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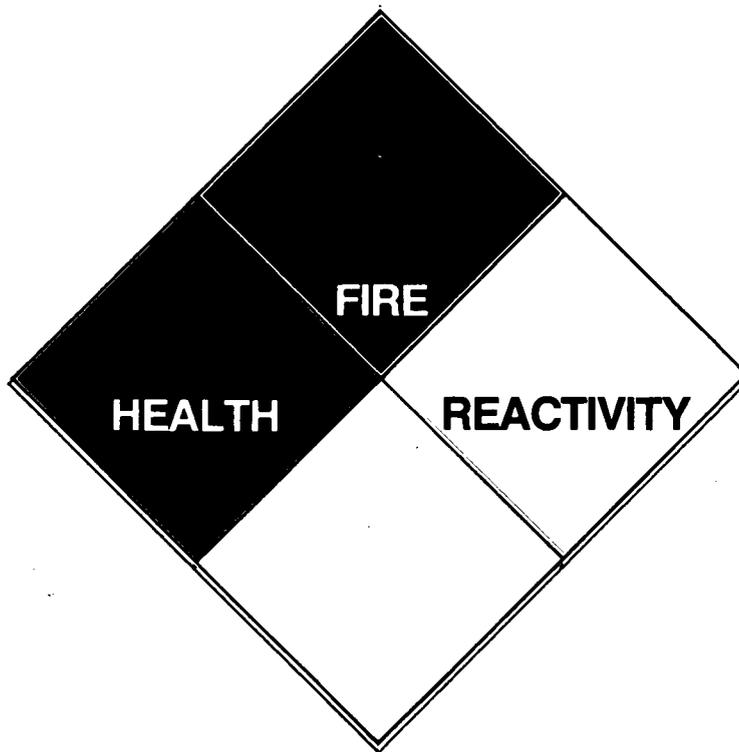
**FMPC HAZARD COMMUNICATION STANDARD
WRITTEN PROGRAM**

08/25/87

**WMCO:EH(IH):87:150
WMCO
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MANUAL**

FMPC

Hazard Communication Standard Written Program



Westinghouse Materials Company of Ohio

#18

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WMCO

HAZARD COMMUNICATION STANDARD PROGRAM

In Compliance With

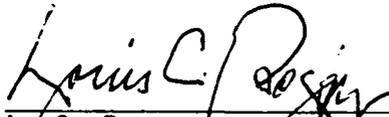
OSHA 29 CFR 1910.1200

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The following is the Written Hazard Communication Program for the Westinghouse Materials Company of Ohio. Its purpose is to provide information in order for you to understand and comply with the various requirements defined in the Occupational Safety and Health Administrations' Hazard Communication standard.

Questions or comments regarding the contents of this manual should be referred to the Industrial Hygiene Subsection of the Environment, Safety and Health Department. As with many documents, changes and updates are expected. This manual will be reviewed and revised as necessary to reflect these changes.

Effective Date June 15, 1987



L. C. Bogar
Vice President & Manager
Environment, Safety & Health

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Introduction

The Occupational Safety and Health Administration's Hazard Communication Standard (29 CFR 1910.1200) requires a written program be maintained for each facility. This program will address the following:

1. A list of hazardous materials known to be present in the workplace.
2. Methods to be used as to how employees will be notified of the hazards of non-routine tasks.
3. Methods to be used as to how employees will be notified of the hazards of unlabeled pipes in their work area.
4. Methods to be used as to how subcontractor employees will be notified of the hazardous materials they may be exposed to while performing their work and any suggestions for appropriate protective measures.
5. Methods to be used to ensure that each hazardous material container is labeled.
6. Methods to be used to ensure that Material Safety Data Sheets (MSDS) will be maintained.

7. A description of how MSDS and labeling requirements will be explained.
8. A description of how employees will be notified of new hazards in the workplace.
9. A description of how the training/informing requirements will be handled.

This document is WMCO's Written Program and will discuss each of these items in detail and explain how the FMPC will comply with these requirements.

1. A List of Hazardous Materials Known to be Present in the Workplace

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The list of hazardous materials used at the FMPC is attached as Appendix III of this program. The list is prepared by Industrial Hygiene personnel and involves reviewing all purchase orders, entering appropriate information from the purchase order to a data base, and then generating the list of hazardous materials. All chemicals and mixtures received since 1/1/84 are listed. The complete list, maintained by Industrial Hygiene, shall be kept current by periodic updates. The receipt of an MSDS from a supplier is the first step in determining if a material is hazardous or not. Requests for additional information from manufacturers and WMCO Environment, Safety, and Health resources are also used to determine if materials are hazardous. If no information is available on a chemical or chemical mixture, the material is considered hazardous. Industrial Hygiene has primary responsibility for this requirement. The Requisitioner must obtain a MSDS for any new material and supply this to Industrial Hygiene prior to ordering the material. The Requisitioner and Purchasing must order a MSDS, as a line item, if the material is a "rush" item and a MSDS is not available.

2. Methods to be Used as to How Employees Will be Notified of the Hazards of Non-routine Tasks. 526

There are non-routine tasks performed at the FMPC which may result in employee exposure to hazardous materials. Non-routine tasks are defined as those not covered by an SOP or some other defined criteria such as construction projects, work permit jobs, work performed under a Plant Test Authorization (PTA), testing of new products, or other work which introduces new potentially hazardous material to the workplace or causes untrained workers to handle a material. Employees should be alert to these possibilities. It is the responsibility of all supervision to recognize that these hazards may be associated with the non-routine task to be performed and to determine, with the assistance of personnel from Industrial Hygiene, if necessary, or other ES&H personnel, the precautions to be taken. Prior to performing the work, involved employees must be informed of the hazardous materials they may encounter and the necessary protective measures that must be used. Supervision and involved employees shall review the hazards associated with these materials. Industrial Hygiene shall be contacted if there are additional questions. Documentation of this training is required and shall be reported on the form found in Appendix X. Review of other safety matters concerning a non-routine task would also be appropriate at this time. Work Permits shall be obtained by supervision, as required, and will also serve to inform employees of hazards of non-routine tasks. Larger projects, such as those requiring engineering support, are reviewed by personnel from Industrial Hygiene in the planning stages and the necessary steps are taken to ensure that those

employees assigned to this project are informed of the hazardous materials they may encounter and that the proper protection is used. It is often difficult to foresee every possible situation during the planning stages of projects. The construction engineer, production, or maintenance supervisor, as well as employees, must be constantly alert for potential problems and inform Industrial Hygiene when the potential for hazardous material/chemical exposure exists. All employees should refer to and be familiar with established Environment, Safety, and Health procedures already in place to ensure safe working conditions such as those described in the current Health and Safety Manual and all requirements listed in applicable FMPC standard operating procedures (SOPs).

3. Methods to be Used as to How Employees Will be Notified of the Hazards of Unlabeled Pipes in Their Work Area.

It is the responsibility of supervision to ensure that employees are aware of the hazards (if any) of unlabeled pipes in their work area. Supervision must contact other plant personnel, the utility engineer, or other knowledgeable persons if they are uncertain of the contents of pipes in their work area, then contact Industrial Hygiene if, after reviewing the hazards associated with this material with employees, more information is required. Refer also to Section 9 of this program.

4. Methods to be Used as to How Subcontractor Employees Will be notified of the Hazardous Materials They May be Exposed to While Performing Their Work and Any Suggestions for Appropriate Protective Measures.

Subcontractor employees shall be informed of the hazardous materials they may encounter while performing work at the FMPC by providing the subcontractor with a list of hazardous materials for that work area. Subcontractors shall be informed of the presence of these items before beginning work, at prebid or at preconstruction meetings, and the necessary MSDS will also be provided at this time. Any requirements for personal protective equipment, respirator fit testing, or other items will be provided at this time. This will allow the subcontractor time to train/inform his/her employees of these items. It is the responsibility of the project manager to ensure that this information has been provided to the subcontractor by ES&H in regard to materials encountered at the FMPC. Similarly, it will be the responsibility of the project manager to ensure that Rust Safety has obtained MSDS from the sub-contractor for hazardous materials which the sub-contractor will use in the project and has forwarded the MSDS to WMC0 Industrial Hygiene. This must be written into the contract. These must be in the Industrial Hygiene office at least one week prior to the materials arrival at the FMPC. This will allow time to communicate this information to WMC0 employees who may be in the project work or storage areas, or who may be emergency response team members.

5. Methods to be Used to Ensure That Each Hazardous Material Container is Labeled.

Incoming containers of hazardous materials, which are properly labeled, do not have to be relabeled with the FMPC in-plant label (described later). A properly labeled incoming container has the following information:

- A. Name of the material.
- B. Name and address of the manufacturer or supplier.
- C. Some type of hazard warning.

If that label is unreadable or partially destroyed, then the material must be set aside in a designated safe area until the proper label can be obtained and placed on the container. The label to use for this purpose can be one supplied by the manufacturer or an in-plant label can be used. The in-plant label to use for this purpose is a diamond label, color coded, with space to indicate hazards. This in-plant label is used for labeling stationary containers (e.g. tanks) and other unmarked containers (e.g. drums or pails) into which a hazardous material has been transferred from a labeled container. A numerical hazard rating scheme has been adopted to provide the user with hazard information. Each color represents a different hazard and is rated on a scale 0 through 4, with 4 as the most serious hazard rating. The bottom portion of the diamond label is reserved for indicating special hazards such as "OXY" for oxidizing materials, "W" indicating not to use water, and  indicating a possible radiation hazard. The top portion of the

label, above the diamond, must identify the hazardous material. The bottom portion of the label can contain additional information about the material. It is not necessary, when labeling in-plant, to include the manufacturers' name and address, only the identification of the material and hazard warnings are necessary. See Appendix IV for a diagram of the label and the criteria used by Industrial Hygiene for rating hazardous materials. Unless the container is emptied, all containers of hazardous materials, with the exception of those items listed in the referenced sources (e.g. hazardous waste which is regulated by EPA), must be labeled and no label should be removed or defaced.

All employees, who work with hazardous materials, must be aware of the need to have proper labels on all containers. Employees must label unmarked containers into which they have transferred a hazardous material. Employees are also responsible for attending the training sessions concerning the Hazard Communication Standard, reading and understanding the in-plant labeling system as well as labeling systems used by suppliers of hazardous materials which they use, following established procedures for handling that material, and reporting unlabeled containers to supervision. Receiving Group supervision is responsible for ensuring incoming containers are properly labeled, as described above, and reporting improperly labeled containers to the buyer and Industrial Hygiene. Shipping Group supervision is responsible for ensuring containers shipped by the FMPC offsite are properly labeled. These labels will be supplied to the Shipping Group by Industrial Hygiene. Production supervision is responsible for ensuring that all containers located in or leaving their area are properly labeled with FMPC in-plant labels or labels provided by the

manufacturer. These supervisors should notify Industrial Hygiene personnel whenever they receive any containers of hazardous materials that are unlabeled. Stores supervision should ensure that all containers of hazardous materials are properly labeled before distribution to the requester. Improperly labeled containers, from outside vendors, should be reported to Purchasing and to Industrial Hygiene. Purchasing should be aware of the importance of dealing only with manufacturers and suppliers who abide by the OSHA Hazard Communication Standard (most are required to do so as of November 25, 1985). Industrial Hygiene has overall responsibility for implementing the standard and, with the assistance of supervision, will ensure all the necessary stationary containers of hazardous materials are labeled. See Appendix V for the responsibilities of the various groups of the WMC0.

6. Methods to be Used to Ensure that Material Safety Data Sheets (MSDS) Will be Maintained.

Upon receipt of a MSDS, Industrial Hygiene will ensure that a copy of the MSDS is distributed to those areas of the FMPC using or storing this material. Binders or file cabinets marked "Material Safety Data Sheets" will be maintained by that area's supervision for filing of these MSDS. A form is provided in Appendix VI for requesting MSDS for materials which are in a work area but do not have MSDS. Purchase order

information and Stores issue data will be used to determine which areas of the FMPC need a particular MSDS. Industrial Hygiene will maintain a master file of MSDS's. Appendix VII lists areas at the FMPC where the binders or files of MSDS's are located and the responsible individual in that area for maintaining the MSDS's.

7. A Description of How MSDS and Labeling Requirements Will be Explained.

Each employee, who works with hazardous materials or who may be potentially exposed to a hazardous material, will be trained in understanding the MSDS and labeling requirements. This will be accomplished in general employee training sessions by reviewing categories of hazardous materials, by describing to the employees, the NFPA, DOT, HMIS, and other labeling systems, and by a specific review of a MSDS for a particular hazardous material. In addition, supervisors or ES&H personnel will review MSDS with employees. Literature and audiovisual techniques may also be used.

8. A Description of How Employees Will be Notified of New Hazards in the Workplace.

When a new hazard is introduced into the workplace, the supervisor shall review the hazard with the employee, with assistance from ES&H personnel. If the new hazard requires that engineering or other controls be used to prevent exposure, then additional training, such as reviewing the MSDS, shall be provided (see Appendix X).

9. A Description of How the Training/Informing Requirements Will be Handled.

The following requirements are intended to ensure that all employees of the FMPC are aware of the requirements of this standard and are appropriately trained for their job. In addition to hazardous materials, the DOE standard requires training of employees who work in areas where physical and biological hazards exist and controls are in place to limit exposure. The following describes areas of responsibility in meeting the training requirements, frequency of training, and a guide for training and informing employees. Industrial Hygiene is responsible for implementing and managing the training requirements of the Hazard Communication Standard. This includes

maintaining training records and assisting supervision in training/informing employees. Supervision is responsible for ensuring that their employees are informed and trained. Employees are responsible for complying with all applicable aspects of the standard, especially attending and understanding the training/informing sessions, understanding MSDS's, and following established instructions and procedures.

Training must be conducted at the time of initial assignment and whenever a new hazard is introduced into the work area. Employees must also be informed and trained according to this standard for all hazardous materials that are currently used. Retraining will be conducted periodically.

The depth of training provided will depend on the employee's potential for exposure. Employees will be divided into at least two groups by Industrial Hygiene personnel; those employees that only need to know the basics of the standard, such as office workers, and those employees who actually work with hazardous materials. Training for the first group will consist of the employee reviewing a booklet describing the Hazard Communication Standard, attending a short training session which includes providing the employee with contacts of where to go for additional information, and signing an attendance form. Training for the second group will consist of the information described for Group One plus training by Industrial Hygiene on the topics listed and described in Appendix VIII. The additional training provided by Industrial Hygiene will be classroom training using slide/tape presentations or other audiovisual presentations. After this training, Group Two

employees will be further divided into smaller groups and trained in ⁵²⁶the specific topics of hazardous materials which they use (See Appendix IX). An attendance form or a quiz will be given in order to serve as documentation of this training. Supervision is also required to train employees on certain topics. The hazards associated with materials contained in pipes in a work area, for example, must be explained to workers in that area by supervision. The form, found in Appendix X, will serve as a guide for supervisors to follow in conducting this training for all employees and will also serve as documentation of the training. This form will be explained and distributed to supervision at a later date.

This program has been written to ensure that the FMPC is in compliance with the Hazard Communication Standard. Any questions regarding the program should be addressed to Industrial Hygiene of the Environment, Safety, and Health Department, telephone number - 6816.

APPENDIX I

Occupational Safety and Health Administration's
Hazard Communication Standard, 29 CFR 1910.1200

1910.1200—HAZARD COMMUNICATION

(a) Purpose.

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

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

(b) Scope and application.

(1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers in SIC Codes 20 through 39 (Division D, Standard Industrial Classification Manual) to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers in SIC Codes 20-39.

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

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

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

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

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

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

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

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

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

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

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

(5) This section does not apply to:

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

(ii) Tobacco or tobacco products;

(iii) Wood or wood products;

(iv) Articles; and,

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

(c) **Definitions.**

"Article" means a manufactured item:

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

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

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

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

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

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

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

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

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

"Compressed gas" means:

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

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

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

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

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

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

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

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

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

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

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

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

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

(ii) "Gas, flammable" means:

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

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

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

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

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

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity

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

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

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

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

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

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

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

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

to determine whether or not a chemical is to be considered hazardous for purposes of this standard.

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

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

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

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

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

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

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

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

"Oxidizer" means a chemical other than a blasting agent or explosive as defined in § 1910.109(a), that initiates or promotes combustion in other materials thereby causing fire

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

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

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

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

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

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

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

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

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

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

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

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

(d) Hazard determination.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(iv) If the employer has evidence to indicate that a component present in the mixture in concentrations of less than one percent (or in the case of carcinogens, less than 0.1 per-

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

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

(e) **Written hazard communication program.**

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

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

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

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

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

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

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

(f) Labels and other forms of warning.

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

- (i) Identity of the hazardous chemical(s);
- (ii) Appropriate hazard warnings; and
- (iii) Name and address of the chemical manufacturer, importer, or other responsible party.

(2) Chemical manufacturers, importers, or distributors shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked in accordance with this section in a manner which does not conflict with the requirements of the Hazardous Materials Transportation Act (18 U.S.C. 1801 et seq.) and regulations issued under that Act by the Department of Transportation.

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

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

- (i) Identity of the hazardous chemical(s) contained therein; and
 - (ii) Appropriate hazard warnings.
- (5) The employer may use signs, placards,

process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by paragraph (f)(4) of this section to be on a label. The written materials shall be readily accessible to the employees in their work area throughout each work shift.

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

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

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

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

(g) Material safety data sheets.

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

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

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

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- (a) If the hazardous chemical is a single substance, its chemical and common name(s);
- (b) If the hazardous chemical is a mixture which has been tested as a whole to determine its hazards, the chemical and common name(s) of the ingredients which contribute to these known hazards, and the common name(s) of the mixture itself; or,
- (c) If the hazardous chemical is a mixture which has not been tested as a whole:
- (1) The chemical and common name(s) of all ingredients which have been determined to be health hazards, and which comprise 1% or greater of the composition, except that chemicals identified as carcinogens under paragraph (d)(4) of this section shall be listed if the concentrations are 0.1% or greater; and,
 - (2) The chemical and common name(s) of all ingredients which have been determined to present a physical hazard when present in the mixture;
- (ii) Physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point);
- (iii) The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity;
- (iv) The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical;
- (v) The primary route(s) of entry;
- (vi) The OSHA permissible exposure limit, ACGIH Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the material safety data sheet, where available;
- (vii) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) *Annual Report on Carcinogens* (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) *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

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

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

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

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

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

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

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

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

(i) The requirements of this section;

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

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

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

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

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

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

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

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

(i) Trade secrets.

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

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

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

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

(iv) The specific chemical identity is made available to health professionals, 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), providing medical or other occupational health services to exposed employee(s), and to employees or designated representatives, if:

(i) the request is in writing;

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

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

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

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

(d) To provide medical treatment to exposed employees;

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

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

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

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

(a) The properties and effects of the chemical;

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

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

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

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

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- (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 (i)(8) of this section, OSHA shall consider the evidence to determine if:
- (i) The chemical manufacturer, importer, or employer has supported the claim that the specific chemical identity is a trade secret;
 - (ii) The health professional, employee, or designated representative, has supported the claim that there is a medical or occupational health need for the information; and
 - (iii) The health professional, employee, or designated representative, has demonstrated adequate means to protect the confidentiality.
- (10)
- (i) If OSHA determines that the specific chemical identity requested under paragraph (i)(3) of this section is not a *bona fide* trade secret, or that it is a trade secret, but the requesting health professional, employee, or designated representative has a legitimate medical or occupational health need for the information, has executed a written confidentiality agreement, and has shown adequate means to protect the confidentiality of the information, the chemical manufacturer, importer, or employer will be subject to citation by OSHA.
 - (ii) If a chemical manufacturer, importer, or employer demonstrates to OSHA that the execution of a confidentiality agreement would not provide sufficient protection against the potential harm from the unau-

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

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

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

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

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

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

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

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

cluding initial training for all current employees.

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

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g. flammability), health hazard definitions are less precise and more subjective. Health hazard 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, 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 or symptoms occur commonly in nonoccupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

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

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

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obvious a concern in the workplace, but again, do not adequately cover the area of chronic effect excluding, for example, blood dyscrasias (such as anemia), chronic bronchitis and liver atrophy.

The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them.

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Appendix B, which is also mandatory, outlines the principles and procedures of hazard assessment.

For purposes of this section, any chemicals which meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards:

1. **Carcinogen:** A chemical is considered to be a carcinogen if:

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

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

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

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

3. **Highly toxic:** A chemical falling within any of the following categories:

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

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

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

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

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

6. **Toxic:** A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD₅₀) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal dose (LD₅₀) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

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

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

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

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Signs and Symptoms:	Cough; tightness in chest; shortness of breath.
Chemicals:	Silica; asbestos.
f. Reproductive toxins:	Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms:	Birth defects; sterility.
Chemicals:	Lead; DBCP.
g. Cutaneous hazards:	Chemical which affect the dermal layer of the body.
Signs and Symptoms:	Defatting of the skin; rashes; irritation.
Chemicals:	Ketones; chlorinated compounds.
h. Eye hazards:	Chemicals which affect the eye or visual capacity.
Signs and Symptoms:	Conjunctivitis; corneal damage.
Chemicals:	Organic solvents; acids.

APPENDIX B TO § 1910.1200—HAZARD DETERMINATION (MANDATORY)

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

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

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

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

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

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

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

APPENDIX C TO § 1910.1200—INFORMATION SOURCES (ADVISORY)

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

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

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

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

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

Charles C. Thomas, 301-327 East Lawrence Avenue,
Springfield, IL
Recognition of Health Hazards in Industry
William A. Burgess, John Wiley and Sons, 605 Third
Avenue, New York, NY 10158
Chemical Hazards of the Workplace
Nick H. Proctor and James P. Hughes, J. P. Lipincott
Company, 6 Winchester Terrace, New York, NY 10022
Handbook of Chemistry and Physics
Chemical Rubber Company, 18901 Cranwood Parkway,
Cleveland, OH 44128
*Threshold Limit Values for Chemical Substances and
Physical Agents in the Workroom Environment with
Intended Changes*
American Conference of Governmental Industrial Hy-
gienists, 6500 Glenway Avenue, Bldg. D-5,
Cincinnati, OH 4521

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

Occupational Health Guidelines
NIOSH/OSHA (NIOSH Pub. No. 81-123)
NIOSH/OSHA Pocket Guide to Chemical Hazards
NIOSH Pub. No. 78-210
Registry of Toxic Effects of Chemical Substances
U.S. Department of Health and Human Services, Public
Health Service, Center for Disease Control, National
Institute for Occupational Safety and Health (NIOSH
Pub. No. 80-102)
The Industrial Environment—Its Evaluation and Control
U.S. Department of Health and Human Services, Public
Health Service, Center for Disease Control, National
Institute for Occupational Safety and Health (NIOSH
Pub. No. 74-117)
*Miscellaneous Documents—National Institute for Occu-
pational Safety and Health*
1. Criteria for a recommended standard *** Occupa-
tional Exposure to "____"
2. Special Hazard Reviews
3. Occupational Hazard Assessment
4. Current Intelligence Bulletins

Bibliographic Data Bases

Service Provider and File Name

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

AGRICOLA
BIOSIS PREVIEWS
CA CONDENSATES
CA SEARCH

DRUG INFORMATION
MEDLARS
MEDOC
NTIS
POLLUTION ABSTRACTS
SCIENCE CITATION INDEX
SSIE
Lockheed—DIALOG, Lockheed Missiles & Space Compa-
ny, Inc., P.O. Box 44481, San Francisco, CA 94144
AGRICOLA
BIOSIS PREV. 1972-PRESENT
BIOSIS PREV. 1969-71
CA CONDENSATES 1970-71
CA SEARCH 1972-76
CA SEARCH 1977-PRESENT
CHEMNAME
CONFERENCE PAPERS INDEX
FOOD SCIENCE & TECH. ABSTR.
FOODS ADLIBRA
INTL. PHARMACEUTICAL ABSTR.
NTIS
POLLUTION ABSTRACTS
SCISEARCH 1978-PRESENT
SCISEARCH 1974-77
SSIE CURRENT RESEARCH
SDC—ORBIT, SDC Search Service, Department No.
2230, Pasadena, CA 91051
AGRICOLA
BIOCOCODES
BIOSIS/BIO6973
CAS6771/CAS7276
CAS77
CHEMDEX
CONFERENCE
ENVIROLINE
LABORDOC
NTIS
POLLUTION
SSIE
Chemical Information System (CIS), Chemical Informa-
tion Systems Inc., 7215 Yorke Road, Baltimore, MD
21212
Structure & Nomenclature Search System
Acute Toxicity (RTECS)
Clinical Toxicology of Commercial Products
Oil and Hazardous Materials Technical Assistance
Data System
National Library of Medicine, Department of Health and
Human Services, Public Health Service, National In-
stitutes of Health, Bethesda, MD 20209
Toxicology Data Bank (TDB)
MEDLIN
TOXLINE
CANCERLIT
RTECS

APPENDIX D TO 1910.1200—DEFINITION OF "TRADE SECRET" (MANDATORY)

A trade secret may consist of any formula, pat-
tern, device or compilation of information which is
used in one's business, and which gives him an op-
portunity to obtain an advantage over competitors
who do not know or use it. It may be a formula for

a chemical compound, a process of manufacturing,
treating or preserving materials, a pattern for a
machine or other device, or a list of customers. It
differs from other secret information in a business
(see §759 of the *Restatement of Torts* which is not

included in this Appendix) in that it is not simply information as to single or ephemeral events in the conduct of the business, as, for example, the amount or other terms of a secret bid for a contract or the salary of certain employees, or the security investments made or contemplated, or the date fixed for the announcement of a new policy or for bringing out a new model or the like. A trade secret is a process or device for continuous use in the operations of the business. Generally it relates to the production of goods, as, for example, a machine or formula for the production of an article. It may, however, relate to the sale of goods or to other operations in the business, such as a code for determining discounts, rebates or other concessions in a price list or catalogue, or a list of specialized customers, or a method of bookkeeping or other office management.

Secrecy. The subject matter of a trade secret must be secret. Matters of public knowledge or of general knowledge in an industry cannot be appropriated by one as his secret. Matters which are completely disclosed by the goods which one markets cannot be his secret. Substantially, a trade secret is known only in the particular business in which it is used. It is not requisite that only the proprietor of the business know it. He may, without losing his protection, communicate it to employees involved in its use. He may likewise communicate it to others pledged to secrecy. Others may also know of it independently, as, for example, when they have discovered the process or formula by independent invention and are keeping it secret. Nevertheless, a substantial element of secrecy must exist, so that, except by the use of improper means, there would be difficulty in acquiring the information. An exact definition of a trade secret is not possible. Some factors to be considered in determining whether given information is one's trade secret are: (1) The extent to which the information is known outside of his business; (2) the extent to which it is known by employees and others involved in his business; (3) the extent of measures taken by him to guard the secrecy of the information; (4) the value of the information to him and his competitors; (5) the amount of effort or money expended by him in developing the information; (6) the ease or difficulty with which the information could be properly acquired or duplicated by others.

Novelty and prior art. A trade secret may be a device or process which is patentable; but it need

not be that. It may be a device or process which is clearly anticipated in the prior art or one which is merely a mechanical improvement that a good mechanic can make. Novelty and invention are not requisite for a trade secret as they are for patentability. These requirements are essential to patentability because a patent protects against unlicensed use of the patented device or process even by one who discovers it properly through independent research. The patent monopoly is a reward to the inventor. But such is not the case with a trade secret. Its protection is not based on a policy of rewarding or otherwise encouraging the development of secret processes or devices. The protection is merely against breach of faith and reprehensible means of learning another's secret. For this limited protection it is not appropriate to require also the kind of novelty and invention which is a requisite of patentability. The nature of the secret is, however, an important factor in determining the kind of relief that is appropriate against one who is subject to liability under the rule stated in this Section. Thus, if the secret consists of a device or process which is a novel invention, one who acquires the secret wrongfully is ordinarily enjoined from further use of it and is required to account for the profits derived from his past use. If, on the other hand, the secret consists of mechanical improvements that a good mechanic can make without resort to the secret, the wrongdoer's liability may be limited to damages, and an injunction against future use of the improvements made with the aid of the secret may be inappropriate.

Information not a trade secret. Although given information is not a trade secret, one who receives the information in a confidential relation or discovers it by improper means may be under some duty not to disclose or use that information. Because of the confidential relation or the impropriety of the means of discovery, he may be compelled to go to other sources for the information. As stated in Comment a, even the rule stated in this Section rests not upon a view of trade secrets as physical objects of property but rather upon abuse of confidence or impropriety in learning the secret. Such abuse or impropriety may exist also where the information is not a trade secret and may be equally a basis for liability. The rules relating to the liability for duties arising from confidential relationships generally are not within the scope of the Restatement of this Subject. As to the use of improper means to acquire information, see §759.

APPENDIX II

Department of Energy Environment, Safety, and Health Bulletin,
Issue No. 14, DOE/EH-0003, Sept. 1985

BULLETIN

Assistant Secretary for Environment, Safety, & Health
Office of the Deputy Assistant Secretary for Environment, Safety, & Health

DOE/EH-0003

Issue No. 14

September 1985

HOW OSHA'S NEW "HAZARD COMMUNICATION" STANDARD AFFECTS DOE CONTRACTORS

OSHA's new standard, "Hazard Communication" (29 CFR 1910.1200) will go into effect November 25, 1985, for certain chemical manufacturers and distributors and on May 25, 1986, for certain other employers. At this time, those that fall under the jurisdiction of the standard are specified by their Standard Industrial Classifications (SIC). However, OSHA has been ordered by the Third Circuit Court of Appeals to expand the standard to include all employers and it is expected that OSHA will comply.

As it is, the standard is confusing as it applies to DOE. It clearly applies to DOE contractors that are designated by their SIC codes; those in SIC codes 20-39. But what about others, like universities, that do not fall under an applicable SIC code but that, under contract with DOE, make and, or use hazardous toxic chemicals?

Two DOE Orders that apply to contractors prescribe the standard*; thus, all DOE contractors must comply with the Hazard Communication standard whether or not they fall under the SIC codes referenced in the current OSHA standard.

THE BASIC REQUIREMENTS

The basic requirements of the OSHA standard are:

- 1) Employers must develop and implement a written Hazard Communication Program. It must at least contain:
 - a) a description of how chemical containers will be labeled, tagged, or otherwise marked to identify the hazardous material contained and warn of hazards;
 - b) a list of the hazardous chemicals known to be present using an identity for each that is

* DOE 5483.1A, Occupational Safety and Health Program for DOE Contractor Employees at Government-owned Contractor-operated Facilities, and DOE 5480.4, Environment, Safety, and Health Standards.

referenced on an appropriate material safety data sheet. How material safety data sheets are made accessible to all employees must be described;

- c) a description of the methods used to inform and train employees and on-site contractor and subcontractor personnel about unlabeled hazards (exposure to metal fumes during welding operations, for example).
- 2) Employers must maintain copies of material safety data sheets for each hazardous material in the workplace and make them accessible during all work shifts.
- 3) Employers must provide formal training on the hazardous chemicals in the workplace. It must at least include information about:
 - a) which operations involve hazardous chemicals;
 - b) where the list of hazardous chemicals and the material safety data sheets are located;
 - c) what physical and health hazards are associated with any hazardous chemical;
 - d) what the purpose of any control, (i.e., ventilation, personal protective equipment, or a specific work practice) is and how to use that control properly;
 - e) what methods are used to detect the hazard (i.e., recognizing odors, monitors, alarms, symptoms of overexposure).

FACILITIES THAT MANUFACTURE CHEMICALS

The manufacturer of a chemical for either internal use or for further distribution to others is responsible for:

- a) labeling the container with the identity of the chemical and a warning of its hazards.

- b) producing a material safety data sheet for that chemical.

The material safety data sheet should be based on a hazard analysis. How to determine whether a chemical is hazardous for hazard communication purpose is covered in paragraph (d) of the OSHA standard.

Exceptions

The production, use, sale, or transfer of radioisotopes within or between DOE facilities and the sale or transfer of radioisotopes to a Nuclear Regulatory Commission or agreement state licensee are exempt from this standard. Requirements for labeling, employee education, and radiation protection are covered in separate Orders, standards and regulations.

Laboratories (any operation equipped for the testing, analysis, or experimental use of chemicals) are not required to develop material safety data sheets. Labels must be provided for all chemical containers being used in laboratories in accordance with NFPA 45, *Fire Protection for Laboratories Using Chemicals*.

The applicability of the OSHA standard to an operation or to material should be determined by the safety and health staffs based on the definition of the terms used in the standard.

FACILITIES WITH CLASSIFIED CHEMICALS

DOE facilities where the identities of materials are classified should keep the lists of hazardous chemicals and material safety data sheets required by this standard in a secure location in accordance with security requirements. However, any employee working with a hazardous chemical is considered to have a need to know its identity and the nature of the hazards involved (of course, access to classified information requires an appropriate current DOE security clearance). The documented Hazard Communication Program must describe how employees can access applicable classified information. If the employer is required to develop a label, the label must contain a warning of the nature of the hazard and a name that can be cross-referenced to classified information about the material's chemical identity.

REQUIREMENTS OF DOE 5480.10

OSHA's "Hazard Communication" Standard covers chemical hazards only; DOE Orders cover other hazards as well, noisy machines and lasers, for example. *DOE*

5480.10, *Contractor Industrial Hygiene Program*, has requirements analogous to those in the OSHA standard. They are:

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1. An inventory must be maintained of potential physical and biological health hazards as well as chemical hazards. Those hazards are to be listed by location and/or the job category of those who would be affected with an indication of when those hazards would be present. To avoid duplication, the list of chemicals required by the OSHA standard may be incorporated in this hazards inventory;
2. An employee education program must be initiated whenever controls (i.e., personal protective equipment, engineered systems, or administrative procedures) are used;

Contractors' industrial hygiene staffs must assist in developing the information and training programs for physical and biological health hazards as well as for chemical hazards. Included is the requirement that employees be notified in writing when environmental monitoring indicates that they have been exposed above permissible limits.

The Order recommends that training include information about: the operations which may lead to exposure; the potential health effects; the requirements of the applicable standard; and the purpose and results of workplace monitoring.

TECHNICAL ASSISTANCE IS AVAILABLE

The Center for Assessment of Chemical and Physical Hazards, Brookhaven National Laboratory, operates a Toxic Material Advisory Program for the Department. Questions about all aspects of hazard recognition, including toxicology, will be answered by contacting Dr. James Brower, FTS: 666-5057; Comm: (516) 282-5057.

The Center is building a data base of material safety data sheets so that DOE contractors can share them when appropriate. This data system is expected to become a module of the Safety Performance Measurement System before the end of this year. Copies of material safety data sheets for those materials being used in your facility would be appreciated. Please note whether they have been reviewed for accuracy and thoroughness and send them to The Center for Assessment of Chemical and Physical Hazards, Brookhaven National Laboratory, Upton, New York 83401.

If you have questions about the OSHA standard or how DOE is implementing it, contact Donald M. Ross or Paul Wambach; FTS: 233-3331, Comm.: (301)353-3331.

Bulletin is published to provide DOE managers and contractors with information relevant to DOE programs and operations. For more information, contact Nona Gilbert Shepard, Editor, EH-121, Office of the Deputy Assistant Secretary for Environment, Safety & Health, U.S. Department of Energy, Washington, D.C. 20545; telephone FTS 233-2958, Comm. (301) 353-2958.

APPENDIX III

List of Hazardous Materials

UPDATE LIST OF ALL PURE CHEMICALS PURCHASED FROM 01/01/84 TO 05/18/87

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Pure Chemical Name
.....

ACETIC ACID, (1,2-CYCLOHEXYLENEDINITRILE) TETRA- (AKA:CDTA)
ACETIC ACID, GLACIAL 99.5%
ACETONE
ACETONITRILE, HPLC GRADE
ACID POTASSIUM PHATHALATE
ALCOHOL, ETHYL (AKA: ETHANOL)
ALCOHOL, ISOPROPYL (AKA: 2-PROPANOL)
ALCOHOL, METHYL ABSOLUTE (AKA: METHANOL)
ALUMINA, ACTIVATED
ALUMINA, HYDRATED
ALUMINUM METAL
ALUMINUM NITRATE REAGENT GRADE
ALUMINUM SULFATE N-HYDRATE (ALUM)
AMMONIA, ANHYDROUS
AMMONIUM CHLORIDE
AMMONIUM CITRATE
AMMONIUM HYDROXIDE 58% NH4OH
AMMONIUM IODIDE CRYSTAL
AMMONIUM MOLYBDATE
AMMONIUM OXALATE
AMMONIUM PYRROLIDINE DITHIOCARBONATE
AMMONIUM SULFATE
ANTIMONY
ASBESTOS ASCARITE POWDER 20-30 MESH
ASBESTOS FIBER
ASCORBIC ACID
BARIUM CHLORIDE
BORIC ACID
BROMOCRESOL GREEN
BRUCINE SULFATE, ACS REAGENT GRADE
CADMIUM METAL
CALCIUM CHLORIDE
CALCIUM FLUORIDE
CALCIUM HYDROXIDE, HYDRATED LIME
CALCIUM HYPOCHLORITE
CALCIUM OXIDE, BULK PEBBLE LIME
CALCIUM OXIDE, REAGENT
CALCIUM SULFATE (INDICATING DRIERITE)
CALMAGITE, METALLOCHROMIC INDICATOR
CELLULOSE, SODIUM CARBOXYMETHYL ETHER
CHLOROFORM
CHROMIC ACID CRYSTAL (AKA: CHROMIUM TRIOXIDE)
CITRIC ACID
COBALTIC FLUORIDE COF3
COPPER METAL
CREATININE
CUPRIC SULFATE PENTAHYDRATE CUSO4.5H2O
CYCLOHEXANE
DIBUTYLAMINE
DICHLORODIMETHLSILANE REAGENT
DIOCTYLPHTHALATE, DOP
DISODIUM PHOSPHATE (AKA: SODIUM PHOSPHATE DIBASIC)

UPDATE LIST OF ALL PURE CHEMICALS PURCHASED FROM 01/01/84 TO 05/18/87

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Pure Chemical Name

ETHANE, 1,1,2-TRICHLORO-2,2,1-TRIFLUORO-
ETHYL ACETATE
ETHYLAMINE (ANHYDROUS)
ETHYLENE GLYCOL
ETHYLENEDIAMINE ANHYDROUS
FERRIC CHLORIDE, REAGENT GRADE
FERRIC NITRATE $Fe(NO_3)_3$
FERROUS CHLORIDE
FERROUS SULFATE CRYSTAL
FERROZINE IRON, 3(2-PYRIDYL)-5,6-BIS(4-PHENYLSULFONIC ACID..
FLUORESCCEIN SODIUM SALT (URANINE)
FORMIC ACID 88%
GALLIC ACID POWDER
GLUCONIC ACID (50% IN WATER)
GLYCERINE
GRAPHITE, VARIOUS SHAPES
HEXANE
HYDRAZINE
HYDROCHLORIC ACID, 20 DEGREES BE
HYDROCHLORIC ACID, SP.G.=1.18
HYDROFLUORIC ACID, 48% SOLUTION
HYDROGEN FLUORIDE, ANHYDROUS
HYDROGEN PEROXIDE, 30% REAGENT
HYDROGEN PEROXIDE, 35% TECHNICAL GRADE
HYDROXY NAPHTHOL BLUE CALCIUM INDICATOR
HYDROXYLAMINE HYDROCHLORIDE
INDIUM METAL
IRON
ISOOCTANE, PESTICIDE GRADE
KEROSENE
KETONE, METHYL ETHYL (AKA: 2-BUTANONE)
KETONE, METHYL ISO-BUTYL (AKA:2-PENTANONE, 4-METHYL).
LACTIC ACID
LANTHANUM CHLORIDE
LANTHANUM NITRATE
LEAD DIOXIDE (AKA: LEAD PEROXIDE)
LEAD SHOT, ASSORTED SIZES
LITHIUM CARBONATE, 98.7 % TECHNICAL GRADE
LITHIUM CHLORIDE
LITHIUM HYDROXIDE
MAGNESIUM METAL, CHIPPED
MAGNESIUM OXIDE
MAGNESIUM PERCHLORATE, ANHYDROUS
MAGNESIUM SULFATE
MERCAPTOACETIC ACID 80% AQUEOUS SOL'N (THIOGLYCOLIC ACID)
MERCURY, INSTRUMENT GRADE
METHYL SULFOXIDE (DIMETHYL SULFOXIDE)
METHYLENE CHLORIDE
MOLYBDIC ACID, 85 % POWDER
NICKEL NITRATE, $Ni(NO_3)_2 \cdot (H_2O)_6$
NIOBIUM METAL
NITRIC ACID, 100% BASIS

UPDATE LIST OF ALL PURE CHEMICALS PURCHASED FROM 01/01/84 TO 05/18/87

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Pure Chemical Name

.....
NITRIC ACID, ANALYTICAL REAGENT GRADE
OXALIC ACID
PERCHLORIC ACID, 70-72% ANALYT. REAGENT
PHENANTHROLINE MONOHYDRATE
PHENANTHROLINE, 1,10- 2,9-DIMETHYL (AKA: NEOCUPROINE HCL)
PHENOL, 2-(5-BROMO-2-PYRIDYLAZO)-5-(DIETHYLAMINO)
PHENOLPHTHALEIN REAGENT
PHOSPHORIC ORTHO ACID, 85 % ANALYTICAL REAGENT
POTASSIUM ACID PHTHALATE
POTASSIUM CARBONATE
POTASSIUM CHLORIDE
POTASSIUM CHROMATE
POTASSIUM DICHROMATE CRYSTAL
POTASSIUM FLUORIDE
POTASSIUM HYDROXIDE
POTASSIUM HYDROXIDE, 45% AQUEOUS SOLUTION
POTASSIUM IODIDE
POTASSIUM NITRATE
POTASSIUM OXALATE
POTASSIUM PHOSPHATE MONOBASIC CRYSTAL
POTASSIUM PYROSULFATE (AKA: POTASSIUM HYDROGEN SULFATE)
POTASSIUM SULFATE
PYRIMIDINE, 4-AMINO-2,6-DIHYDROXY-5-NITROSO
PYRROLIDINECARBOETHIOIC ACID, 1- AMMONIUM SALT
RHENIUM
S-DIPHENYL CARBAZIDE
SILICA GEL
SILICA SAND, BLACKHAWK BRAND, OTTAWA, OR EQUAL
SILICON METAL POWDER
SILVER SULFATE
SODIUM BICHROMATE, REAGENT
SODIUM BORATE
SODIUM BOROHYDRIDE 98% NABH₄
SODIUM BROMIDE
SODIUM CARBONATE
SODIUM CHLORIDE
SODIUM CITRATE
SODIUM CYANIDE
SODIUM FLUORIDE
SODIUM FORMATE
SODIUM GLUTAMATE (MONO)
SODIUM HYDROSULFITE
SODIUM HYDROXIDE
SODIUM HYDROXIDE, 50% AQUEOUS SOLUTION
SODIUM HYPOCHLORITE 12.5% AVAILABLE CHLORINE
SODIUM NITRATE, PURIFIED GRADE
SODIUM NITRITE, CRYSTAL
SODIUM OXALATE
SODIUM PEROXIDE, REAGENT GRADE
SODIUM PHOSPHATE, MONOBASIC MONOHYDRATE CRYSTAL
SODIUM SULFATE
SODIUM SULFITE

UPDATE LIST OF ALL PURE CHEMICALS PURCHASED FROM 01/01/84 TO 05/18/87

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Pure Chemical Name

SODIUM TETRABORATE DECAHYDRATE (BORAX)
STRONTIUM CARBONATE REAGENT POWDER
SULFAMIC ACID
SULFOSALICYLIC ACID
SULFUR
SULFURIC ACID, 83.2%
SULFURIC ACID, ANALYTICAL REAGENT A.C.S.
SULFURIC ACID, BATTERY ELECTROLYTE SP.GR.=1.250
TETRA ACETIC ACID, 1,2-CYCLOHEXYLENEDINITRIL-
TETRACHLOROETHYLENE (AKA: PERCHLOROETHYLENE)
THENOYLTRIFLUOROACETONE (TTA)
THIRON (DISODIUM-1,2-DIHYDROXYBENZENE-3,5-DISULFONATE)
THYMOLPHTHALEIN
TIN METAL, GRANULAR REAGENT
TOLUENE
TRIBUTYL PHOSPHATE (TBP)
TRICHLOROETHANE, 1,1,1- (AKA: METHYL CHLOROFORM)
TRICHLOROETHYLENE
TRIETHANOLAMINE
TRIOCTYLPHOSPHINE OXIDE
TRISODIUM PHOSPHATE (AKA: SODIUM PHOSPHATE TRIBASIC)
TUNGSTEN METAL
URANYL NITRATE, CRYSTAL
UREA, FLAKED, SHOTTED, OR PRILLED
VANADIUM SULFATE, DIHYDRATE
XYLENE (XYLOL)
YTTRIUM OXIDE PAINT
YTTRIUM OXIDE POWDER 99.99% PURE
ZINC ACETATE CRYSTAL
ZINC CHLORIDE
ZINC, HIGH PURITY
ZIRCONIUM OXIDE POWDER

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

.....
 ACCELERATOR, COPPER LECO #501-263
 LECOCEL LECO #763-266 FOR CARBON ANALYZER
 ADHESIVE, #520
 3M BRAND STYLE EC 1300
 3M SUPER 77 SPRAY ADHESIVE
 3M SUPER SPRAY ADHESIVE
 ASPHALT CUT BACK - MASTIC HENRY #232
 ASPLIT CM CARBON POWDER
 ASPLIT CM SOLUTION
 CARBOMASTIC 15
 DECO-REZ EPOXY CRACK FILLER & ADHESIVE A + B
 ELMERS GLUE
 F-181 BOLT ANCHOR SULFASET
 GLUE FOR CEILING TILE
 HARDMAN EXTRA FAST SETTING RED LABEL EPOXY
 INSULATION ADHESIVE
 LIQUID NAIL CONSTRUCTION ADHESIVE
 LOCKWELD 600 BRUSHABLE CONTACT ADHESIVE
 LOCTITE SUPER BONDER 495
 MASTIC - HENRY #232, ASPHALT CUTBACK
 PERMABOND 910 ADHESIVE
 PLIOBOND #20 INDUSTRIAL
 PRAIRIE BOND 2000
 REPLACEMENT PART FOR HALOGEN LEAK DETECTOR
 REZ-N-BOND PLASTIC GLUE
 RTV 102 SILICONE RUBBER
 SPRAY 3M SUPER 77 HIGH COVERAGE
 THINNER FOR "GRIPIT" RUBBER CEMENT #CL-00094
 TRA-BOND 2101 GENERAL PURPOSE EPOXY
 TUFF-BOND GENERAL PURPOSE
 WAX - ADHESIVE USE IN GOODKIN COATER
 WAYLOCK ADHESIVE AND HARDNER
 WELD-ON PLASTIC

AIR FRESHENER, DEOZONE
 GOOD SENSE
 GOOD SENSE 7
 ODOR COUNTERACT DISC
 SPRING GREEN ODOR-DISCS

AIR FRESHNER, CAN SCENT DEODORANT MASK
 ASBESTOS BOARD, ASBESTOS BOARD OR CAREY-MINERITE
 ASBESTOS CEMENT CORRUGATED BOARD, TRANSITE
 ASBESTOS CEMENT LEGS, SOLID TRANSITE FOR REMELT FURNACE COIL
 ASBESTOS FLEXITALLIC GASKETS
 ASBESTOS GASKET, #10 MANHOLE GASKET 11
 304 SS AND STYLE
 ELIPTICAL ASBESTOS MANHOLE GASKET
 MONEL ENVELOPE DOUBLE JACKETED
 SINGLE,DOUBLE JACKETED & SPIRAL WOUND
 STYLE 655 RING GASKET COMPANION FLANGE
 STYLE 736 AFRICAN BLUE GASKET
 WASHER-SWIVEL NUT-STYLE W-16

ASBESTOS PACKING, GARLOCK ASBESTOS SHEET PACKING

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

Chemical Mixture Category Name
.....

BA TREAT, MIXTURE OF SULFATE RUST INHIBITOR AND STABIL.AGENT
 BELT DRESSING, CHESTERTON SPRA-GRIP
 BLASTING GRIT, BLACK BEAUTY BB40-16
 BUFFER, BUFFER SOLUTION - PH 1.00 - 2.00
 BUFFER SOLUTION - PH 3.00, 4.00, & 5.00
 BUFFER SOLUTION - PH 6.00 - 8.00, 582823-BECKMAN
 BUFFER SOLUTION - PH 9.00 - 11.0
 BUFFER SOLUTION, CONC. FORM
 BUFFER SOLUTION, FLURAN I
 BUFFER SOLUTION, FOR HARD WATER SAMPLES
 COLOR-KEYED (RED) 4.01PH, 20 LITER
 HYDRION
 PH 1.00 TO 10.00, SO-B-96,97,98,99,101,102,104...140
 PH 10.00 COLOR KEYED BLUE, BECKMAN P/N 188097
 POWDER FOR PH 10.00, HACH 22271-95
 POWDER FOR PH 4.01, HACH 22269-95
 POWDER FOR PH 7.00, HACH 22270-95
 RED SOLUTION 4.01 PH, FISHER CAT# 50B-101
 CAULK, CAULKING COMPOUND IN CARTRIDGES FOR HANDICALK GUN
 DAP WHITE ACRYLIC LATEX
 CEMENT, #301 AIR SETTING
 ACIDSILL LIQUID
 ACIDSILL POWDER
 ALUMINUM BOND
 BESTLINE RUBBER CEMENT THINNER
 COLUMBIA PORTLAND
 CPVC PIPE CEMENT #29053
 CPVC PIPE PRIMER #29055
 DUCCO HOUSEHOLD.
 ELECTRODE JOINT #W-7130
 EPOXY GLUE #10-347
 FIBREX SUPER KOTE PIPE INSULATING CEMENT
 FIRECRETE
 GR-R-RIP #10-115
 LIQUID RUBBER CEMENT, K-103 13
 QUICK COTE CEMENT, P.K.
 QUICK-STIK #10-114
 SACKRETE MORTAR
 SAUERREISEN ELECTRIC RESISTOR NO. 78
 SERVICE CEMENT- QUICK DRYING AND WATERPROOF
 TASIL
 THERMON BRAND HEAT TRANSFER GRADE STD. IT-3
 WATERPLUG
 WEATHER STRIP MAPA #4061 8001
 CHUCKHOLE PATCH, PRIMER FOR F-230-S
 RANDUSTRIAL F-230-S
 TRUHOLD PATCHING MATERIAL
 CLEANER,
 "CONTACT RE-MU" AEROSOL
 #208 LENS CLEANING FLUID K-LENS-M OR KLEAR GLASS
 #21 WINTERGREEN, TEXOPHENE, OR PHILOGREEN DISINFCT
 #M-47 CAR SHAMPOO DUPONT 1634

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

Chemical Mixture Category Name
.....

ACTEX
ACTUSAL, NL #40, OR TEXOL #7
ALCONOX
ASHLAND TOLUENE CLEANER LIQUID
BETZ #K1-2 RESIN
BLEACH NO. 421PSHC55
BRUSH CLEANER SOLUTION (SILICON CLEANER)
BUTCHER'S SUNDANCE
CAL-CLEAN LIQUID DETERGENT
CAR SHAMPOO 0420 PENRAY
CARPET AND FABRIC PROTECTOR
CHALK BOARD CLEANER (PHILLIPS)
COMET
COVERAGE 256
DEGREASING AGENT, MAGNU-SPRAY 205
DEGREASING AGENT, MAGNUS 905-XX
DRI-IT DISHWASHING AID
DU PAN POWDERED DETERGENT SOAP
DUBOIS COMBAT DISHWASHING COMPOUND
DUBOIS FABRIC SOFTENER
DUBOIS FLOW
DYNA SPREX
ENVOY - GERMICIDAL CLEANER
ENVY INSTANT SPRAY
FORTIFY
FRANKLIN
FREEDOM SPEED STRIPPER
GLASS CLEANER, SILICLENE OR SSS BLUE
HAND CLEANER, KO-REC-TYPE, P/N A7-21-L
HILLCO EXTRACTION SHAMPOO
IN PLACE CLEANER HI POWER
JOHNNY RINGO GENERAL PURPOSE CLEANER
JOHNSON WAX PRONTO, FAST DRY FINISH
JOHNSON'S COMPLETE FLOOR FINISH
JOHNSON'S SHINE-UP LIQUID
L P S SPRAY CONTACT CLEANER
MARKERBOARD CLEANER
M.F. CLEANER/DEGREASER
MABC BATHROOM
PERJ
PLATE SAV-UR
POWDER BLEACH #448P DRY
POWDER KEY #6394-85
RBS-35 CONCENTRATE CLEANING AGENT
RID - LIME
ROLMARK SOLVENT & CLEANER
RUSTOLEUM SURFA ETCH, 108 ETCHING SOLUTION
SANITUFF BODY SHAMPOO
SPARTAN DC-13 ALL-PURPOSE
SPRAY BUFF - JOHNSON SNAPBACK
SPREX, TEXO AC, OR TROJAN #145 P
SR-44 SPOT REMOVER

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

SSS METAL CLEANER
 SUPER DESOIL
 THERMATIC SEWER CLEANER
 THOMAS LIQUID CLEANER, PHOSPHATE FREE
 TWINKLE STAINLESS STEEL CLEANER & POLISH
 VESTAL CREME CLEANSER
 VESTAL DEFOAMER CONCENTRATE #8265-08
 VESTAL DOUBLE BARREL CLEANER
 VIEW QUICK CLEANER
 WATERLESS STRIPPER
 COAL - ANTHRACITE FILTER GRADE
 COATING, CLEAR INTERIOR, CVC CODE #60170, #60662 WATER REDU.
 EZE PEEL (SPRAY BOOTH COATING)
 FIBRATED ROOF
 HEAVY DUTY EPOXY COATING
 HEAVY DUTY GRAY FLOOR COATING
 KOPPERS BITUMASTIC NO. 50
 MAGNA-MASTIC
 PERFORATED FELT
 TERRAPAIN 550 MOLD COATING
 TEXO L.P. 21W
 TEXO L.P. 781
 WAX PRONTO
 WORKABLE FIXATIVE KRYLON SPRAY COATING
 YTTRIUM OXIDE COATING
 COMPOUND, #320 GRINDING AND LAPPING COMPOUND
 3M EDGE SEALING COMPOUND FOR WALKS + TREADS
 AQUASET
 DAMP DEK LIQUID
 DAMP DEK PLASTIC
 DOW CORNING 11
 GLAZING COMPOUND, DAP #33 OR TREMCO #626
 GRADE 1 - W-47 HYPREZ - DIAMOND POLISHING COMPOUND
 GREEN LABEL MILITE FOR HILCO OIL RECLAIMER
 HYPRES F/OS DIAMOND COMPOUND FLUID
 NO. 100 'PULL IN' MINERALLAC
 PADDING
 PETRA-SET
 RELEASE AGENT
 SPACKLE COMPOUND
 YORK'S SPAT-R-PRUF WELDING COMPOUND 106
 CONCENTRATE, CMS CONTRAD 70
 DEOZONE LIQUID WITH
 CONDITIONER NP,
 COOLANT, 0/50 OXCEDOT
 CAMPBELLENE COOL BLUE
 DE-FOAMER
 EMULSIFIER
 HYDROIL
 INGERSOLL RAND SSR
 OXCEDOT
 P/N 39118294, FOR INGERSOLL RAND MODEL 1500L WMSW

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

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SUPERCUT #S-5

COPIER FLUID, 3M BRAND QUANTIMATIC TONER TYPE 748F

CONVERSION SOLUTION PART #83-5-101247

DEVELOPER P/M 5R-148, FOR 1055 XEROX COPIER

ELECTROSTATIC SOLUTION P/M 83-1-104054

KEEPEZE SOLUTION, PART #200-726-2A

LIQUID DISPERSANT P/M 83-4-104416

LIQUID MASTER DEVELOPER P/M 83-1-101241

P/M 5R-130 FOR XEROX MODEL 3450

REPELEX SOLUTION PART # 200-722-2A

TONER AND DISPERSANT FOR SAVIN COPIERS

TONER TYPE 748F FOR 3M ENLARGER/PRINTER

XEROX #5R-142 DEVELOPER

XEROX #5R12 DEVELOPER

XEROX #6R-121 DRY INK PLUS

XEROX #6R-149 TONER

XEROX 1055 DEVELOPER #5R-116

XEROX 1055 DRY INK PLUS #6R-82

XEROX 1075 DEVELOPER #5R-302

XEROX 1075 DRY INK #6R-301

XEROX 2600/3100 DRY IMAGER #6R-68

XEROX DEVELOPER P/N 5R-127

XEROX DEVELOPER P/N 5R-129

XEROX DEVELOPER P/N 5R-283

XEROX DEVELOPER P/N SR139

XEROX DEVELOPER, P/N 5R-111

XEROX DEVELOPER, P/N 5R130

XEROX DRY INK PLUS P/N 6R113

XEROX DRY INK PLUS P/N SR112

XEROX FUSER LUBRICANT #8R-983

XEROX FUSER/LUBRICANT P/N 8R111

COPIER LUBRICANT, XEROX P/N 8R-111

CUTTING & GRINDING FLUID, TAPMATIC CUTTING #2

TAPMATIC CUTTING FLUID #1

TRIM SOL CONCENTRATE

DASH POT OIL, GENERAL ELECTRIC # D687A1 FOR CIRCUIT BREAKERS

DETECTOR, GASOLINE/OIL P/M 1078T17

WATER DETECTOR FOR GASOLINE/OIL TANKS P/N 1078T14

DEVELOPER, #51-101-2 DEVELOPER

3M

3M CD-5 COLOR KEY

AM INTERNAT'L FOR 7100 WORD PROCESSOR

KODAK DEFOAMER, PROCESS E-6

KODAK INDUSTREX MANUAL DEVELOPER AND REP.100-3623

KODALITH LIQUID PART A #157-1900

KODALITH LIQUID PART B #157-1918

LASER IMAGER P/N S690039

LASER P/N S690824

PREMIX FOR 3M ENLARGER

XEROX P/N 5R-140

DIATOMACEOUS EARTH, DICALITE FILER AID

SIL-FLO FILTER AID GRADE 443

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

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DRUM COATING, CLEAR INTERIOR
 DRY ICE (CO2)
 DRY IMAGER
 FIXER, 3M 028 FITING SOLUTION
 3M BRAND, 3M I.D.#78-9020-0160-7
 3M H-1
 AM INTERNAT'L FOR 7100 WORD PROCESSOR
 KODAK RAPID FIXER, PARTS A & B

FLOCCULANT,
 FLUID, "ASBESTOS WET" WETTING SOLUTION
 CORRECTION FOR INK ROTEX INTERNATIONAL #000153R
 HYDROLIC BRAKE FLUID #21
 LENS CLEANING #208
 LIQUID PAPER CORRECTION FLUID
 LIQUID PAPER CORRECTION FLUID THINNER
 LIQUID PHOTO MASKOID
 SNOOP LEAK DETECTOR
 SNOPAKE ERASING FLUID
 SPRAYON BLUE LAYOUT FLUID

FLUX, DUPONT ZACLON F.
 DUPONT ZACLON HV
 OXWELD BRAZING
 STAY-SILV BLACK/WHITE FLUX

FUEL, DIESEL #2
 LIGHTERS GAS - SURELIGHT, #2001

GAS, 10-30% HYDROGEN IN ARGON
 AIR, HYDROCARBON FREE, 20-21% O2
 ARGON 95%, METHANE 5%
 CHLORINE
 FREON TYPE 11
 FREON TYPE 12, LABCRAFT BRAND AIR-IT
 FREON TYPE 22
 FREON, R22
 HELIUM
 HYDROGEN
 HYDROGEN 1% IN AIR
 HYDROGEN 2% IN AIR
 LIQUEFIED PETROLEUM GAS
 METHANE
 METHANE 2% IN AIR
 NITROGEN
 NITROUS OXIDE 98%
 P-10 (10% METHANE 90% ARGON)
 TEST 1%: CO, CO2, CH4, H2, O2 IN N2
 TEST 25% CO2 AND 75% ARGON
 TEST 5 TO 9.9 PPM HCL IN NITROGEN
 TEST 72% HE2, 5% CO, 5% N2, 4% CH4, 4% H2, 5% O2, 5%CO2
 TEST 75% H2, 25% N2
 TEST 96% N2, 4% O2
 TEST 97% N2, 3% H2
 TEST 98.8% N2, 0.6% H2, 0.6% O2
 TEST 99% N2, 1% O2

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

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TEST GAS AEROSOL FOR PYROTRONICS P/N GC-7
 GASOHOL
 REGULAR UNLEADED

GEL, TIGHT MULTI PURPOSE GEL P/N 51604

GREASE, #49-08-4121 TYPE "E" GREASE
 APEIZON
 DOW CORNING SILICONE
 GULFCROWN, E. P. NO. 2 GREASE
 INDUSTRIAL - POLY-CON
 LUBRIPLATE #630-AA GREASE
 MPG-2 GREASE
 PLASTIC TUBE - FALK LONG TERM GREASE
 SILICONE (TUBE) P/N U-10242
 SILICONE IMPACTION GREASE
 STOPCOCK GREASE, LUBRISEAL
 TRIBOLUBE 13D - SYNTHETIC GREASE

GROUT, EMBECO 636

HERBICIDE, BRUSHKILLER 170 (2,4-D)
 PRAMITOL 25E (25% PROMETON)

HYDRAULIC FLUID, BROOKS VERSALENE 650
 FYREQUEL #150 FIRE RESISTANT
 FYREQUEL #550 FIRE RESISTANT

INK, BLACK (LITHOGRAPHIC) INK
 COLOR BLACK R-BK
 COLOR BLUE
 COLOR GREEN
 COLOR RED
 COLOR WHITE R-W
 PANTONE 285 BLUE INK SPEC 1 - RUBBER BASE
 VAN SON BLACK VS-100
 VAN SON RUBBER BASE IVY GREEN #VS-338
 VAN SON RUBBER BASE KODAK PROCESS YELLOW 201 #VS-301

INSECTICIDE, BUG DUSTER 0.1%PYRETHRIN, 1%PIPERONYL BUTOXIDE
 PHILLIPS HIGH PRESSURE BOMB EPA #7405-52-17004
 SEVIN 50W (CARBARYL)

INSULATION, KAOWOOL RIGIDIZER

JOINT SEALER, SEAL TIGHT RUBBER

KITS, SHURE-BOND CONCRETE REPAIR

LIMESTONE, CRUSHED

LINSEED OIL, RAW

LUBRICANT, #995 MULTIFAK EP 2 & #1922 MOLYTEX EP 2, PERMA 12
 CONDUCTO-LUBE
 COOL AMP POWDER
 GOOP, HIGH PURITY THREAD LUBRICANT
 KLINGFAST GEAR, SOHITAC, WHITMORE OR TENACE SPRAY
 L P S INSTANT SPRAY
 MOBILGEAR 629
 NEVER-SEEZ ANTI-SEIZE & SEALING COMPOUND
 POLY-CON PL-2 INDUSTRIAL GREASE
 POLY-CON PL80-90 GEAR LUBE
 SILI SPRAY (SILICON LUBRICANT) #10-600
 SUN-WAY (WAYLUBE #1180)

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

-
- VAC GOOP THREAD LUBRICANT
- WATER PUMP LUBE AND ANTI-RUST PERMATEX 38M
- WD-40
- METAL, ALUMINUM
- IRON METAL POWDER A-220
- MIXTURE, CARBON ACTIVATED PELLETS
- MOLD COATING, CERAMCO ZWR-20A
- CERAMCOTE ZA-BE
- CERAMCOTE ZWR
- TERRAPAIN 550
- TERRAPAIN 559
- OIL SORBENT, OIL-DRY ALL PURPOSE
- 3-IN-1 OIL
- 310 SOVAC MOTOR OIL (LUBRITE MOTOR OIL SAE 10)
- A49796 SEAL OIL
- CALGON ZEROL REFRIGERATION OIL
- CHESTERTON #390 CUTTING OIL
- CMP-37
- CUTTING OIL, SHELL GARIA H5L7026 BLEND #3
- DRAD CONCENTRATED OIL VALVE LUBRICATION
- DUO SEAL PUMP VACUUM
- ENDURA AIR TOOL OIL, EXTRA LIGHT
- FUSER OIL
- HOOKER FLUOROLUBE TYPE MO-10
- HOUGHTON QUENCH K OR BEACON K-9
- IMMERSION, MICRO SLIDE
- MERRIAM UNITY OIL SPEC D-2969
- MOBIL 427 AIR COMPRESSOR OIL
- MOBIL DELVAC, 1110, SAE 10 HIGH DETERGENT
- MOBIL DTE 24
- MOBIL DTE EXTRA HEAVY
- MOBIL DTE OIL 26
- MOBIL LUBRITE #130 SAE 30
- MOBILE DELUAC #130 (LUBRITE SAE 30)
- MOBILGEAR #632 OIL
- MOBILUBE HD90
- OIL FOR MAKO COMPRESSOR, SUB-AQUATICS P/N MD 1230
- OIL FOR SILENT COMPRESSOR
- POLY-COM PL-30 INDUSTRIAL OIL
- REXLUBE SPINDLE LIGHT #129
- RIGID DARK THREAD CUTTING
- SAE 20W-20 NON-DETERGENT MOTOR OIL
- SEAL #11678 C/R
- SHELL ROTELLA OIL T MULTI-GRADE SAE 15W/40
- SHELL TURBO OIL #33
- SUN OIL CO.
- SUN SOLUBLE OIL 31
- TRANE REFRIGERATION OIL
- PAINT REMOVER, KLEAN-KUTTER CODE 115
- KLEAN-STRIP HEAVY BODIED
- TEXO 404 THICK
- #100-10 PERMA-BOND

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UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name
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#101-1 A & B INDUSTRIAL EPOXY WHITE
 #101-250B EPOXY ENAMEL CATALYST, B
 #116-11 ACRYLIC LATEX PRIMER
 #1201-A GLYPTOL RED ENAMEL
 #1500 LATEX FIRE RETARDANT PAINT
 #16-11 BLACK FILLER LATEX
 #164 GREEN EXTERIOR ENAMEL OR FED. SPEC. #14110
 #168 QUICK DRY IND. RUST INHIBITIVE PRIMER
 #177 EPOXY HARDENER
 #178 EPOXY THINNER
 #18 ROYAL BLUE SPRAY OR CLARK #437 BRITE BLUE
 #1801 KRYLON, CLARK 436 YELLOW SPRAY
 #181 EPOXY RUST INHIBITIVE PRIMER
 #182 CHEMICAL & WATER RESISTANT EPOXY BASE
 #1900 PERMITE HOT SEAL HIGH HEAT ALUMINUM
 #1902 HIGH TEMPERATURE SILICONE ALUMINUM
 #205 RED FEDERAL COLOR SPEC #11105
 #21 PERMITE WHITE, KRYLON 1501, OR CLARK 451
 #2101 KRYLON, CLARK 444, #362 CHINESE RED SPRAY CAN
 #22 CRYSTAL CLEAR PERMITE OR CLARK #455
 #250 PLASTIC-KOTE, KRYLON 1601, CLARK 452, WEEKEND358
 #31-424 DURONODIC URETHANE SATIN ENAMEL
 #34-80 FLAT PAINT
 #35-111 HARDIG RUST SCAT INHIBITIVE PRIMER
 #3513 DECO-REG EPOXY MASTIC
 #363 ALL PURPOSE GRAY PRIMER
 #393-10 MOISURE CURED POLYURETHANE
 #4-37 ACRYLIC SEMI-GLOSS MASONARY COATING
 #40-11 WHITE LATEX PRIMER
 #408 PORTER WHITE TRAFFIC PAINT
 #409 PORTER YELLOW TRAFFIC
 #4302 MCR EPOXY BLACK: 4302-PT.A AND 4346-PT.B
 #4306 GRAY EPOXY: #4340-PART A AND #4346N-PART B
 #431 ALUMINUM SPRAY, SEYMOUR LUSTRE CHROME CLARK
 #4310 MCR WHITE EPOXY: 4310-PT.A AND 4346-PT.B
 #435, #349, CLARK OR EQUAL GREEN SPRAY ENAMEL
 #4361 HIGH BUILD WHITE
 #4372 RED EPOXY: 4372-PT.A AND 4346-PT.B
 #4374 MCR GLOSS POLYURETHANE YELLOW: 4374-PT.A + 4347-P.B
 #49 WHITE SEMI-GLOSS ENAMEL
 #5001 RUST BLOCK ALUMINUM
 #504 NLO LATEX LIGHT GREEN SEMI-GLOSS
 #7050 PERMITE OR #7018-01 MIRROLAC ALUMINUM FINISH
 #810 ILLINOIS BRONZE GLASS FROSTING
 #925-147 HARDIG QUICK DRY RUST INDUST. INHIB. PRIMER
 #940 RED ENAMEL
 #965 HARDIG'S GREEN ENAMEL
 #99 HARDIG'S WHITE RUBBER BASE CEMENT PAINT
 #07-36P VANILLA BEAN LATEX INTERIOR
 #S-128 TUF-N-HARD LIGHT GRAY POLYURETHANE ENAMEL
 #S-943 BLACK
 #S-945 HARDIG'S WHITE

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

#S-969 MACHINERY PRIMER
 #S-977 HEAVY DUTY OIL POLYURETHANE CHROME YELLOW
 #S-990 BROWN MSO PRIMER
 12-1 CORONADO ACRYLIC WHITE SEMI-GLOSS
 8-11 CORONADO ACRYLIC PRIMER
 AEROSOL PVC SPRAY
 BIN 3-PURPOSE PRIMER/SEALER
 CARBOLINE 190 FD-COLOR GRAY C-703
 CARBOLINE THINNER #15
 COLOR# Q7-6P FREE SPIRIT, SEMI GLOSS
 CORONADO SEAL IT
 CRYSTAL CLEAR KRYLON ACRYLIC SPRAY
 DRUM BLACK ENAMEL - WATER REDUCIBLE, CVC CODE # 38295
 DRUM BLACK ENAMEL CVC CODE #34884
 DRUM CLEAR LINER
 DRUM RED ENAMEL
 DRUM RED ENAMEL - WATER REDUCIBLE, CVC CODE #38363
 DRUM WHITE ENAMEL
 ENAMEL - BROWN
 FEEL FILMITE
 FREE SPIRT LATEX SEMI GLOSS COLOR Q7-6P
 HARDIGS #S-941 ORANGE
 INTERIOR ACRYLIC SEMI GLOSS LATEX, ENAMEL (BEIGE)
 JAPAN DRYER
 LATEX BEIGE ENAMEL COLOR 23717
 LATEX BROWN ENAMEL COLOR 20117
 LATEX SEMI GLOSS (FREE SPRIT)
 LATEX SEMI-GLOSS WALL PAINT
 LATEX WHITE INTERIOR FLAT
 LATEX WHITE INTERIOR SEMI-GLOSS
 LIGHT GREEN OIL BASE PAINT
 MAPLE STAIN - OIL
 MEK THINNER
 MOISTURE CURED URETHANE
 MOJAVE TAN URETHANE ALKYD SEMI-GLOSS ENAMEL 13-38
 NO. 164 GREEN EXTERIOR ENAMEL
 OAK STAIN - OIL
 OIL BASE WOOD PAINT PRIMER
 PENNATROL ENAMEL THINNER
 PERMA-BOND THINNER
 PLATINUM WHITE 1-31-3P INTERIOR WALL
 PORTER HIGH BUILD EPOXY (GRAY)
 PORTER HIGH BUILD EPOXY (WHITE)
 PORTER MC43 PRIMER
 PORTER U-PRIME PRIMER OR EQUAL GRAY
 PORTER U-PRIME UNIVERSAL #282 WHITE
 PORTER WHITE TRAFFIC
 PORTER YELLOW TRAFFIC
 QUICK DRY ENAMEL (FRIED MUSHROOM)
 RUSTOLEUM, SURFA ETCH
 SHERWIN WILLIAMS INTERIOR ALKYD ENAMEL, #BM-39-13
 SHERWIN WILLIAMS INTERIOR ANTIQUE WHITE, #BM-41-8

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name

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SHERWIN WILLIAMS, INTERIOR, ANTIQUE WHITE
 SHERWIN WILLIAMS, INTERIOR/EXTERIOR ALKYD ENAMEL
 SINGLE PACKAGE ENAMEL - PANTONE BLUE
 SUR-PREP IV CONCRETE ETCH
 T-13 THINNER TARSET
 T-3 THINNER
 T-5 THINNER
 URETHANE LT. GRAY
 VINYL-ACRYLIC MASTIC GREY CHILDERS CP-10
 WALNUT STAIN - OIL
 WHITE LATEX CEILING PAINT
 WHITING
 XYLOL OR XYLENE THINNER
 ZYNOLYTE BLACK PVC AEROSOL
 PASTE, #1113 SOLDER FLUX PASTE
 COLD WATER,
 PLASTIC WOOD, DAP WOOD DOUGH (ALL COLORS)
 NATURAL #1 OR DAP DURATITE WOOD DOUGH
 POWDER, ASCARITE (NOT LESS THAN 20-30 MESH) ASBESTOS POWDER
 CALCIA STABILIZED ZIRCONIA PLASMA SPRAY POWDER
 DC FILTROL DRY CLEANING
 GREEN GLO-RAY POWDER
 LECO #811-139 DIALYL PHTHLATE-COPPER FILLER POWDER
 ORANGE GLO-RAY POWDER
 POZZALIMETM CALCIC POWDER, POZZALIME TYPE I
 VISOLITE GREEN FLUORESCEIN P/N 03500483
 VISOLITE ORANGE FLUORESCEIN P/N 03500482
 VISOLITE ORANGE FLUORESCEIN P/N 3500288
 PRESERVATIVE, STEVENS WATER TANK PRESERVER
 PRINTING SOL'N, 3M TYPE
 PLATE R PROCESS GUM
 VARN INK READY
 VARN VSP 23 WASH
 VARN VSP-44 ROLLER DETERGENT
 VARN VSP-GEL DEGLAZER
 VARN-34 ALL PURPOSE FOUNTAIN SOLUTION
 PVC, CEMENT TPI-R-4003
 CLEANER TPI-R-4001
 HEAVY DUTY SOLVENT CEMENT
 PRIMER TPI-R-4002
 PURPLE PRIMER
 PYROTRONICS, FIRE & SMOKE DETECTOR SPRAY
 RADIONUCLIDES, COBALT-60 RADIOGRAPHIC SOURCE
 NP-237 OXIDE
 PLUTONIUM TRACER SOLUTION IN 2M HNO3
 SB-125, EU-154, EU-155 IN 4M. HCL SOLUTION
 TC-99 SOLUTION
 TECHNETIUM-99, SRM-4288
 UF6 WITH A 236U CONTENT OF 0.906 +/- 0.003
 REAGENT, AMINO ACID 804-99
 AMMONIA ELECTRODE FILLING SOLUTION, #13-641-928
 CHLORINE TITRATING CODE 285

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

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Chemical Mixture Category Name
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DPD FREE CHLORINE REAGENT POWDER PILLOWS
 F-CL ABSORBENT
 FILLING SOLUTION FOR CALOMEL REFERENCE ELECTRODE
 NEMA-QUICK STAIN SOLUTION
 HF ELECTROLYTE
 HYDRANAL COMPOSITE/5, CAT. NO. CC 34805-1
 HYDROGEN PEROXIDE SOLUTION 30% ACS SP. GR.
 ISOTON II
 KARL FISCHER
 NITRAVER 5 NITRATE REAGENT
 NITRIVER 2 NITRITE REAGENT POWDER PILLOWS
 NOCHROMIX CRYSTALS, CAT. NO. 19040
 SCHUTZE REAGENT, CAT. NO. 761-747
 SILVER CHLORIDE - LITHIUM FLUORIDE CARRIER
 SULFAVER 4 SULFATE REAGENT
 REFRACTORY, PTB THERMO LITH BATCH CHROME
 REFRACTORY SHEET PRODUCTS, ZIRCAR
 RESIN, AG50W-X8 CATION EXCHANGE RESIN
 ANION EXCHANGE DOWEX COMMCL. GRADE 1-X8, 100-200MESH
 ANION EXCHANGE RESIN AG1-X8, CAT.# 9991111-NI
 MIXED BED RESIN FOR DEMINERALIZER
 SALT, BULK ROCK SALT
 LIQUID CALCIUM CHLORIDE, DE-ICING AGENT
 NU-SAL HEAT TREATING (SODIUM CHL. + POTASS.CHLORIDE)
 SALT-AWAY
 SEALANT, DUXSEAL PUTTY TYPE COMPOUND
 LEAK-LOCK PIPE THREAD SEAL
 LOCOUIC ACTIVATOR (707)
 LOCTITE PIPE SEALANT W. TEFLON
 LOCTITE PIPE SEALANT WITH TEFLON P/N 59231
 LOCTITE RED A
 PERMATEX #1 FAST DRYING
 PERMATEX #2 SLOW DRYING
 PERMATEX #3 HEAT RESISTANT SEALING COMPOUND
 PERMATEX SPRAY A GASKET
 RECTORSEAL #5 PIPE SEALANT
 SILICONE RUBBER SEALANT (SILICAP)
 SWAK, ANAEROBIC PIPE THREAD SEALANT
 SHELLAC, WHITE
 SHOE POLISH, BOTTLE LIQUID WAX
 HARD CAN WAX
 SOAP, DERMASMOOTH SKIN CARE LOTION
 EXTRA FOAMING POWERED SOAP #02030
 HAND SOAP #420C05502W
 KUTOL COMPLYING WITH NLO SPEC.1147 WATERLESS HAND CLMR
 NLO SPEC #1134 STIGLER'S LIQUID HAND SOAP
 POWDERED NLO SPEC #1133 DATED 1/21/69
 RUBARS DUBOIS BAR SOAP
 SBS-40 MEDICATED SKIN CREAM
 SEPTI-SOFT CONCENTRATE
 SODA ASH, COMMERCIAL GRADE
 SOLDER BRAZE, SILVER #403 CADMIUM FREE

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

Chemical Mixture Category Name

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SOLDER FLUID, RUBY SOLDERING FLUID
 SOLDER FLUX, 3059 STAY CLEAN COLDER FULX (FLUX-ALUM)
 HARDY SILVER
 J.W. HARRIS SILVER
 #34C CERTANIUM ALLOY SOLDER
 3060 STAYBRIGHT SILVER BEARING SOLDER
 3100 95/5 SOLID WIRE SOLDER
 50/50 WIRE SOLDER , SOLID CORE
 60/40 TIN/LEAD ROSIN CORE
 SILVER ALLOY ERSIN FIVE CORE LMP
 SILVER, CADMIUM-FREE

SOLVENT, ALL PURPOSE DEGREASER FORMULA III P/N C-2466
 AND CLEANER FOR FOUNTAIN BRUSH
 AND CLEANER FOR INK RMS
 BROOKS VERSALENE 650
 CONTACT CLEANER - MILLER-STEPHENSON FREON "MS-190"
 DEGLAZING SOLVENT, AM CAT.#83-4-788004
 FLUSHING SOLVENT AH225 FOR CAST VACUUM PUMPS
 FREON TF SOLVENT, MS-180
 HEAVY DUTY CONCRETE DEGREASER
 MULTILITH DEGLAZING P/N 83-7-788001
 PERMATAX GASKET REMOVER SOLVENT
 STODDARD
 VARN FAST WASH VK-21

STANDARD, ALKALINITY STANDARD SOLUTIONS, NO. 14278-10
 AMMONIA 150 MG/L CAT #2128410
 AQUEOUS SPECTROMETRIC SOLN. FOR ANTIMONY, ARSENIC,
 AQUEOUS SPECTROMETRIC SOLN. FOR BA, CA, MG, SR
 BOD CAT #14865-10
 CALCIUM STANDARD SOLUTION AS CaCO₃, 121-16
 CARBON DIOXIDE STANDARD 400 MG/L
 CHLORINE TOTAL 50 MG/L CL₂ CAT #14268-10
 CHROMIUM 12.5 MG/L CR+6 CAT #14256-10
 CHROMIUM HEXAVALENT 50 MG/L 810-14
 COPPER 12.5 MG/L CU+2 CAT #21126-10
 EP TOXICITY (RCRA) STANDARD
 FLORIDE STANDARD SOLUTION 1.0 PPM AS F
 FLUOURIDE 10 PPM P/N 302
 GOLD ATOMIC ABSORPTION G4137
 HEXAVALENT CHROMIUM 12.5 MG/L
 NITRATE (NITROGEN) STANDARD SOLUTION 10 PPM NO₃
 NITROGEN AMMONIA 1 MG/L
 NITROGEN AMMONIA 160 MG/L
 NITROGEN, NITRATE STANDARD SOL. 1000MG/L 12792-11
 ORTHO PHOPHATE LOW RANGE 50 MG/L PO₄ CAT#171-10
 PHOSPHATE 30 MG/L
 REFERANCE STANDARD SOLUTION FOR SULFATE
 REFERENCE STANDARD SOLUTION FOR ALUMINUM
 REFERENCE STANDARD SOLUTION FOR AMMONIUM
 REFERENCE STANDARD SOLUTION FOR ANTIMONY
 REFERENCE STANDARD SOLUTION FOR ARSENIC
 REFERENCE STANDARD SOLUTION FOR BARIUM

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

526

Chemical Mixture Category Name

.....
 SOLDER FLUID, RUBY SOLDERING FLUID
 SOLDER FLUX, 3059 STAY CLEAN COLDER FLUX (FLUX-ALUM)
 HARDY SILVER
 J.W. HARRIS SILVER
 #34C CERTANIUM ALLOY SOLDER
 3060 STAYBRIGHT SILVER BEARING SOLDER
 3100 95/5 SOLID WIRE SOLDER
 50/50 WIRE SOLDER , SOLID CORE
 60/40 TIN/LEAD ROSIN CORE
 SILVER ALLOY ERSIN FIVE CORE LMP
 SILVER, CADMIUM-FREE

SOLVENT, ALL PURPOSE DEGREASER FORMULA III P/N C-2466
 AND CLEANER FOR FOUNTAIN BRUSH
 AND CLEANER FOR INK RMS
 BROOKS VERSALENE 650
 CONTACT CLEANER - MILLER-STEPHENSON FREON "MS-190"
 DEGLAZING SOLVENT, AM CAT.#83-4-788004
 FLUSHING SOLVENT AH225 FOR CAST VACUUM PUMPS
 FREON TF SOLVENT, MS-180
 HEAVY DUTY CONCRETE DEGREASER
 MULTILITH DEGLAZING P/N 83-7-788001
 PERMATEX GASKET REMOVER SOLVENT
 STODDARD
 VARN FAST WASH VK-21

STANDARD, ALKALINITY STANDARD SOLUTIONS, NO. 14278-10
 AMMONIA 150 MG/L CAT #2128410
 AQUEOUS SPECTROMETRIC SOLN. FOR ANTIMONY, ARSENIC,
 AQUEOUS SPECTROMETRIC SOLN. FOR BA, CA, MG, SR
 BOD CAT #14865-10
 CALCIUM STANDARD SOLUTION AS CaCO3, 121-16
 CARBON DIOXIDE STANDARD 400 MG/L
 CHLORINE TOTAL 50 MG/L CL2 CAT #14268-10
 CHROMIUM 12.5 MG/L CR+6 CAT #14256-10
 CHROMIUM HEXAVALENT 50 MG/L 810-14
 COPPER 12.5 MG/L CU+2 CAT #21126-10
 EP TOXICITY (RCRA) STANDARD
 FLORIDE STANDARD SOLUTION 1.0 PPM AS F
 FLUORIDE 10 PPM P/N 302
 GOLD ATOMIC ABSORPTION G4137
 HEXAVALENT CHROMIUM 12.5 MG/L
 NITRATE (NITROGEN) STANDARD SOLUTION 10 PPM NO3
 NITROGEN AMMONIA 1 MG/L
 NITROGEN AMMONIA 160 MG/L
 NITROGEN,NITRATE STANDARD SOL. 1000MG/L 12792-11
 ORTHO PHOPHATE LOW RANGE 50 MG/L PO4 CAT#171-10
 PHOSPHATE 30 MG/L
 REFERENCE STANDARD SOLUTION FOR SULFATE
 REFERENCE STANDARD SOLUTION FOR ALUMINUM
 REFERENCE STANDARD SOLUTION FOR AMMONIUM
 REFERENCE STANDARD SOLUTION FOR ANTIMONY
 REFERENCE STANDARD SOLUTION FOR ARSENIC
 REFERENCE STANDARD SOLUTION FOR BARIUM

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

526

Chemical Mixture Category Name

- REFERENCE STANDARD SOLUTION FOR BISMUTH
- REFERENCE STANDARD SOLUTION FOR BROMIDE
- REFERENCE STANDARD SOLUTION FOR CADMIUM
- REFERENCE STANDARD SOLUTION FOR CALCIUM
- REFERENCE STANDARD SOLUTION FOR CHLORIDE
- REFERENCE STANDARD SOLUTION FOR CHROMIUM
- REFERENCE STANDARD SOLUTION FOR COBALT
- REFERENCE STANDARD SOLUTION FOR COPPER
- REFERENCE STANDARD SOLUTION FOR LEAD
- REFERENCE STANDARD SOLUTION FOR LITHIUM
- REFERENCE STANDARD SOLUTION FOR MAGNESIUM
- REFERENCE STANDARD SOLUTION FOR MANGANESE
- REFERENCE STANDARD SOLUTION FOR MERCURY
- REFERENCE STANDARD SOLUTION FOR MOLYBDENUM
- REFERENCE STANDARD SOLUTION FOR NICKEL
- REFERENCE STANDARD SOLUTION FOR NITRATE
- REFERENCE STANDARD SOLUTION FOR NITRATE
- REFERENCE STANDARD SOLUTION FOR OIL & GREASE
- REFERENCE STANDARD SOLUTION FOR PHOSPHATE
- REFERENCE STANDARD SOLUTION FOR POTASSIUM
- REFERENCE STANDARD SOLUTION FOR SELENIUM
- REFERENCE STANDARD SOLUTION FOR SILICON
- REFERENCE STANDARD SOLUTION FOR SILVER
- REFERENCE STANDARD SOLUTION FOR SODIUM
- REFERENCE STANDARD SOLUTION FOR STRONTIUM
- REFERENCE STANDARD SOLUTION FOR TIN
- REFERENCE STANDARD SOLUTION FOR TITANIUM
- REFERENCE STANDARD SOLUTION FOR TRACE METALS
- REFERENCE STANDARD SOLUTION FOR VANADIUM
- REFERENCE STANDARD SOLUTION FOR ZINC
- SODIUM CHLORIDE STANDARD SOLUTION, 183-11
- SULFITE STANDARD SOLUTIONS (#22674-10/16 PK)
- TOTAL HARDNESS 10 G/L CaCO3 CAT #2187-10
- ZIRCONIUM ATOMIC ABSORPTION 22875
- SURFACTANT, DETER MICROBOND #1010A
- SWEEPING COMPOUND, CLEAN SWEEP
 - DUST-BAN 7977 DUST CONTROL
 - RED REGULAR
- VARNISH, FORMULA # 1501
 - KAMAR VARNISH KRYLON
- WATER TREATMENT, BET2 1110 POLY-FLOC
 - BET2 2020
 - BET2 2040
 - BET2 CORROGEN
 - BET2 NEUTRAMEEN NA-9
 - BET2 PERMACOL
 - BET2 POLYMER 1110
 - BET2 POLYMER 1117
 - D-TAC
 - DEPRESS 14W
 - DUBOIS MIR DUSHIELD - 125
 - DUCLIDE 20

UPDATE LIST OF ALL CHEMICAL MIXTURES PURCHASED FROM 01/01/84 TO 05/18/87

526

Chemical Mixture Category Name

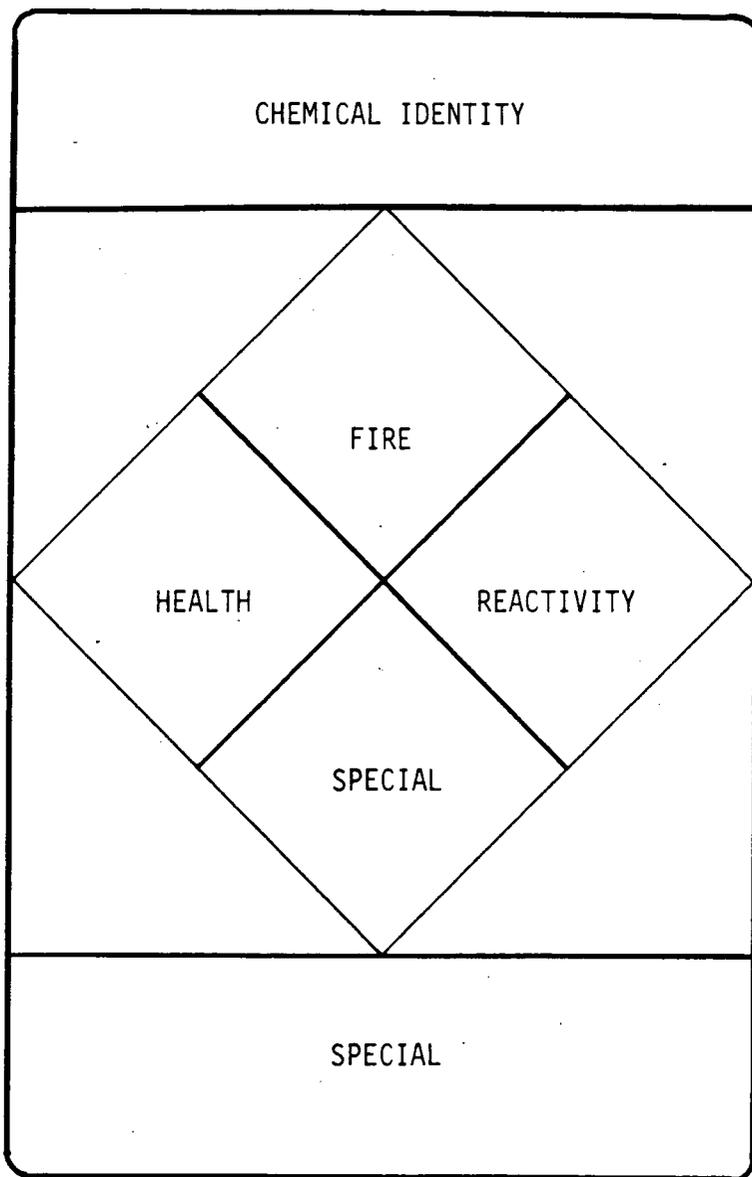
.....
FERROSPERSE
WEATHERPROOFING, CADALON BLACK
WELD ROD, # 6011

- #1 CHAMFERTRODE FOR CUTTING STAINLESS STEEL
- #2233 XUPER EUTECTIC
- #310 S.S. WELD ROD
- #316 S.S. WELDING ROD
- #317 ELC S.S. WELD ROD
- #7018 LINCOLN COATED WELDING ROD
- 2X THORIA CENTERLESS GROUND TUNGSTEN ELECTRODE
- 6010 B.I. REVERSE POLARITY FLEETWELD 5P
- CERTAINIUM COATED WELD RODS #507SP
- CLASS E6012 OR 6013 STEEL, FLUX COATED
- EUTECTIC CASTOLIN #2233 CAST IRON WELDING ROD
- EUTECTIC CASTOLIN, #680 COATED
- EUTECTIC CHAMFERTRODE
- FLEETWELD #180 MILD STEEL (LINCOLN)
- FLEETWELD #35 MILD STEEL WELDING ROD
- HASTELLOY "C" ELECTRODE
- HI TEST STEEL
- INCO-ROD
- J.W. HARRIS #25-M BRONZE
- MAGNESIUM TYPE, A292A, WELD ROD
- OXWELD #25-M BRONZE
- STAINLESS STEEL 316
- STAINLESS STEEL AWS-308-16 ELC TITANIA COATED
- STAINLESS STEEL AWS-316-16 TITANIA COATED
- STAINLESS STEEL AWS-T-347-16 TITANIUM COATED
- STELLITE #6
- STULZ MANGANESE XL COATED
- TITANIA COATED STAINLESS STEEL ELECTRODE
- TYPE ALUMINUM
- TYPE ER70 S-6
- TYPE INCONEL A
- WELDING ROD MONEL 190

APPENDIX IV

Label and Rating Criteria

FMPC HAZARD WARNING LABEL



The following criteria are guidelines only. Professional judgement and the unique characteristics of each chemical must be considered when assigning hazard ratings. In general, a "4" Health hazard rating is reserved for materials which cause immediate & severe health effects, are normally a gas, or is a liquid material which readily penetrates the skin, and/or are known human carcinogens. This criteria takes precedent over other data and may reduce some materials with low TLV's, for example, to only a "3" health hazard rating.

In no case will the ratings be less than those listed by the current NFPA 704-M System.

Questions concerning the rating of materials should be addressed to Industrial Hygiene at 6816.

TABLE V-1

RELATIVE TOXICITY RATING FOR HAZARDOUS MATERIALS
(Human Exposure by Any Route)

Rating	Key Words	Acute (Single Exposure, immediate or delayed effects)	Chronic (Repeated Exposure)
4	EXTREME HEALTH HAZARD	Death	Death*
3	HIGH HEALTH HAZARD	Major temporary or permanent injury May threaten life	Major permanent injury (Includes mutagens and teratogens)
2	MODERATE HEALTH HAZARD	Minor temporary or permanent injury** (Includes nonlife threatening substances which sensitize the majority of exposed workers)	Minor temporary or permanent injury (Includes skin carcinogens)
1	SLIGHT HEALTH HAZARD	Minor injury readily reversible**	Minor injury readily reversible
0	NO SIGNIFICANT HEALTH HAZARD	Materials which produce toxic effects only under the most unusual conditions or by overwhelming dosage.	

*Includes substances which bear a significant relationship to the development of cancer in man, but excluding the common varieties of skin cancer.

**Allergens are rated according to their sensitizing potential rather than the severity of an allergic reaction upon reexposure to a substance by a sensitized worker.

TABLE V-2

RELATIVE ACUTE TOXICITY CRITERIA *

Rating	Key Words	LD50 Single* Oral Dose: Rats mg/kg	LC50 Inhalation* Vapor Exposure: Rats ppm	LD50-Skin* Rabbits: mg/kg
		less than or equal to	less than or equal to	less than or equal to
4	EXTREMELY HAZARDOUS	1	10	5
3	HIGHLY HAZARDOUS	50	100	43
2	MODERATELY HAZARDOUS	500	1,000	340
1	SLIGHTLY HAZARDOUS	5,000	10,000	2,800
0	NO SIGNIFICANT HAZARD	5,000 or greater	10,000 or greater	2,800 or greater

* See Appendix III for the source of these data and test methods.

RELATIVE HEALTH HAZARD CRITERIA BASED ON TLV'S

<u>Rating</u>	<u>Common Term</u>	<u>PPM</u>	<u>mg/m3</u>
4	Extreme Health Hazard	<1	<0.25
3	High Health Hazard	2 - 10	0.26 - 2.5
2	Moderate Health Hazard	11 - 250	2.57 - 5.0
1	Slight Health Hazard.	251 - 1000	5.1 - 10.0
0	No Significant Health Hazard	>1000	>10

- around legs, arms and waist should be provided. No skin surface should be exposed.
- 2 Materials hazardous to health, but areas may be entered freely with full-faced mask self-contained breathing apparatus which provides eye protection.
 - 1 Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus.
 - 0 Materials which on exposure under fire conditions would offer no hazard beyond that of ordinary combustible material.

Flammability.

Susceptibility to burning is the basis for assigning degrees within this category. The method of attacking the fire is influenced by this susceptibility factor. For further information on this subject, refer to the column on "Extinguishing Method" and to its explanation on pages 5 and 6.

- 4 Very flammable gases or very volatile flammable liquids. Shut off flow and keep cooling water streams on exposed tanks or containers.
- 3 Materials which can be ignited under almost all normal temperature conditions. Water may be ineffective because of the low flash point.
- 2 Materials which must be moderately heated before ignition will occur. Water spray may be used to extinguish the fire because the material can be cooled below its flash point.
- 1 Materials that must be preheated before ignition can occur. Water may cause frothing if it gets below the surface of the liquid and turns to steam. However, water fog gently applied to the surface will cause a frothing which will extinguish the fire.
- 0 Materials that will not burn.

Reactivity (Stability).

The assignment of degrees in the reactivity category is based upon the susceptibility of materials to release energy either by themselves or in combination with water. Fire exposure was one of the factors considered along with conditions of shock and pressure.

- 4 Materials which (in themselves) are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. Includes materials which are sensitive to mechanical or localized thermal shock. If a chemical with this hazard rating is in an advanced or massive fire, the area should be evacuated.
- 3 Materials which (in themselves) are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement. Fire fighting should be done from an explosion-resistant location.

- 2 Materials which (in themselves) are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may react violently with water or which may form potentially explosive mixtures with water. In advanced or massive fires, fire fighting should be done from a safe distance or from a protected location.
- 1 Materials which (in themselves) are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently. Caution must be used in approaching the fire and applying water.
- 0 Materials which (in themselves) are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used.

Additional Markings.

A fourth space in the identification symbol is reserved for additional information when such may be of value to the fire fighter. For example, any material which will react violently with water should carry the symbol W to indicate "avoid use of water." Radioactivity could be identified in this space as well as special information contained within the "Extinguishing Method" column. Materials which possess oxidizing properties can be identified by the letters OX.

Hazardous Chemicals Data

In various parts of this tabulation references will be found to the *Hazardous Chemicals Data*. This material is published in the *National Fire Codes*[®] and is also available in pamphlet form from the National Fire Prevention Association (NFPA 49).

Oxygen — Mixtures

The values in this Table, except where otherwise indicated, are based upon experiments in normal air. In oxygen the values may be different and an increase in hazard is probable. Mixtures of two or more flammable materials may have properties different from their components. In the case of mixtures it is common practice to base precautions on the properties of the more hazardous component.

Mists and Froths

In finely divided form such as a mist or spray, liquids can be ignited at temperatures below their flash points. As in the case of vapors a minimum concentration of droplets must be present to support combustion. Froths also may be ignited below flash point temperatures.

Indexing

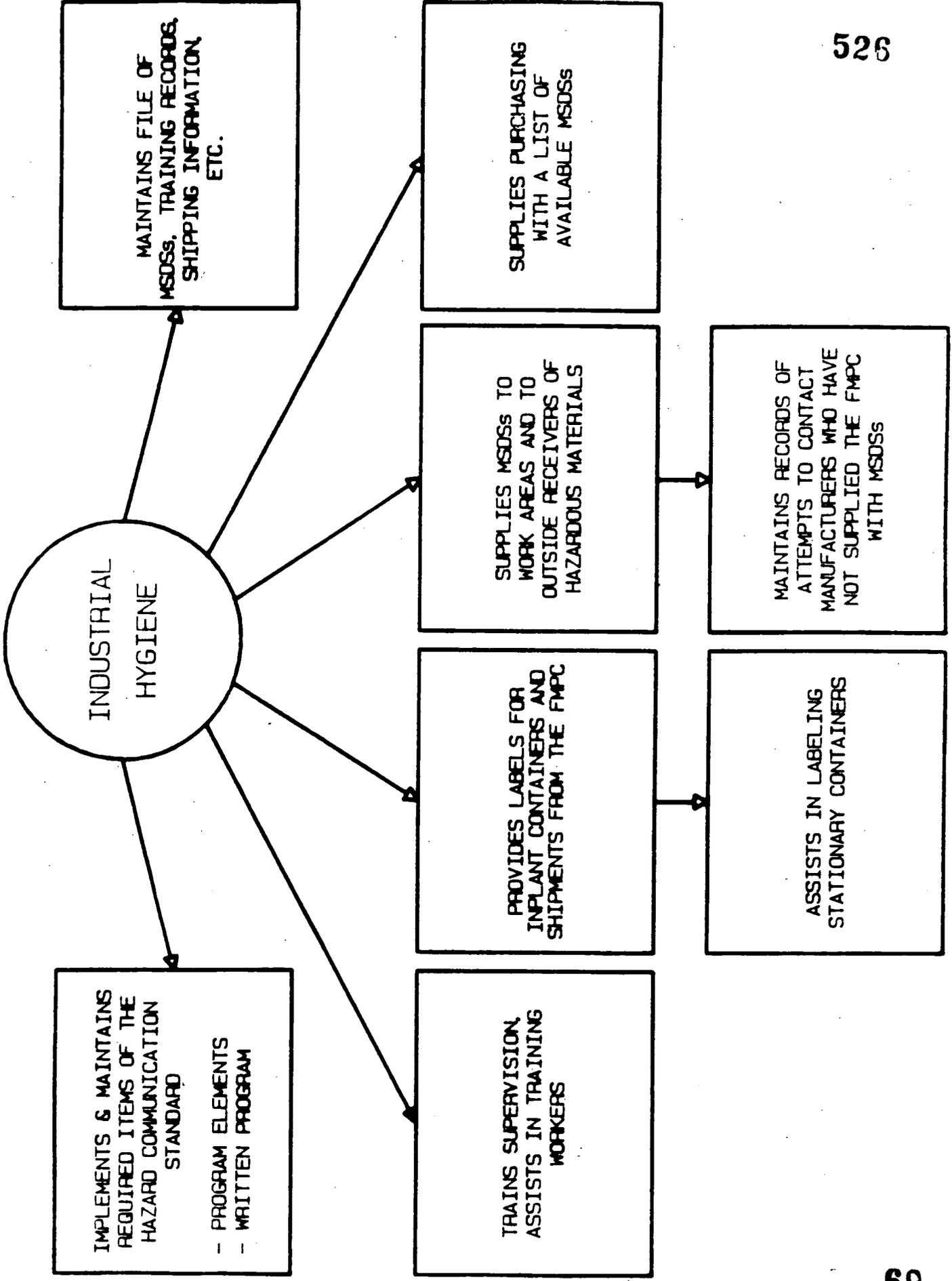
The chemicals in the Table are listed alphabetically. Data for a chemical is listed under the name considered

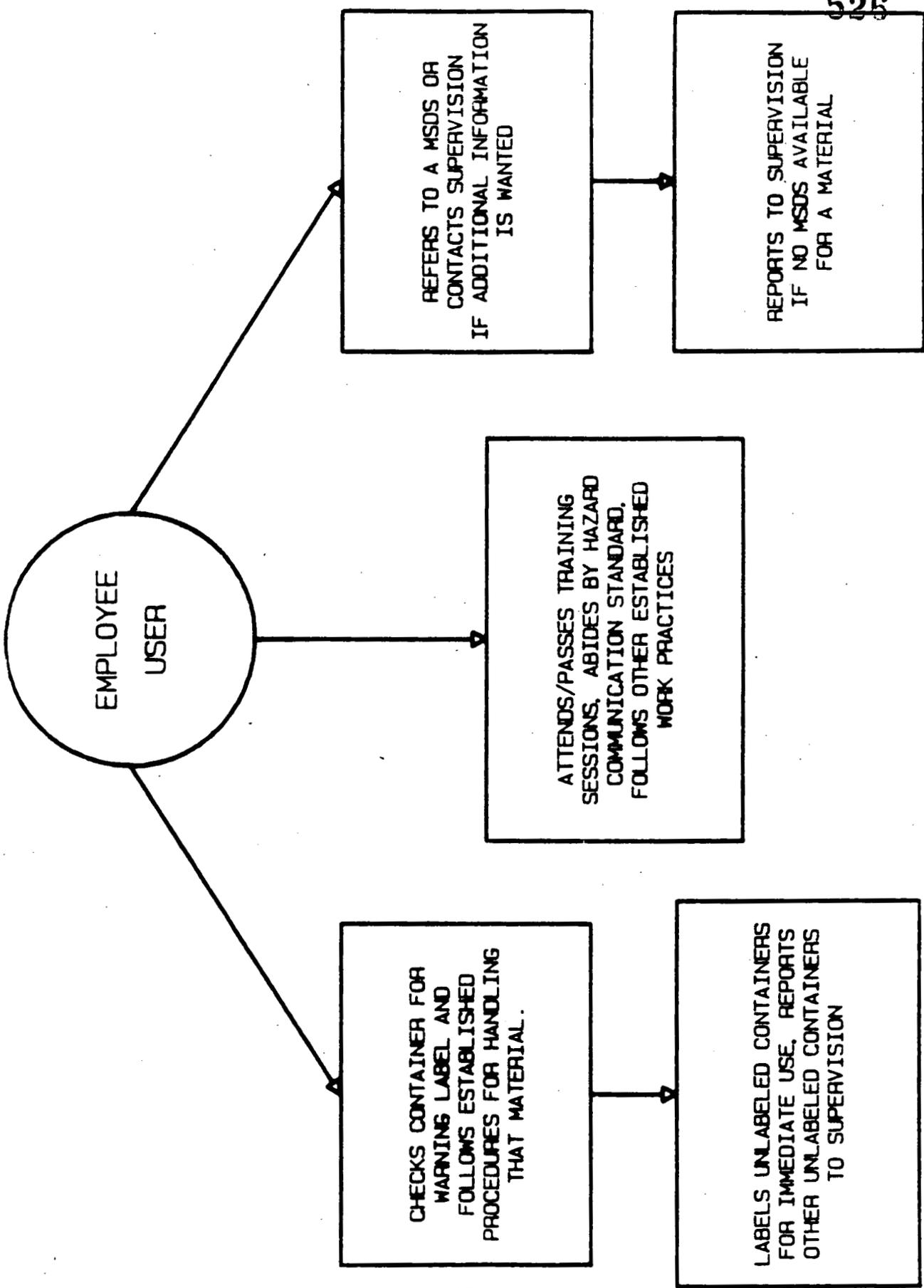
RELATIVE FLAMMABILITY CRITERIA

Rating	Common Term	Flash Point °C(°F)	°C(°F) Boiling point
4	Extremely Flammable	Below 23 (73)	Below 37.8 (100)
3	Highly Flammable	Below 23 (73) 23-38 (73-100)	Above 37.8 (100)
2	Moderately Flammable	38-93 (101-200)	--
1	Slightly Flammable	Above 93 (200)	--
0	Non-Flammable	Above 816 (1500)	--

APPENDIX V

Responsibilities for Implementing the Hazard Communication Standard





EMPLOYEE
USER

CHECKS CONTAINER FOR
WARNING LABEL AND
FOLLOWS ESTABLISHED
PROCEDURES FOR HANDLING
THAT MATERIAL.

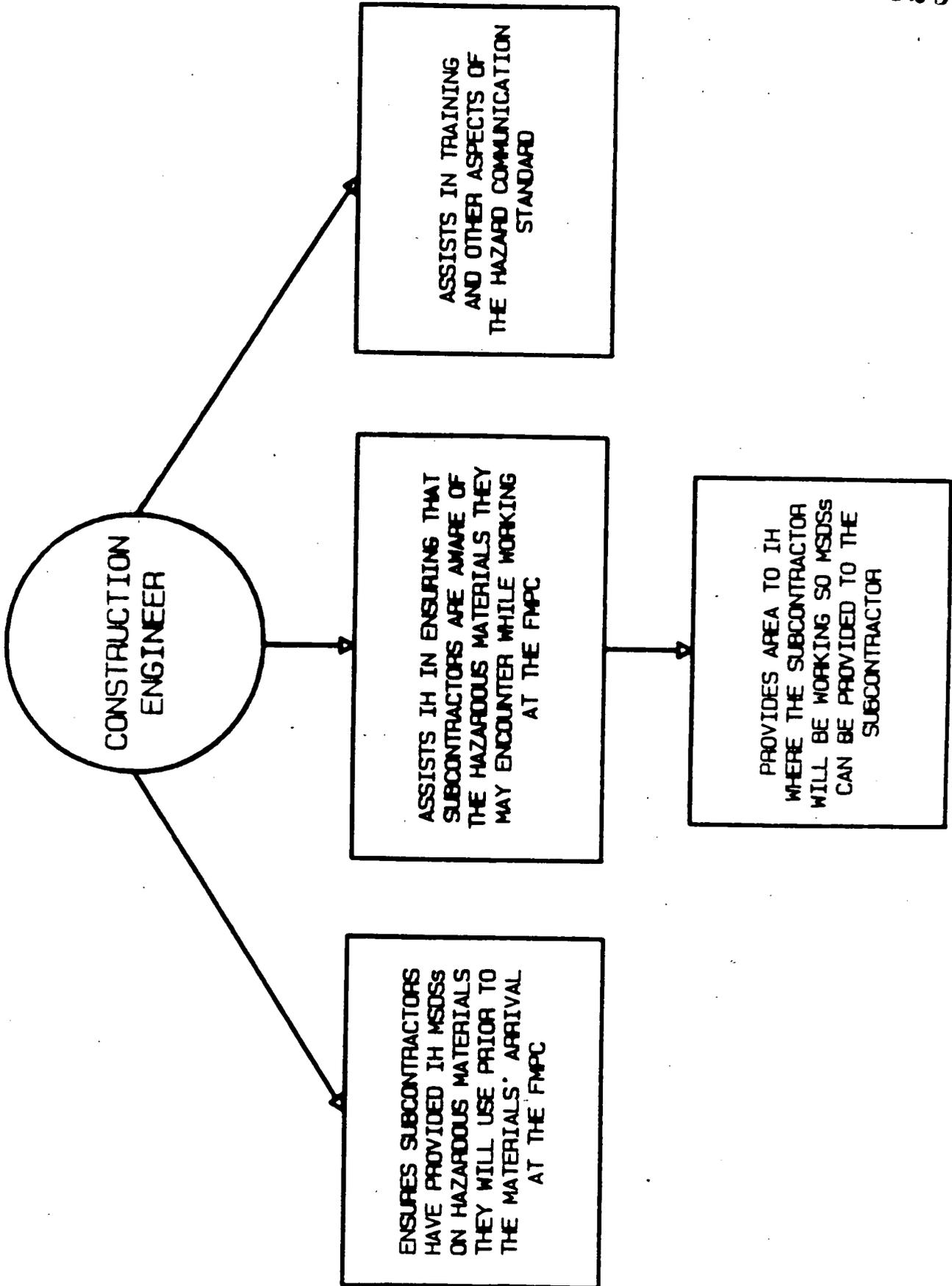
LABELS UNLABELED CONTAINERS
FOR IMMEDIATE USE, REPORTS
OTHER UNLABELED CONTAINERS
TO SUPERVISION

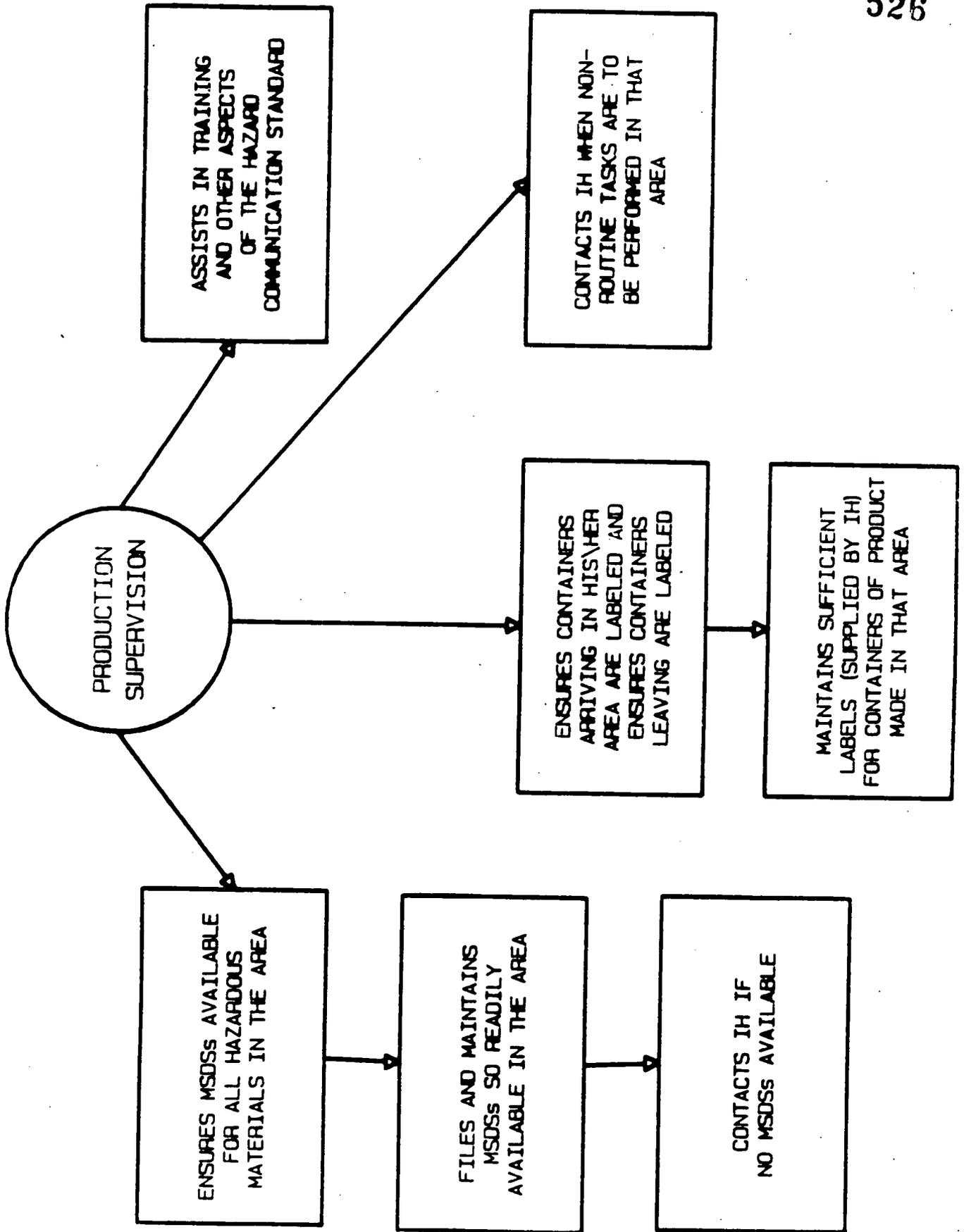
ATTENDS/PASSES TRAINING
SESSIONS, ABIDES BY HAZARD
COMMUNICATION STANDARD,
FOLLOWS OTHER ESTABLISHED
WORK PRACTICES

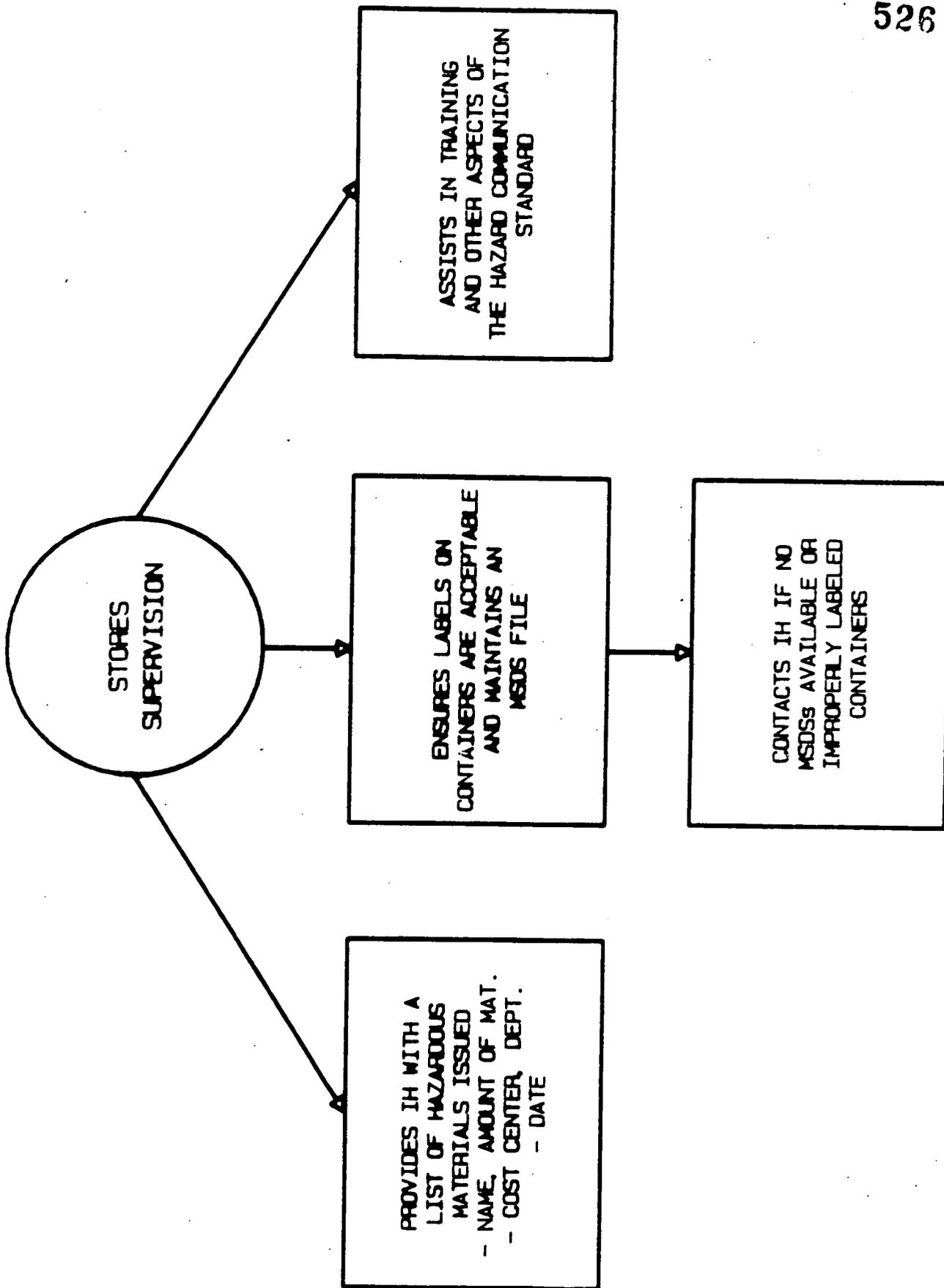
REFERS TO A MSDS OR
CONTACTS SUPERVISION
IF ADDITIONAL INFORMATION
IS WANTED

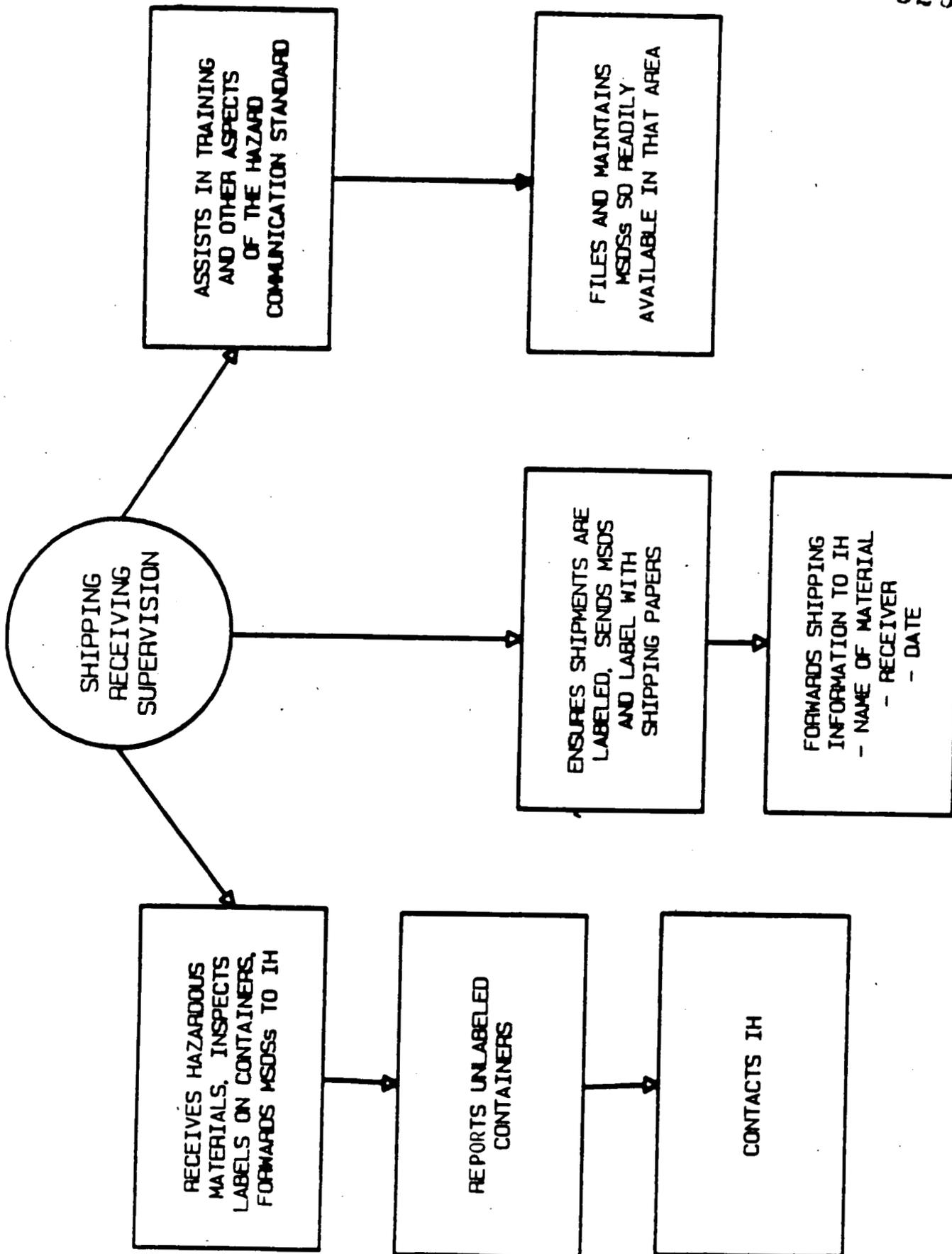
REPORTS TO SUPERVISION
IF NO MSDS AVAILABLE
FOR A MATERIAL

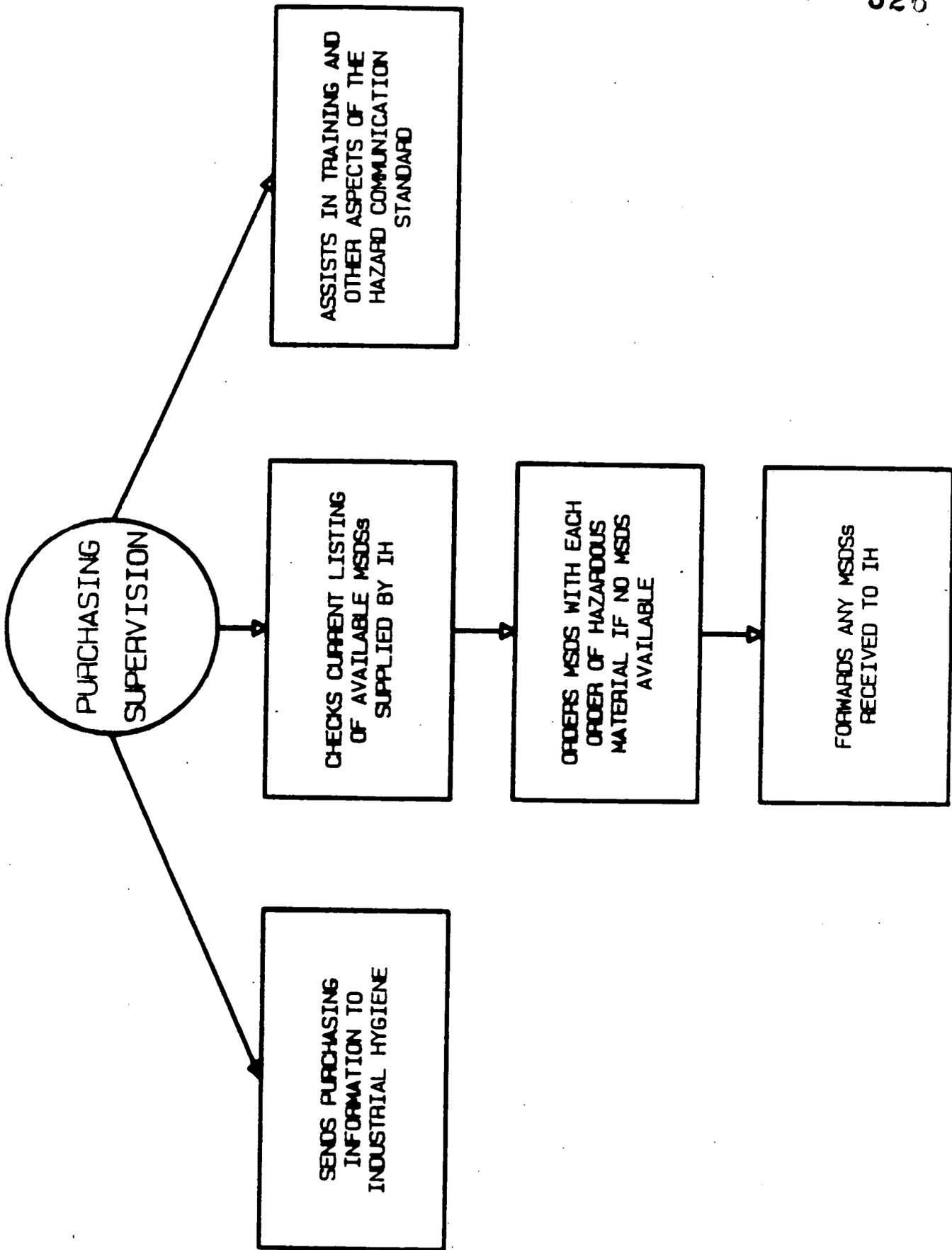
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25
53

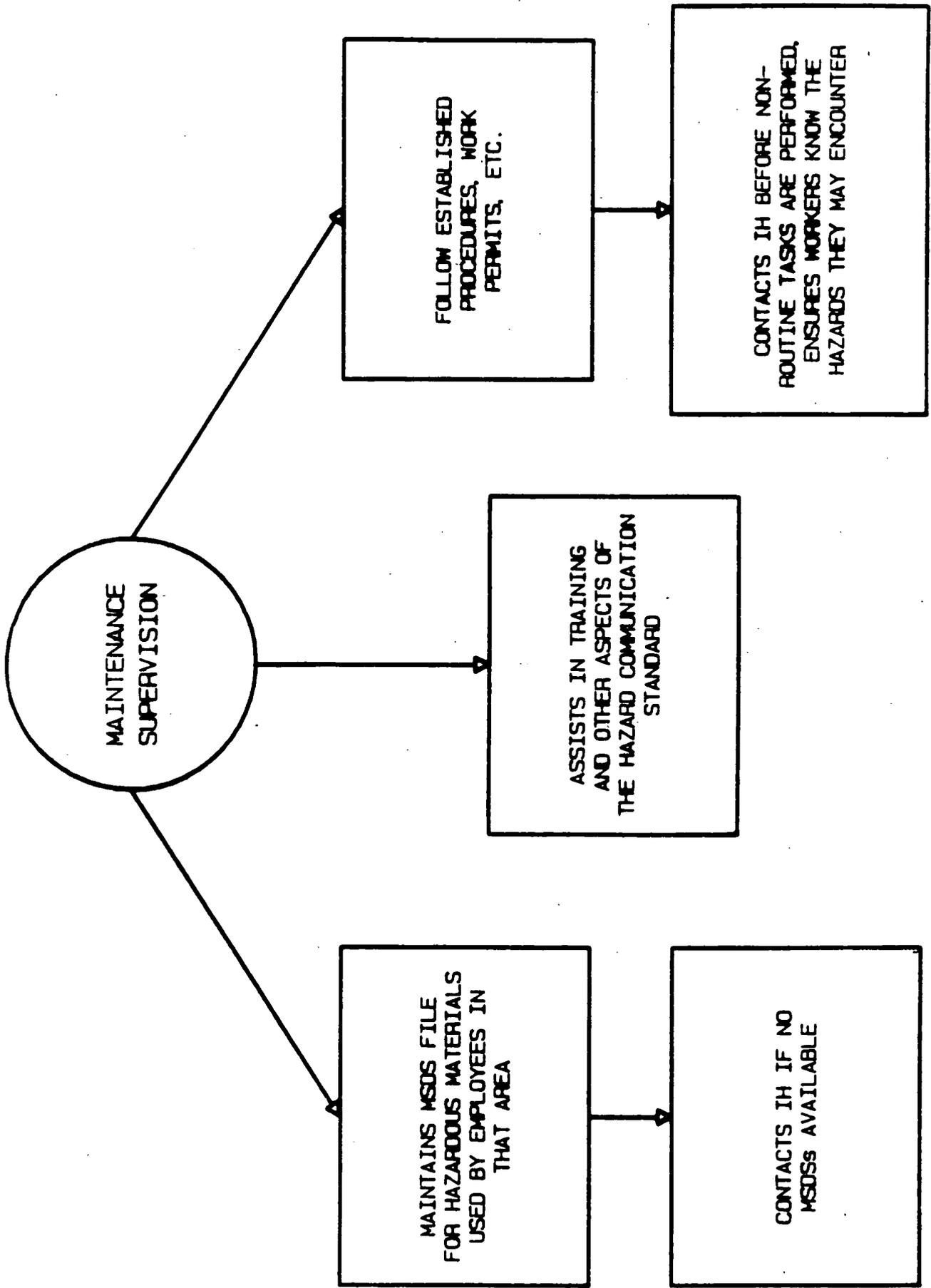












APPENDIX VI

Material Safety Data Sheet Request Form

NAME OF MATERIAL AS IT APPEARS ON THE CONTAINER: _____

ANY MANUFACTURERS INFORMATION SUCH AS NAME, ADDRESS, CODES, ETC. _____

APPROXIMATE QUANTITY AND CONTAINER TYPE _____

WMCO STORES CATALOG # IF AVAILABLE _____

LOCATION WHERE MATERIAL IS STORED OR USED: BLDG.# _____

DEPT.# _____

SUPERVISOR FOR THIS AREA: _____

EMPLOYEE REQUESTING MSDS: _____ BADGE # _____

TODAYS DATE _____

SEND COMPLETED MSDS REQUEST FORM TO THE INDUSTRIAL HYGIENE GROUP

— FOR INDUSTRIAL HYGIENE USE —

DATE WROTE OR CONTACTED COMPANY _____ DATE MSDS RECEIVED _____

DATE CONTACTED SUPERVISOR _____ DATE MSDS SENT TO WORK AREA _____

COMMENTS _____

APPENDIX VII

Material Safety Data Sheet Plant Locations

MATERIAL SAFETY DATA SHEETS

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PLANT LOCATIONS

#	AREA	LOCATION	RESPONSIBLE PERSON
1	CARPENTRY SHOP	SUPERVISORS OFFICE	P.H. RAAB
2	TECH. LAB BLDG.	OFFICE	E.S. CULVER
3	PLANT 1	PLANT 1 OFFICE	R.C. DICKEN
4	PLANT 2/3	PLANT 2/3 OFFICE	T.N. HUEY
5	PLANT 4, TANK FARM	PLANT 4, 2nd FLOOR OFFICE	R.J. PERKINS
6	PLANT 5	PLANT 5 SHIFT SUP'S OFFICE	SHIFT SUP'S
7	PLANT 6	PLANT 6 OFFICE	K.M. INMAN
8	PLANT 8	PLANT 8 OFFICE	T.N. HUEY
9	PLANT 9	PLANT 9 SUP. OFFICE	H. COLE
10	PILOT PLANT	PILOT PLANT OFFICE	R.J. HIESTAND
11	MECHANICAL, BLDG. 12	OFFICE	M.V. CARLE
12	BOILER, WATER TRT.	BOILER PLANT DESK	L. PENNINGTON
13	ES&H/ADMINISTRATION	IH OFFICE #53-8	G.J. FOLTZ
14	SERVICES/LAUNDRY	LAUNDRY AREA	C.J. MIZE
15	PAINT SHOP	SUPERVISORS OFFICE	P.H. RAAB
16	PIPE SHOP	SUPERVISORS OFFICE	P.C. HARSH
17	WELDING SHOP	SUPERVISORS OFFICE	R.L. YOUNG
18	SCALE AND INSTR. SHOP	SUPERVISORS OFFICE	H.J. EBBING
19	DECONTAMINATION	BLDG. 69 OFFICE	T.L. KLEIN
20	EMERGENCY BRIGADE	FIRE INSP. OFFICE	G.J. JONES
21	RECEIVING/STORES	RECEIVING STORAGE AREA	J.E. ALLEN
22	PLANT 4, TANK FARM, MAINT.	PLANT 4 MAINT. OFFICE	D.A. MOORE
23	TANK FARM	TANK FARM OFFICE	R.J. PERKINS

APPENDIX VIII

Initial Training Topics

Studies show that one of every four workers in the U.S. is exposed to hazardous chemicals on the job. If used properly, most of these chemicals are harmless. In order to keep worker exposures to hazardous chemicals to a minimum, OSHA has requested that all chemical and manufacturing companies participate in a Hazard Communication Program. The objectives of this program are outlined in the Federal OSHA Hazard Communication Standard.

IMPORTANT PROVISIONS OF THE HAZARD COMMUNICATION STANDARD

A. Hazard Evaluation

OSHA has called for all chemicals and mixtures to be evaluated for potential hazards. Chemical producers or importers have the primary responsibility for evaluating whether a chemical is a potential health hazard (e.g., carcinogen, irritant, or sensitizer), or a physical hazard (explosive or flammable substance). If a study reveals a connection between a chemical and a harmful health effect, the chemical is to be regarded as a potential health hazard.

Procedures that are used to determine a chemical's potential hazard will be written and made available to workers upon request.

B. Warning Labels

Labels should be placed on all containers of substances that are potentially hazardous. Chemical producers or importers will label containers before they leave the facility for transport. This warning label should include the identity of the chemical, hazard warnings, and the name and address of the producer/importer.

If a chemical is transferred from its original container to another, this new container must also be properly labeled.

C. Material Safety Data Sheets (MSDS)

Material Safety Data Sheets (MSDS) provide a source of health and safety information on hazardous chemicals for workers. These sheets will be supplied by the chemical producer. The information on the MSDS includes any potential health hazards related to the use of the chemical, precautions for use, handling, and storage, and emergency procedures for leaks, spills, and fires. Also included is specific information on the chemical and physical properties of the substance.

MSDS will be kept on file in the work place and will be available to workers.

D. Training

Companies will provide training and information to all workers who are involved in any operations where hazardous substances are present. This training includes such topics as methods to use in the detection of hazardous chemicals in the work environment, physical and health hazards of the chemical, and protective measures to take against these hazards. The company will also provide information as to the location and availability of the Written Hazard Communication Program.

E. Written Program

A Written Hazard Communication Program will be provided by the company and made available to workers upon request. This program will include a list of all hazardous chemicals known to be at the facility, a plan to ensure all containers of hazardous materials are labeled, the location of the MSDS file, and details on the worker training and information program.

This audiovisual program presents a general introduction to chemical safety in the workplace. The program is designed to encourage employee awareness and understanding of the kinds of hazards that can result from working with chemical processes. Among the points covered in the program are health hazards posed by chemicals, safe handling of materials, safe work practices, proper use and storage, safety information contained on warning labels and Material Safety Data Sheets (MSDS), personal protective equipment, and emergency response procedures.

Emphasis is placed, in this videotape, on the three states of matter (solids, liquids, and gases) since this provides a method of reviewing problems associated with the containment of chemical substances. Knowledge of the states of matter can be of benefit when transporting chemicals from one location to another. Also, this concept helps employees to focus attention on the different routes of exposure.

The various routes of entry through which chemicals can come in contact with the body are reviewed. These routes include direct contact with the skin, accidental swallowing, and inhalation. The signs and symptoms experienced from exposure to a hazardous chemical can vary, depending on the type of chemical and its entry route into the body.

Labels are used to identify the contents of chemical containers. The OSHA standard requires that, in addition to the chemical identity, the label must provide hazard warnings and the name and address of the manufacturer. The OSHA standard also requires that chemical manufacturers and importers obtain or develop MSDS for each hazardous chemical that they produce or import.

Various types of personal protective equipment are discussed and their usage depends on the severity of the hazard.

APPENDIX IX

Specific Chemical Category Topics

Oxidation is the reaction of a material with oxygen. Some common oxidation reactions which involve our atmospheric oxygen are respiration, combustion, and slow oxidation processes like rusting.

Oxidizers are substances that release oxygen as they react and therefore provide a self-contained source of energy to fuel the reaction. Some oxidizers contain no oxygen (e.g., chlorine). This property is important in promoting useful chemical reactions, but can also be a hazard source. Oxidizers are very reactive compounds; the kinds of reactions that can occur depend upon the other reactants with which they contact and upon the reaction conditions. When oxidizers combine with combustible materials, they will burn fiercely. Contact between some materials can result in spontaneous combustion. Oxidizers may cause immediate combustion or explosion with extremely reactive substances. Organic peroxides are a special class of oxidizers, and when involved in fire, they react violently.

Oxidizers are defined as a safety hazard due to the fire and explosion potential either from the compound itself or from the reaction with other materials. Many oxidizers are health hazards and have been identified as being carcinogens, corrosives, toxins, irritants, sensitizers, and substances affecting target organs. The information about the health hazard of a chemical compound should be indicated on the hazard label and on the Material Safety Data Sheet (MSDS). The safe handling and use of oxidizers should be based upon no physical contact with them and if there is a probability of contact, an analysis for the routes of entry (e.g., inhalation, reaction with mucous tissues) is needed. The use of protective gear should be discussed with the employees. Since oxidizers react with most other chemicals, it is important to make sure the storage containers do not leak and that they are stored away from materials with which they could react.

Planning and training for emergency response procedures should be conducted before an emergency occurs. Oxidizers involved in fires can react with explosive violence. It is important to remember that these compounds can react with other chemicals and release toxic vapors, causing a fire or explosion.

POISONS

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Poisons are substances that may cause death or serious injury if swallowed, inhaled, or if they come in contact with the skin. The degree of hazard posed by a poison depends on its physiological action, its route of attack, and its reactivity in addition to the concentration of the chemical and the duration of exposure. A wide range of physiological effects is possible when exposed to poisons. For example, they can interfere with the oxygen distribution system of the body, paralyze muscles, and affect nervous system activity.

A toxic substance is defined by its effects on test animals. The two major categories for health hazards, as defined by the OSHA standard, are "highly toxic materials" and "toxic materials." Each of these categories is discussed in the videotape. Irritants and sensitizers are also classified as health hazards by the OSHA standard. Although irritants are not corrosive, they will cause a reversible inflammatory effect on living tissue by chemical action at the site of contact. Repeated contact with a sensitizer can result in the development of an allergic reaction in normal tissue.

Because poisons are specific in their harmful effects, it is necessary to ensure that they are properly contained and labeled. It is important to make sure the containers do not leak and that they are stored away from materials that could degrade them. Safe handling of poisons should be based upon the elimination of human contact with them. If there is a probability of contact, an analysis of body entry routes is needed. The hazards of toxic vapor inhalation and reaction with or absorption through the skin may exist. The need for protective equipment should also be discussed with employees.

Planning and training for emergency response procedures should be conducted before the emergency occurs. It is necessary to be familiar with emergency response procedures for individual chemicals before accidents occur. These procedures will be given on the Materials Safety Data Sheet (MSDS) for the specific chemical compound.

Corrosives are chemical compounds that destroy the structural integrity of other materials. Some corrosive materials can eat away metals, others cause severe injury and death to living tissue. The name or structure of a chemical alone is not sufficient to identify a substance as a corrosive. For example, strong acids are corrosives, but not all acids are corrosives. Boric acid, for example, is used as an eyewash. If a substance is defined as a corrosive, this will be recorded on the warning labels and on the Material Safety Data Sheet (MSDS).

Some corrosives are extremely dangerous and can cause skin destruction in less than three minutes after exposure. Others are regarded as presenting a medium hazard if they cause skin destruction within three to 60 minutes after exposure. Other corrosives are regarded as presenting a minor degree of hazard. The degree of hazard or damage a corrosive can inflict is dependent upon its reactivity, the concentration of the chemical, and the duration of exposure.

Corrosives can present multiple threats to humans. Some can be hazardous not only as corrosives, but are toxic also through inhalation and skin absorption. They can react with other chemicals, causing an increased hazard situation. Some may decompose at high temperatures and release toxic gases or react with water or moisture in the air and release hazardous substances. Certain corrosives are also flammable liquids or oxidizing materials.

Because corrosives are so reactive, their containers must be made of materials that cannot corrode. It is important to make sure that corrosives do not leak and that they are stored away from materials with which they could react violently.

The safe handling and use of corrosives should be based upon avoiding contact with them. If there is a possibility of contact, the chemical should be analyzed for any vapor inhalation hazards or reaction with mucous tissues. Protective equipment must also be used when handling corrosives. In emergency situations involving corrosives, immediate action is essential because the longer the contact, the greater the damage to body tissues. Planning and training for emergency response procedures should be conducted before the emergency occurs.

Although no single chemical class can be defined as a solvent, it is natural to consider solvents as a group because of their common characteristics for handling, use, and storage. Because solvents are used to dissolve other materials, they are used as cleaning fluids, for degreasing agents, and for extracting soluble materials from raw materials. Solvents are also important in chemical processing, and many different types are used in industry. Water is the most common solvent; it dissolves a wide range of substances.

Many solvents are flammable liquids and, as such, they present a safety hazard. Because vapors may form combustible or explosive atmospheres, precautions must be taken to eliminate electrical sparks or other forms of ignition. The storage area for solvents should be constructed of fireproof materials and designed to contain fire. Solvents should be stored away from other chemicals (e.g. oxidizers) with which they could react.

In addition to safety hazards, solvents can pose any of the health hazards identified in the OSHA Standard. These include carcinogens, corrosives, highly toxic substances, irritants, sensitizers, toxic substances, and compounds with target organ effects. All substances posing one of these health hazards should have a warning label, and information will also be available on the Materials Safety Data Sheet (MSDS).

Because almost all organic solvents, if inhaled, will have an anesthetic effect leading to wooziness, sleepiness, or unconsciousness, adequate ventilation must be provided in work areas where solvents are used. Chemical contact with the skin should be avoided because solvents remove the protective oils in the skin, and some are capable of penetrating the skin. Exposure to many of the solvents can result in systemic or target-organ damage, particularly to the liver and blood-forming organs. The use of protective equipment should be discussed with all employees working with solvents.

A gas is a physical state of matter that tends to fill the available space. If it is confined in a container, it will expand to fill the total container; if it is free in the air, it will diffuse to fill the confining space, such as a room or building. Gases can pose the same physical hazards associated with materials which are kept at high pressure or are readily flammable. Gases can be liquified by subjecting them to higher pressure or by lowering their temperature. The ease with which this can be done depends on the molecular weight and the chemical structure of the material.

The health hazards identified by the OSHA Hazard Communication Standard are carcinogens, corrosives, toxins, irritants, sensitizers, and substances affecting target organs. If a gaseous substance presents one of these health hazards, the OSHA Standard requires this to be listed on the hazard label and on the Material Safety Data Sheet (MSDS). When a substance is in a gaseous state, the exposure hazard automatically is increased because of the greater possibility of inhalation and of eye and skin contact.

Many gases are heavier than air, and, therefore, they will form layers at the lowest level they can reach. Concentrations at the floor level or in equipment wells may reach high levels. Inert or non-toxic gases can displace air and collect in concentrations which can be suffocating.

Working with pressurized substances can present problems if care is not exercised. Leakage of flammable gases can result in the formation of explosive atmospheres; therefore, precautions should be taken to eliminate static or electrical sparks in the work place. Flammable gases should be stored away from combustible materials, oxidizers, and explosives.

Planning and training for emergency response procedures should be conducted before an emergency occurs. There are recommended general actions, including removing employes from the contamination source and diluting the compounds. Other emergency response measures include isolating and containing the gaseous materials. A special cleanup may be required because it may be unsafe to vent the hazardous gases to the atmosphere.

EXPLOSIVES

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An explosive is a chemical compound or mixture of compounds which suddenly undergoes a rapid chemical transformation with the simultaneous production of large quantities of heat and gases. Explosive reactions can be initiated by ignition or shock. The severity of the reaction depends upon the specific compound and upon the conditions present.

In addition to the actual hazards of an explosion, there is a hazard of explosive conditions in the work place. Concentrations of vapor from flammable substances may build up to form combustible or explosive atmospheres. There is a lower concentration limit called the lower explosion limit (LEL) which must be reached before the mixture becomes explosive. There is also an upper explosion concentration, called the upper explosion limit (UEL). This upper concentration denotes the level where the mixture becomes too fuel-rich to burn (not a significant consideration in a safety program).

Although mixtures of gases and vapors with air are the principal hazards associated with fire and explosion, explosive mixtures can also be formed with dust particles. Flour mills have a serious problem controlling airborne particles in order to reduce the risk of dust explosions. The use of chemical equipment can also pose explosive hazards; for example, pressure can build up in pumping operations or in distillation columns and cause an explosion. Also, many chemical reactions result in a release of heat; the heat will, in turn, accelerate the reaction which eventually may cause an explosive blast.

The primary hazard posed by explosives is the physical one of detonation. Some explosive compounds have additional health risks (e.g., nitroglycerin and dinitrophenol are toxic). Hazard warning information must be available on container labels and on the Material Safety Data Sheet (MSDS).

When working with explosives, it is essential to have a good fire prevention program. Areas where explosives are handled and stored must be free of ignition sources. Non-sparking tools must be used and electrical circuits must be safeguarded against short circuits and sparking. Routine personal equipment is not likely to be effective against an explosion, but will be required in fire-fighting operations or in toxic atmospheres.

Carcinogens are chemical substances that cause cancer or are suspected as causing cancer as defined by OSHA. According to the OSHA standard, a chemical compound is considered to be a carcinogen if it has been (1) evaluated by the International Agency for Research on Cancer and found to be a carcinogen or potential carcinogen, (2) listed in the Annual Report on Carcinogens published by the National Toxicology Program as a carcinogen or potential carcinogen, or (3) regulated by OSHA as a carcinogen.

Cancerous body cells start reproducing and continue to do so out of control, leading to the formation of tumors. The causes of cancer are not definitely known, although many of them are thought to be attributable to lifestyle or environmental factors. Exposure to some compounds is correlated with cancer development. There is a broad range of effects which are dependent upon the dose levels and the duration of exposure.

The problem of cancer initiation is extremely complex because the causes are uncertain and include a combination of factors, for example, individual susceptibility. In addition, some cancers may not become active for twenty years or more, so it is difficult to trace the cause to the effect.

In some cases, correlations have been shown to exist between exposure to certain chemicals and the occurrence of cancer in particular organs. The liver, which is the body's principal detoxification organ, is particularly susceptible. According to the OSHA standard, if a carcinogen affects target organs, this fact must be noted on hazard warning labels and on Material Safety Data Sheets (MSDS).

A mandatory system of controls has been established for regulated substances. Some of these provisions are reviewed in the videotape (e.g., establishment of a controlled area for any work environment where carcinogens are processed, used, handled, or stored).

Further measures, such as the use of personal protective clothing and equipment, may be required. It is important to remember that carcinogens should be stored away from other materials and access to them should be strictly controlled.

APPENDIX X

Supervisor's Training Form

HAZARD COMMUNICATION STANDARD TRAINING REQUIREMENTS RECORD

Employee's Name _____ Badge # _____

Job Title _____ Dept. Name _____

Initial Hire Date _____ Date Started Work In This Job. _____
month/year month/day/year

Training For Employees Who May Be Exposed To Hazardous Chemicals Under Normal Operating Conditions or Foreseeable Emergencies

1. Employee knows the location of the MSDS for his/her work area.
2. Employee knows any operation, process, or piping in his/her work area where hazardous materials are present.
3. Employee knows emergency procedures in case of exposure or release of a hazardous material in his/her work area.
4. Employee knows to ask his/her supervisor if any questions arise concerning hazardous materials or conditions.
5. Employee has reviewed MSDS on the following materials: _____

Employee initial _____ Date _____ Supervisor initial _____

Comments _____

Instructions: 1. This form must be completed by the supervisor for all new employees, transferees, and all current employees.

2. This form must be completed by the supervisor for each employee whenever a new hazardous material that requires some type of control, ie. ventilation or use of a respirator, is introduced into the employee's work area.