unique to his/her lab. Some MSDS's are located in the Safety Office, 480 Celeste Lab. MSDS's can also be found on the Web. Go to: http://www.chemistry.ohio-state.edu and click on "Safety" in the left frame. Click on "Material Safety Data Sheets (MSDS)." If you cannot find a specific MSDS, contact the Safety Office at 9-679-1820.

8.0 Training Requirements

Each academic, research or support department/administrative unit is responsible for informing and training their employees about hazardous chemicals used in the workplace. This information and training must be provided to employees at the time of the initial assignment to the work area. Additional instruction must be provided whenever a new chemical hazard is introduced in the work area. Periodically, refresher courses are advisable thereafter.

Generic instructions and training includes the following:

- A discussion of the Hazard Communication Standard and its key elements. This includes an explanation of: definitions (Appendix F), and abbreviations of key terms (Appendix G), and permissible exposure limit (PEL) information (Appendix H).
- A description of the health and physical hazards posed by chemicals.
- Safe operating procedures and personal protective equipment to be used for various chemical hazard classes.
- The methods for detecting and identifying the presence of a hazardous chemical in the work area.
- The emergency procedures to be followed in case of chemical spills, fires and other incidents.
- The measures (i.e. safe work practices, emergency procedures, and spill control) that employees can take to protect themselves from work place hazards.

Department/Administrative Unit instruction and training includes:

- The 'location and availability of the department administrative unit's written hazard communication program document.
- The location and accessibility of MSDS's for chemicals used in the work area.
- The specific physical and health hazards of the chemicals used in the work area. This would include a discussion of the physical and chemical characteristics of these substances, as well as target organ systems.

Employees are to be informed of any new information concerning potential hazards as it becomes available. Departments are responsible for documenting all initial and follow-up training. The documentation should include the date, time, location, subject material, attendance lists of all participants and names of instructors.

9.0 Employee Hazard Awareness - Non-Routine Tasks

It is the responsibility of the department/administrative unit or the immediate supervisor to ensure that their employees are informed about the hazards of non-routine tasks, as well as the protective measures that should be followed to reduce exposure. Special written operating procedures are to be developed for internal use when necessary.

10.0 Contractors

It is the responsibility of the University to inform contractors about potentially hazardous chemicals or operations that may threaten the health and safety of their employees. Furthermore, it is the responsibility of project captains, administrators, supervisors or research investigators that have authority for controlling the work area or operation to inform the contractors of these hazards. A list of known chemicals, precautions and procedures to be followed must be communicated to the contractor.

MSDS's are to be maintained at the job site by the contractor during the course of their work and are readily available upon request to the contractor employees, government officials, or University employees. The project captains or persons responsible for the construction or renovation work are responsible for forwarding the MSDS's to the Office of Environmental Health and Safety.

11.0 Hazard Communication Program Availability and Review

The Written Hazard Communication Program, which includes the hazardous chemical inventory and MSDS's is to be made available to employees, employee designated representative(s), contractors, and regulatory officials upon request.

A copy of the Departmental Hazard Communication Plan is available in the Safety Office, 480 Celeste Lab, during normal business hours. It is understood, however, that each group or division or shop should maintain their own HCP.

The HCP is available on the Chemistry Web Page. Go to http://www.chemistry.ohio-state.edu and click on "Safety" in the left frame. Click on "Hazard Communication Plan" to find information on the HCP.

The Hazard Communication Program should be reviewed and updated at least annually using the review document included in Appendix I.

Appendix A

Title 29: Part 1910 :: Subpart Z
29CFR1910.1200

1910.1200 Hazard communication.

(a) Purpose.
(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their 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.
(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.
(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.)
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 during each workshift to laboratory employees when they are in their work areas;
(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,
(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.
(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 loadling, warehousing, or retail sales), this section applies to these operations only as follows:
(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced;
(ii) Employers shall maintain copies of any material safety data sheets that are received with incoming shipments of the sealed containers of hazardous chemicals, shall obtaina 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,
(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.

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

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

(ii) Any 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;

(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;

(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;

(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,

(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.

(6) This section does not apply to:

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

(ii) 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 Environmental Protection Agency regulations.

(iii) Tobacco or tobacco products;

(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);

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

(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;

(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);

(viii) Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption

(ix) Any consumer terms are defined in U.S.C. 2051 et seq.) U.S.C. 1261 et seq.) show that it is usedby employees while in the workplace; product or hazardous substance, as those the Consumer Product Safety Act (lS and Federal Hazardous Substances Act (lS 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;

(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;

(xi) Ionizing and nonionizing radiation; and,

(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 functions) 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 chemicals) 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 (93.35<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.

"**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.F (21.1 C); or

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at l3O F (54.4 C) regardless of the pressure at 7O F (21.1 C); or

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

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

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

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

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

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

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

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

"**Exposure or exposed**" means that an employee is subjected 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 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, Zll.24-1979 (ASTM D S6-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100 F (37.8 C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

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

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

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

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

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

"**Hazard warning**" means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemicals) in the containers). (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 -0-0-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 F (54.4 C) or below.

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

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

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

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

"**Use**" means to package, handle, react, 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.
(1) Chemical manufacturers and importers shall evaluate chemicals produced in their workplaces or imported by them to determine if they are hazardous. Employers are not required to evaluate chemicals unless they choose not to rely on the evaluation performed by the chemical manufacturer or importer for the chemical to satisfy this requirement.
(2) Chemical manufacturers, importers or employers evaluating chemicals shall identify and consider the available scientific evidence concerning such hazards. For health hazards, evidence which is statistically significant and which is based on at least one positive study conducted in accordance with established scientific principles is considered to be sufficient to establish a hazardous effect if the results of the study meet the definitions of health hazards in this section. Appendix A shall be consulted for the scope of health hazards covered, and Appendix B shall be consulted for the criteria to be followed with respect to the completeness of the evaluation, and the data to be reported.
(3) The chemical manufacturer, importer or employer evaluating chemicals shall treat the following sources as establishing that the chemicals listed in them are hazardous:
(i) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,
(ii) Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition). The chemical manufacturer, importer, or employer is still responsible for evaluating the hazards associated with the chemicals in these source lists in accordance with the requirements of this standard.
(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:
(i) National Toxicology Program (NTP), Annual Report on Carcinogens (latest edition);
(ii) International Agency for Research on.Cancer (IARC) Monographs (latest editions); or
(iii) 29 CFR part 1910, subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration.

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

(5) The chemical manufacturer, importer or employer shall determine the hazards of mixtures of chemicals as follows:
(i) If a mixture has been tested as a whole to determine its hazards, the results of such testing shall be used to determine whether the mixture is hazardous;
(ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which are considered to be a carcinogen under paragraph (d)(4) of this section;
(iii) If a mixture has not been tested as a whole to determine whether the mixture is a physical hazard, the chemical manufacturer, importer, or employer may use whatever scientifically valid data is available to evaluate the physical hazard potential of the mixture; and,
(iv) If the chemical manufacturer, importer, or employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health risk to employees in those concentrations, the mixture shall be assumed to present the same hazard.
(6) Chemical manufacturers, importers, or employers evaluating chemicals shall describe in writing the procedures they use to determine the hazards of the chemical they evaluate. The written procedures are to be made available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director. The written description may be incorporated into the written hazard communication program required under paragraph (e) of this section.

(e) Written hazard communication program.
(1) Employers shall develop, implement, and maintain at 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:
(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material

safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

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

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

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

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

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

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

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

(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.

(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 chemicals);

(ii) Appropriate hazard warnings; and

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

(2)(i) For solid metal (such as a steel beam or a metal coating), solid wood, or plastic items that are not exempted 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;

(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,

(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).

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

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

(5) Except as pr,ovided 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:

(i) Identity of the hazardous chemicals contained therein; and,

(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.

(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 wor-k area throughout each work shift.

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

(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the

container is immediately marked with the required information.
(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.
(10) The chemical manufacturer, importer, distributor or employer need not affix new labels to comply with this section if existing labels already convey the required information.
(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.
(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.
(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:

(i) The identity used on the label, and, except as provided for in paragraph (i) of this section on trade secrets:
(A) If the hazardous chemical is a single substance, its chemical and common name(s);
(B) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself: or,
(C) If the hazardous chemical is a mixture which has not been tested as a whole:
(1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d) of this section shall be listed if the concentrations are 0.1% or greater; and,
(2) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise less than 1% (0.1% for carcinogens) of the mixture, if there is evidence that the ingredients) 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,
(3) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;

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

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

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

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

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

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

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

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

(x) Emergency and first aid procedures;

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

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

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

6) (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 uplited;

(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;

(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,

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

(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;

(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;

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

(iv) Wholesale distributors selling hazardous chemicals to employers over-the-counter may also provide material safety data sheets for all hazardous chemicals they.sell, 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;

(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;

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

(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.

(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.)
(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.
(10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).
(11) Material safety data sheets shall also be made readily available, upon request, to designated representatives and to the Assistant Secretary, in accordance with the requirements of 29 CFR 1910.20(e). The Director will also be given access to material safety data sheets in the same manner.

(h) Employee information and training.
(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.

(2) 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.

(3) 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 wo rk 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 xposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

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

(i) Trade secrets.

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

(i) The claim that the information withheld is a trade secretcan 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,

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

(2) Where a treating physician or nurse determines that a medical emergency exists and the specific chemical identity of a hazardous chemical is necessary for emergency or first aid treatment, the chemical manufacturer, importer, or employer shall immediately disclose the specific chemical identity of a trade secret chemical to that treating physician or nurse, regardless of the existence of a written statement of need 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, epidemiologist, or occupational health nurse) providing medical or other occupational health services to exposed employees), and to employees or designated representatives, if:

(i) The request is in writing;

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

(A) To assess the hazards of the chemicals to which e,,loyees will be exposed;

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

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

(D) To provide medical treatment to exposed employees;

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

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

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

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

(A) The properties and effects of the chemical;

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

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

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

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

(v) The health professional, and the employer or contractor of the services of the health professional (i.e. downstream

employer, labor organization, or individual employee), employee, or designated representative, agree in a written confidentiality agreement that the health professional, employee, or designated representative, will not use the trade secret information for any purpose other than the health need(s) asserted and agree not to release the information under any circumstances other than to OSHA, as provided in paragraph (i)(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, employee, or designated representative receiving the trade secret information decides that there is a need to disclose it to OSHA, the chemical manufacturer, importer, or employer who provided the information shall be informed by the health professional, employee, or designated representative prior to, or at the same time as, such disclosure.

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

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

(ii) Be in writing;

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

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

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

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

(9) When a health professional, employee, or designated representative refers the denial to OSHA under paragraph ((a) of this section, OSHA shall consider the evidence to d4%ermine if:

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

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

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

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

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

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

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

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

(j) Effective dates. 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.

[As amended at 59 FR 6126, Feb. 9, 1994; 59 FR 17478, Apr.13, 1994; 59 FR 65947, Dec. 22, 1994]

Date 12/22/94

Title 29 : Part 1910 :: Subpart Z
29CFR1910.1200 Appendix A

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 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 (ZI29.1-1988) -- 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 w' -.h 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 lbino rabbits by the methods of 16 CFR'1500.41 for four hours exposure or by other appropriate techniques, it results ir.,,n empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 FR 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 letnal 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 o?-'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: Defattirig 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

[As amended at 59 FR 6126, Feb. 9, 1994]
Date 02/09/94
Title 29 : Part 1910 :: Subpart Z
29CFR1910. 1200 Appendix B

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 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.

[As amended at 59 FR 6126, Feb. 9, 1994]
Date 02/09/94

Appendix B

University Hazard Communication Policy (29CFR 1910.1200)

Subject: Hazard Communication

Applies To: All University Employees

Policy

To ensure that all Ohio State University Employees are protected by a Hazard Communication Program.

Summary

The purpose of the standard is to ensure that the hazards of all chemicals are evaluated and that information concerning their hazards is transmitted to employers and employees. Information is to be transmitted to employees through a written hazard communication program, labels and other forms of warning, Material Safety Data Sheets (MSDS), and information and training.

Definitions

University Employee: any individual receiving a paycheck from The Ohio State University.

Policy Guidelines

I. Responsibilities

The Ohio State University, represented by the Office of Environmental Health and Safety will:

A. Develop a written Hazard Communication Plan for the University which may be modified and adopted by Colleges, Departments and like units.
B. Establish and maintain a MSDS system for adoption by the Colleges, Departments and like units.
C. Provide notice to University contractors on The Ohio State University Hazard Communication Plan, policies and availability of MSDS's.
D. Develop a Hazard Communication Training Program, system of delivery and work with Colleges and like units to train all employees at The Ohio State University in Hazard Communication.

The Deans and Directors of Colleges, Regional Campuses and like units will:

A. Modify, if necessary, and adopt the University written Hazard Communication Plan.
B. Maintain a physical inventory for all hazardous materials as defined by the Hazard Communication Standard.
C. Adopt and maintain a MSDS system.
D. Provide notice to contractors conducting work specifically for the college, regional campus or like unit.
E. Make available all faculty, staff, graduate assistants and other employees for Hazard Communication Training.

Departments will:

A. Modify, if necessary, and adopt the College written Hazard Communication Plan.
B. Identify all hazards as defined by the written Hazard Communication Plan.
C. Maintain a physical inventory of all hazardous materials as defined by the Hazard Communication Standard.
D. Adopt and maintain a MSDS system.
E. Provide notice to contractors conducting work specifically for the Department or like unit.
F. Make available all faculty, staff, graduate assistants and other employees for Hazard Communication Training.

All Principal Investigators and Supervisors within Departments or like units will:

A. Identify all hazards as defined by the written Hazard Communication Plan.
B. Provide notice to contractors conducting work specifically for the Department or like unit.
C. Assure warning labels are on containers as defined by the written Hazard Communication Plan.
D. Make available all faculty, staff, graduate assistants and other employees for Hazard Communication Training.
E. Identify new hazards in the workplace and conduct, or assist in conducting, such additional Hazard Communication Training.

All Employees will:

A. Identify hazards as defined by the written Hazard Communication Plan.
B. Assure warning labels on containers as defined by the written Hazard Communication Plan.
C. Make themselves available for Hazard Communication Training.

Appendix C

Hazard Communication of Hazardous Chemicals and Products
(Compliance Instructions)

INSTRUCTIONS

Compliance with the Federal Occupational Safety and Health Administration's Hazard Communication Standard (29 CFR 1910.1200) requires the University to inventory all hazardous chemicals that may be present in your work area or where workers may come in contact with these substances. According to the standard, a hazardous chemical is defined as any substance which may be a physical and/or health hazard. Physical hazards include: combustible liquids, compressed gases, explosives, flammables, organic peroxides, oxidizers, pyrophorics, and unstable or water reactive chemicals. Chemicals that have the capacity to cause an acute or chronic effect to an exposed worker are considered health hazards. Please list on the attached form all those hazardous chemicals that meet the previously described criteria. If you are unsure about a specific product or chemical, list it and put a question mark or notation in the left margin next to its name. Questions about what to list can be addressed to the Office of Environmental Health and Safety (EHS) at 292-1284.

The list can be used to search for the Material Safety Data Sheet (MSDS's). These documents are required by the standard to be maintained in the work area and readily accessible for all employees. Also, the list can be used to compile your chemical inventory and to index your department's MSDS files. Complete all columns, including chemical, common, and trade names to improve the chances that the MSDS can be found. Any MSDS's which can not be found should be marked as such, and you will need to contact the manufacturer or supplier of each product to obtain the MSDS. Requests for assistance in obtaining MSDS's can be made by submitting the inventory or chemical list to EHS. All requests will be filled in the order that they are received. Requests can be received by:

Mail:	Hand Deliver:	Fax:
EHS	Room 106	Chemical Inventory
Room 106	1314 Kinnear	MSDS Request
1314 Kinnear Road		292-6404
Columbus, OH 43212		

USER IDENTIFICATION

Department or Work Unit:_____
Name of Contact/Person(s) Who Made Inventory: _____
Phone: _____
Campus Mail Address: _____
_____
_____
_____

Note: Arrangements for the disposal of unused or unneeded chemicals can be made through EHS.

Please copy this cover sheet and inventory listing to insure against loss in transit.

INFORMATION KEY FOR THE STANDARDIZED INVENTORY FORMAT

PI/Supervisor- Indicates who is responsible for chemical management. The field will consist of three units; first name, middle name, and last name. Up to 15 characters for the first name, 15 for the second, and 20 for the last name. Do not use titles or "Ms" or "Dr".

Chemical Name- This field is alpha-numeric; up to 100 characters long. This field should list the IUPAC name as closely as possible for consistency and for searching. Do not use spaces between dashes, commas, or parentheses. Use spaces between words such as "acetic acid". Avoid using greek letters such as alpha, beta, or rho. Use lower case letters (some exceptions include "N, N,N', N'-tetrachloroadipamide).

Synonym- This field is alpha-numeric, up to 50 characters. The more common or shorthand name can be used here. For example: "2-propanol" is also known as "isopropyl alcohol", "ma", "secpropyl alcohol","isopropanol" or propan-2-ol". Use lower case letters. If the greek connotation is important, use, for example, "alpha" instead of its symbol.

Manufacturer- The name of the manufacturer or distributor as it appears on the label.

CAS Number- Include whenever possible. This is an eleven-character field when you include the hyphens or dashes. The dashes are optional.

Stores Catalog Number - Include if the chemical is ordered from the University Stores. It is a 5 digit field.

Building Location- This is a 2 character field, alpha only. Use the two character building abbreviations found in the University Master Schedule of Classes... McPherson is "mp", Johnston is "jl", Evans is "el", Celeste is "ce"' Smith is "sm", Newman Wolfram is nw. Use lower case letters.

Room Location- This is a five character alpha-numeric field. Most rooms are three or four digit and some have further designations. For example, the Chairman's office is: "nw" "1118a". Use lower case letters where applicable.

Amount- This is a four digit field. If you have one-hundred grams of sodium chloride, this field would contain "100" or "0100".

Units- This is a two character field that corresponds to the amount. You are allowed to choose from:

"gr"or "g" - gram,	"kg" - kilogram,
"mg" - milligram,	"li" or "l" - liter,
"ml" - milliliter,	"lb" - pound,
"oz" - ounce,	"gl" - gallon

Number Of Items- If you have duplicates (same material in the same sized container), indicate the total number of items (do not subtract the original entry... for example, if you have three bottles of sodium chloride at 100 g each, then this field would contain a "3"). If you do not have duplicates you can leave it blank or enter "0".

Date of Entry- Using the standard format of MM/DD/YY. This is the date in which you entered this in your inventory. This information is useful for several reasons. The most important reason is to track those chemicals which may have a shelf-life (such as isopropyl ether).

Date of Disposal - Using the same standard format as the date of entry: MM/DD/YY. This to indicate when the chemical has been used up or is no longer under your control.

Remarks- This is an alpha-numeric field up to 100 characters long. It can beused for any relevant information such as; "in refrigerator 2, third shelf from the top" or "dispose of within three months".

Note: Although this information may also be kept on copies of the paper form provided, it is recommended that it be maintained in a data base using the field lengths given to facilitate sharing and transfer of information.

Appendix D
Hazard Communications Labeling Systems

The identification of hazardous chemicals is one of the key elements of the Hazard Communication Standard. The contents of chemical containers must be known at all times.

In general, labels as supplied by the manufacturer are acceptable so long as the label lists the identity of the hazardous chemical, appropriate hazard warnings, and the name and address of the manufacturer.

When hazardous chemicals are transferred into portable containers, the portable containers must be labeled unless the portable container is intended for immediate use by the employee who made the transfer.

If the contents of the portable containers remain beyond the immediate work shift, the labels on portable containers must contain:

- Identity of the chemical or common name used on the hazardous chemical list or inventory which matches the name on the MSDS
- Appropriate hazard warnings and, in some cases, specific chemical substance labeling requirements (e.g. benzene)
- Physical and chemical hazards
- State or identify the target organs
- Appropriate personal protective equipment

Commercially available systems which are useful in meeting the requirements for portable containers include:

HMIG Target Organ Labels from Lab Safety Supply
HMIS Personalized Container Target Organ Labels from Labelmaster, An American Labelmark Co.

Appendix E

HAZARD COMMUNICATION GLOSSARY

Acute Effect	An adverse effect on a human or animal body with severe symptoms which develop rapidly and will subside after the exposure stops.
Anesthetic	A chemical that causes a total or partial loss of sensation. Overexposure can cause impaired judgement, dizziness, headache, drowsiness and even death.
Asphyxiant	A chemical (vapor or gas) that can cause death or unconsciousness by suffocation.
Boiling Point	The temperature at which a liquid changes to a vapor state.
"C" or Ceiling	The maximum allowable exposure limit for an airborne substance. This limit is not to be exceeded even momentarily.
Carcinogen	A substance or agent that can cause a growth of abnormal tissue or tumors in humans or animals.
Chronic Effect	An adverse effect on a human or animal body that can take months or years to develop after exposure.
Combustible Liquid	Those liquids having a f lash point at or above 100 F.
Compressed Gas	Any gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70 F (21. 1 C) ; or 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 a liquid having a vapor pressure exceeding 40 psi at 100 F (37.8 C) as determined by ASTM D-323-72.
Corrosive	According to DOT, causes visible destruction or De=anent changes in human skin tissue at the site of contact or is highly corrosive to steel.
Decomposition	Breakdown of a material or substance (by heat, chemical reaction, decay or other processes) into parts or simpler compounds.
Density	The mass (weight) per unit volume of a substance.
DOT Hazard Class	A Department of Transportation labeling system used for hazardous materials that are being transported. These classes include corrosive, flammable liquid, organic peroxide poison, etc.
Evaporation Rate	The rate at which a material is converted to vapor (evaporates) at a given temperature and pressure when compared to the evaporation rate of a given substance.
Explosive	A chemical that causes a sudden almost instantaneous release of pressure gas and heat when subjected to sudden shock, pressure or high temperature.
Flammable Liquid	Those liquids having a flash point below 100 F.
Flammable Gas	A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen percent (13%) by volume or less; or a gas that at ambient temperature and pressure, forms a range of flammable mixtures with air, wider than twelve percent by volume, regardless of the lower limit.
Flammable Solid	A solid, other than a blasting agent or explosive, as defined in 29 CFR 1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical chance, or retained heat from manufacturing processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.

Flash Point	The temperature at which a liquid will give off enough flammable vapor to ignite if an ignition source is present. There are several flash point test methods, and flash points may vary for the same material depending on the method used, so the test method is indicated when the flash point is given.
General Exhaust	A system for exhausting air containing contaminants from a work area, usually accomplished by dilution.
Hazardous Chemical	Any chemical which is a physical hazard or a health hazard.
Hazard Warning	Any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the hazard(s) of the chemical (s) in the container (s).
Hazardous Decomposition Products	Any hazardous materials that may be produced in dangerous amounts if the material reacts with other agents, burns, or is exposed to other processes such as welding.
Hazardous Polymerization	Polymerization is a chemical reaction in which one or more small molecules combine to form larger molecules. The reaction occurs at a rate which releases large amounts of energy.
Health Hazard	A chemical for which there is statistically significant evidence based on at least one scientific study that acute or chronic health effects may occur in exposed employees.
Ignition Source	A material or energy source that will cause, create, or initiate the minimum temperature at which a substance will continue to burn without the application of external heat.
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.
Incompatible	The term applied to two substances to indicate that one material cannot be mixed with the other without the possibility of a dangerous reaction.
Ingestion	The taking in of a substance through the mouth.
Inhalation	The breathing in of a substance in the form of a gas, vapor, or particulate.
Insoluble	Incapable of being dissolved in a liquid.
Irritant	A substance that produces an irritating effect when it contacts skin, eyes, nose, or respiratory system.
Lethal Concentration 50 (LC 50)	The concentration of an air contaminant that will kill50 percent of the test animals in a group during a single exposure.
Lethal Dose 50 (LD 50)	The does of a substance or chemical that will kill 50 percent of the test animals in a group within the first 30 days following exposure.
Local Exhaust Ventilation	A ventilation system that removes contaminants from the air at the point where contaminants are generated.
Lower Explosive Limit	(Also known as Lower Flammable Limit). The lowest concentration of a substance that will produce a fire or flash when an ignition source is present.
Melting Point	The temperature at which a solid changes to a liquid.
Mechanical Exhaust	A mechanical device, like a motor-driven fan, that removes contaminants from a work area.
Mutagen	Anything that can alter the genetic make-up of a sperm or egg cell.

Oxidizer	A substance that gives up oxygen easily to stimulate combustion of organic material.
Permissible Exposure Limit (PEL)	An exposure limit that is published and enforced by OSHA as a legal standard.
Personal Protective Equipment	Any devices or clothing worn by the worker to protect against hazards in the environment.
Physical Hazard	A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.
Pyrophoric	A chemical that is capable of self-ignition when it is exposed to air.
Reactivity	A substance's susceptibility to undergo a chemical reaction or change that may result in dangerous side effects.
Respiratory Protection	Consists of air cleaning or air supplying devices that protect your breathing system from contaminants or supply fresh air in toxic/oxygen deficient atmospheres.
Routes of Entry	The means by which material may gain access to the body, for example, inhalation, ingestion and skin contact.
Sensitizer	A substance that may cause no reaction in a person during initial exposures, but afterwards further exposures will cause an allergic response to the substance.
Skin Absorption	The ability of some hazardous chemicals to pass directly through the skin and enter the bloodstream.
Solubility in Water	Indicates how much of a substance will dissolve in water.
Specific Gravity	The weight of a material compared to the weight of an equal volume of water, an expression of the density of the material.
Target Organ Toxin	A toxic substance that attacks a specific organ of the body.
Teratogen	A substance that can cause birth defects in the fetus of a pregnant female.
Threshold Limit Value (TLV)	A term used by ACGIH to express the airborne concentration of a material to which nearly all persons can be exposed day after day, without adverse effects.
Time Weighted Average (TWA)	The average time, over a given work period (e.g., 8 hour workday), of a person's exposure to a chemical or an agent.
Toxicity	The sum of adverse effects resulting from exposure to a material.
Upper Explosive Limit (UEL)	(Also known as Upper Flammable Limit) . It is the highest concentration of a substance that will burn or explode when an ignition source is present.
UN Number	A number required in shipping documentation and on packaging as a part of the DOT regulations for shipping hazardous materials.
Vapor Density	The weight of a vapor or gas compared to the weight of an equal volume of air: an expression of the density of the vapor or gas.

Appendix F

Abbreviation Index

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
ASTM	American Society For Testing And Materials
"C"	Ceiling Limit
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
COC	Cleveland Open Cup
CPSC	Consumer Product Safety Commission
DOT	Department of Transportation
EPA	Environmental Protection Agency
IARC	International Agency for Research on Cancer
LEL	Lower Explosive Limit
LFL	Lower Flammable Limit
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Act (Administration)
PEL	Permissible Exposure Limit
PMCC	Pensky-Martens Closed Cup
ppm	parts per million
ppb	parts per billion
RCRA	Resource Conservation and Recovery Act
SARA	SuperFund Amendments And Reauthorization Act
SETA	Setaflash Closed Tester
STEL	Short Term Exposure Limit
TCC	Tag Closed Cup
TOC	Tagliabue Open Cup
TSCA	Toxic Substances Control Act
TLV	Threshold Limit Value
TWA	Time Weighted Average
UEL	Upper Explosive Limit
UFL	Upper Flammable Limit

Appendix G

29 CFR Ch. XVII (7-1-93 Edition)
PART 1910-OCCUPATIONAL SAFETY AND HEALTH STANDARDS (Continued)

Subpart Z-Toxic and Hazardous Substances

SUBJECT INDEX FOR 29 CFR PART 1910--OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Subpart Z-Toxic and Hazardous Substances

AUTHORITY: Secs. 6, 8 Occupational Safety and Health Act, 29 U.S.C. 655, 657: Secretary of Labor's Order 12-71 (38 FR 8754), 9-76 (41 FR 25059), 9-83 (48 FR 35736) or 1-90 (55 FR 3), as applicable; and 29 CFR part 1911.
All of subpart Z issued under section 6(b) of the Occupational Safety and Health Act, except those substances which have exposure limits listed In Tables Z-1. Z-2 and " of 29 CFR 1910.1000. The latter were issued under section 6(a) (29 U.S.C. 655(a)).
Section 1910.1000, Tables Z-1, Z-2 and Z-3 as issued under U.S.C. 553. Section 1910.1000, Tables Z-1, Z-2 and Z-3 not issued under 29 CFR part 1911 except for the arsenic (organic compounds), benzene, and cotton dust listings.
Section 1910.1001 also Issued under See. 107 of Contract Work Hours and Safety Standards Act. 40 U.S.C. 333.
Section 1910.1002 not Issued under 29 U.S.C. 655 or 29 CFR part 1911: also Issued under 5 U.S.C. 553.
Section 1910.1025 also Issued under 29 U.S.C. 653 and 5 U.S.C. 553.
Section 1910.1043 also Issued under 5 U.S.C. 551 et seq.
Sections 1910.1200, 1910.1499 and 1910.1500 also Issued under 5 U.S.C. 553.

SOURCE: 39 FR 23502, June 27, 1974, unless otherwise noted. Redesignated at 40 FR 23072, May 28. 1976.

1910.1000 Air contaminants,

An employee's exposure to any substance listed in Tables Z-1, Z-2, or Z-3 of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a) *Table Z-1. (1) Substances with* limits preceded by "C"- Ceiling Values. An employees exposure to any substance in Table Z-l, the exposure limit of which is preceded by a "C", shall at no time exceed the exposure limit given for that substance. If instantaneous monitoring to not feasible, then the ceiling shall be assessed as a 15-minute time weighted average exposure which shall not be exceeded at any time during the working day.

(2) *Other substances-- 8-hour Time Weighted Averages.* An employee's exposure to any substance In Table Z-1. the exposure limit of which is not preceded by a "C", shall not exceed the 8-hour Time Weighted Average given for that substance in any 8-hour work shift of a 40-hour work week.

(b) *Table Z-2.* An employee's exposure to any substance listed In Table Z-2 shall not exceed the exposure limits specified as follows:

(1) *8-hour time weighted averages*. An employee's exposure to any substance listed in Table Z-2, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that substance in Table Z-2.

(2) *Acceptable ceiling concentrations*. An employee's exposure to a substance listed In Table Z-2 shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit, given for the substance in the table, except for a time period, and up to a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift."

(3) *Example*. During an 8-hour work shift, an employee may be exposed to a concentration of Substance A (with a 10 ppm TWA, 25 ppm ceiling and 50 ppm peak) above 25 ppm (but never above 50 ppm) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to

concentrations less than 10 ppm so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 ppm.

(c) *Table Z-3.* An employee's exposure to any substance listed in Table Z-3, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that substance in the table.

(d) *Computation formulae*. The computation formula which shall apply to employee exposure to more than one substance for which 8-hour time weighted averages are listed in subpart Z of 29 CFR part 1910 In order to determine whether an employee is exposed over the regulatory limit is as follows:

(1)(i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

E=(CaTa+CbTb+- - -CnTn)+8

Where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time T where the concentration remains constant.

T is the duration in hours of the exposure at the concentration C.

The value of E shall not exceed the 8-hour time weighted average specified in subpart Z of 29 CFR part 1910 for the substance involved.

(ii) To illustrate the formula prescribed in paragraph (d)(1)(i) of this section, assume that Substance A has an 8-hour time weighted average limit of 100 ppm noted in Table Z-1. Assume that an employee Is subject to the following exposure:

Two hours exposure at 150 ppm
Two hours exposure at 75 ppm
Four hours exposure at 50 ppm

Substituting this information in the formula, we have

(2 X l50+2 X 75 + 4 X 50)+ 8 = 81.25 ppm

Since 81.25 ppm is less than 100 ppm, the 8 hour time weighted average limit, the exposure is acceptable.

(2)(i) In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

Em = (C1 / L1 + C2 / L2) + - - -(Cn / Ln)

Where:

Em is the equivalent exposure for the mixture.

C is the concentration of a particular contaminant.

L to the exposure limit for that substance specified in subpart Z of 29 CFR part 1910.

The value of Em shall not exceed unity (1).

(ii) To illustrate the formula prescribed in paragraph (d)(2)(i) of this section, consider the following exposures:

Substance	Actual concentration of 8 hour exposure (ppm)	8 - hour TWA or PEL (ppm)
B	500	1000
C	45	200
D	40	200

Substituting In the formula, we have:

Em = 500 / 1000 + 45 / 200 + 40 / 200
Em = O.500 + 0.225 + 0.200
Em = O.925

Since Em is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraphs (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve for compliance, protective equipment or any other protective measures shall be used to keep the exposure of employee to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures time for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with 1910-134.

(f) Effective dates. The exposure limit specified have been in effect with the method of compliance specified in paragraph (e) of the section since May, 1971.

Appendix H

Hazard Communication Program Review Statement

The Hazard Communication Program has been reviewed to ensure that the information contained therein is current and appropriate to safely protect those individuals who use or may come in contact with hazardous chemicals in the workplace. The review has indicated that the following action occured.

----- No revisions to Hazard Communication Program.

----- Revisions incorporated into Hazard Communication Program.

(Department Name)

University Official (Name)	Title	Signature	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____