
**HAZARD
COMMUNICATION
PROGRAM**

**UNIVERSITY OF HAWAII AT
MANOA**

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HAZARD COMMUNICATION PROGRAM

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1.0 Introduction

The University of Hawaii is committed to providing a safe and healthful environment for all employees. Consistent with this commitment, we have developed a Hazard Communication Program.

One of our primary concerns is the safe handling and use of chemicals throughout the University to minimize or prevent potential exposure. Potential hazards in the environment include materials that cause fire or explosion or produce injury by inhalation, skin or eye contact, or ingestion. One of the benefits of this program is that workers will know the hazards of chemicals they are working with. This program introduces a set of procedures designed to minimize the risk of chemical exposure and keep us in compliance with the State of Hawaii Division of Occupational Safety and Health (HIOSH) Hazard Communication Standard (HazCom). In keeping with this program, the health of the worker is a primary concern.

The written HazCom program is provided to each department and includes the following:

- . Description of how labels, Material Safety Data Sheets and training are used to inform employees
- . Description of the method the University uses to inform employees about the hazards of non-routine tasks and unlabeled pipes
- . Description of how the University informs contractors of hazardous substances that they may encounter
- . Standardized form for chemical inventory listing to be followed by each supervisor

This written program is available for review by any interested employee, or representative of any employee. Any questions about this program should be addressed to the EHSO. This program is monitored and audited by the EHSO to ensure that the policies are carried out and that the program is effective.

2.0 Program Administration

Each supervisor shall be responsible for implementing the provisions of this program. All training required under the standard shall be provided at no cost to the employee.

The Industrial Hygienist from the UHM Environmental Health and Safety Office shall assist the departments with the implementation and maintenance of the HazCom Program.

3.0 An Overview of the Program

The HazCom Program consists of the following elements:

1. Inventory of Hazardous Chemicals

An inventory of all hazardous chemicals used in each department is developed. The inventory is to be updated at least annually, with obsolete items removed and new items added as necessary.

2. Material Safety Data Sheets (MSDS)

Each supervisor is responsible for obtaining, filing, updating and placing in appropriate work areas a Material Safety Data Sheet for each chemical on their inventory.

3. Warning Labels on All Containers of Hazardous Materials

Each supervisor is to label all containers of chemicals with both the contents of the containers and hazard warnings.

4. Hazard Communication Training

Each supervisor is responsible for training their employees on the elements of the HazCom Program.

4.0 Hazardous Substance Inventory

Each supervisor is responsible for maintaining an inventory of all chemicals used in its operation. Appendix A and B are provided as guides for determining which substances are considered hazardous.

The name on the inventory form should correspond to the product identity found on the label and MSDS. The hazardous materials inventory form provided in Exhibit 1A may be used by the department. The inventory list indicates if the

substance has an appropriate label and if the MSDS is on site. In the future, if chemicals are received and/or discontinued, this inventory should be revised accordingly.

4.1 Updating the Inventory Lists

Inventories are to be kept current. Once a list has been compiled, it must be updated. The updating should take into account two changes:

- . Products that are no longer used (providing that on-hand stocks have been used up)
- . New products that have been added annually

5.0 Labels

5.1 Labeling Requirements

All containers of hazardous substances must be labeled to provide HazCom information. The manufacturer, distributor or importer is responsible for labeling their products prior to shipment to their customers. The label on original containers must provide the following information:

- . Identity of the hazardous substance(s)
- . Appropriate hazard warning(s)
- . Name and address of manufacturer

Correct labeling is verified upon receipt of any chemical material by the receiving department. If the receiving department has any questions as to the acceptability of a label, questions may be addressed to the ESHO.

5.2 Incomplete or Missing Labels

If a material is received with inadequate labelling, the department is responsible for notifying the supplier and acquiring an acceptable label. The supervisor is responsible for ensuring that chemicals in the work area are appropriately labeled.

5.3 Secondary Containers

Sometimes hazardous substances are transferred from original containers to secondary containers such as test tubes, vials, beakers, etc.. The labels on secondary containers must include the identity of the hazardous substance(s) and appropriate hazard warnings.

For example:

- . Apply an extra copy of the manufacturer's label to the secondary container
- . Copy the chemical identity and hazard warning information from the manufacturer's labels onto a blank label, and affix it to the secondary container(s)

Containers must be labeled clearly with the appropriate information. The supervisor is responsible for verifying correct labeling of the secondary containers.

5.4 Use of Labels

Labels are intended to be an immediate warning and a reminder of the information provided by the MSDS and training program. The labels should be read before the chemicals are handled. If the precautions specified by the label are unfamiliar, employees are encouraged to consult the MSDS for further information or contact their supervisor or the EHSO.

6.0 Material Safety Data Sheet

6.1 Information Requirements

As with labels on original containers, MSDSs are prepared by the manufacturer, distributor or importer of products containing hazardous substances. The MSDSs provide detailed information about the product as listed below:

- . Chemical composition
- . Physical characteristics and chemical properties
- . Fire, explosion and reactivity hazards
- . Health hazard information and symptoms of overexposure
- . Emergency first aid procedures
- . Protective equipment recommendations
- . Handling and storage precautions
- . Cleanup and disposal procedures

We rely on the manufacturer, importer or distributor to evaluate the hazards of materials. Hazard evaluation information is provided on the MSDS. The HIOSH HazCom Standard requires all chemical manufacturers and distributors of hazardous chemicals to furnish a MSDS with each initial shipment to each location and furnish new MSDS information. Appendix D provides a sample MSDS along with the explanation of each section.

6.2 Location and Accessibility of Material Safety Data Sheets

Each supervisor is responsible for maintaining copies of all MSDSs for their products. Since employees in some departments are highly mobile, copies of MSDS may be available at a centralized location and must be readily available to employees during all hours of operation. MSDSs are also available to medical personnel; State and Federal occupational safety and health officials, and ESHO personnel. Employees are encouraged to refer to the MSDSs for information on products in their work area.

6.3 Obtaining Material Safety Data Sheets

For new materials or materials without a MSDS on file, the purchase order should include a statement requiring that a MSDS accompany shipment of hazardous materials. All MSDSs received by each department must be reviewed for completeness and included into the MSDS file by the supervisor. If a MSDS is not available in the department files, then the department must send a letter to the manufacturer.

A new material cannot be distributed or used until the department has received the MSDS and communicated the MSDS information to the employees.

6.4 Incomplete or Missing Material Safety Data Sheet

If the MSDS is missing or incomplete the department should send a letter to the manufacturer requesting one.

If no response is received within twenty five (25) working days of the request, a copy of the request with a notation that no response has been received is sent to the State of Hawaii, HIOSH office.

The department shall keep copies of all correspondence and request letters on file.

7.0 Training

7.1 Employee Training

Each supervisor provides employee training to their employees upon their assignment to a work area where hazardous substances are present. The information provided during this session includes the following:

- . The requirements of the HazCom Standard, including all employee's rights to information and non-discrimination
- . An explanation of the MSDS and information it contains
- . The location and availability of the written HazCom program and MSDSs
- . How to read labels and how to use the information they contain
- . Operations in the work area where hazardous substances are present
- . The physical and health hazards of the chemicals in the work area
- . Methods and observation techniques used to detect the presence or release of hazardous substances in the work area
- . Measures employees can take to protect themselves from and minimize exposure to hazardous substances
- . Emergency first aid procedures

A detailed outline of the HazCom training is provided in Exhibit 1C.

7.2 Refresher/On-going Training

When new hazardous substances are introduced and/or new hazard information becomes available on the materials used in the work area, the supervisor reviews with their employees the items outlined in Section 7.2 (as applicable).

The supervisor contacts the EHSO if employees have questions they cannot answer.

7.3 Documentation

Each department must maintain a list of each employee who has completed HazCom training. This list, along with the training date and contents of the training is kept on file in the department and in each employee's personnel file. The form in Exhibit 1C may be used to document training.

8.0 Non-routine Tasks

Occasionally, employees may be required to do jobs which are not part of their everyday work schedule. These jobs are termed non-routine tasks.

Each supervisor is responsible for informing employees of the hazards associated with the specific task prior to performance of the assigned project. The information provided by the supervisor includes:

- . Chemical and physical hazards of the job
- . Precautionary measures to be taken
- . Available control measures
- . Personal protective equipment required
- . Emergency procedures

Examples of a non-routine tasks that may be performed by employees include cleanup of spills, asbestos removal and other tasks.

9.0 Chemicals in Unlabelled Pipes

Prior to starting work on unlabelled pipes, employees are required to contact their supervisor for information on:

- . Chemicals in the pipe
- . Potential hazards
- . Safety precautions that must be taken

10.0 Informing Contractors

Independent contractors may work at the University in areas where hazardous substances are used. To ensure that contractors work safely, they are given the following information by the University contact person.

- . List of the hazardous substances to which they may be exposed while performing their work
- . Explanation of the precautions their employees may take to lessen the risk of exposure

Additionally, the University requires contractors to provide MSDSs for the chemicals they bring on site. The MSDS must be sent to the ESHO.

APPENDIX A

CRITERIA FOR EVALUATING HAZARDOUS MATERIALS

Defining "Hazardous"

The criteria used to define chemicals as "hazardous" have evolved from several properties that are harmful to people and property. The most obvious of these criteria are the following:

- . Flammable - The material can catch fire or explode.
- . Toxic - The material can be harmful if individuals are exposed to it briefly or over long periods of time. The exposure could come about through ingestion (swallowing it), inhalation, or absorption through the skin or eyes.
- . Reactive - The material can release harmful by-products if subjected to certain environmental changes such as heat or pressure.
- . Corrosive - The material has caustic or acid-like properties.

How These Criteria Relate to Material Data Safety Data Sheets

Materials that fall into any of the above categories are to be considered "hazardous," but may be identified in different sections of the Material Safety Data Sheets, depending on the specific hazard. The guidelines:

<u>Hazard</u>	<u>Listing Category</u>
Flammable	Section IV: "Fire and Explosion Data"
Toxic	
Hazardous when inhaled	Section II - "Hazardous Ingredients"
	Section V - "Health Hazard Information"
Hazardous when ingested or absorbed through skin	Section V
Reactive	Section VI
Corrosive	Section V

Determining Degree of Hazard

The following guidelines should be followed when evaluating the flammability or inhalation toxicity of a material.

- . Flash Point - The temperature to which the substance must be heated (under defined conditions) before a flame will ignite the vapor above the substance.

The following degrees of hazard have been established:

Combustible liquid - A liquid having a flash point at or above 100 degrees Fahrenheit (37.8 degrees Centigrade).

Combustible liquids are subdivided as follows:

Class II liquids shall include those having flash points at or above 100 degrees Fahrenheit (37.8 degrees Centigrade) and below 140 degrees Fahrenheit (60 degrees Centigrade).

Class IIIA liquids shall include those having flash points at or above 140 degrees Fahrenheit (60 degrees Centigrade) and below 200 degrees Fahrenheit (93 degrees Centigrade).

Class IIIB liquids shall include those having flash points at or above 200 degrees Fahrenheit (93 degrees Centigrade).

Flammable liquid - a liquid having a flash point below 100 degrees Fahrenheit (37.8 degrees Centigrade) and having a vapor pressure not exceeding 40 lbs. per square inch (absolute) (2,068 mm Hg) at 100 degrees Fahrenheit (37.8 degrees Centigrade) shall be known as a Class I liquid.

Class I liquids shall be divided as follows:

Class IA shall include those having flash points below 73 degrees Fahrenheit (22.8 degrees Centigrade) and having a boiling point below 100 degrees Fahrenheit (37.8 degrees Centigrade).

Class IB shall include those having flash points below 73 degrees Fahrenheit (22.8 degrees Centigrade) and having a boiling point at or above 100 degrees Fahrenheit (37.8 degrees Centigrade).

Class IC shall include those having flash points at or above 73 degrees Fahrenheit (22.8 degrees Centigrade) and below 100 degrees Fahrenheit (37.8 degrees Centigrade).

Note: Information taken from the National Fire Codes 1986, Vol. 1, "Flammable and Combustible Liquid Code (NFPA 30-1989)," National Fire Protection Association.

Toxicity

The following cases are commonly used when describing levels of toxicity:

Combined Tabulation of Toxicity Classes*

Commonly Used Term	LD Single Oral Dose for (g/kg)	4-hour Vapor Exposure Causing 2 to 4 Deaths in 6 Rat Groups (ppm)	LD Skin for Rabbits (g/kg)	Probable Lethal Dose For Man
Extremely Toxic	0.001 or less	Less than 10	0.005 or less	Taste (1 grain)
Highly Toxic	0.001 to 0.05	10 to 100	0.005 to 0.043	1 tsp. (4 cc)
Moderately Toxic	0.05 to 0.5	100 to 1000	0.044 to 0.340	1 oz. (30 gm)
Slightly Toxic	0.5 to 5.0	1000 to 10,000	0.35 to 2.81	1 pint (250 gm)
Practically Non-Toxic	5.0 to 15.0	10,000 to 100,000	2.82 to 22.6	1 quart
Relatively	>15.0	>100,000	>22.6	> 1 quart

* Information taken from Olishifski, J.B., ed., Fundamentals of Industrial Hygiene. 2nd ed. Chicago: National Safety Council, 1979.

APPENDIX B

LISTING HAZARDOUS CHEMICALS

HOW TO IDENTIFY HAZARDOUS CHEMICALS

Hazard Determination

The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer of a chemical. As a user of chemicals, you may rely on the evaluation received from these suppliers through labels on containers and MSDS.

Definition

A hazardous chemical is defined as any chemical which is a physical or health hazard. This includes chemicals which are combustible liquid, compressed gas, explosive, flammable, organic peroxide, oxidizer, pyrophoric, unstable (reactive), water reactive, toxic, highly toxic, carcinogen, reproductive toxin, irritant, corrosive, sensitizer, hepatotoxin, nephrotoxin, neurotoxin agents which act on the hematopoietic (blood forming) system, and agents which damage the lungs, skin, eyes or mucous membranes.

Minimum List ("Floor List")

A Minimum List of hazardous chemicals, often called the "floor list" is provided in Appendix C. At a minimum the following chemicals are considered hazardous:

- . Regulated by OSHA in 29 CFR Part 1910 Subpart Z
- . Included in the American Conference of Governmental Industrial Hygienist (ACGIH) latest edition of Threshold Limits Values For Chemical Substances and Physical Agents in the Work Environment
- . Listed in the latest edition of the National Toxicology Program's Annual Report on Carcinogens
- . Listed in the latest edition of the International Agency for Research on Cancer (IARC) monographs

Mixtures

If a mixture is not evaluated specifically by the manufacturer or importer, assume it is hazardous if the mixture meets any of the following:

- . Contains 1% or more of any chemical in the floor list
- . Contains 0.1% or greater of a carcinogen
- . Under conditions of use, the mixture could release concentrations that exceed recommended or legal exposure limits of any component

Mixtures produced by work operations such as fumes, vapors or dusts should also be evaluated using these guidelines.

CONSUMER PRODUCTS

Consumer products purchased for employee use are considered hazardous if they fit the definition of hazardous chemical(s).

HOW TO LIST CHEMICALS IN THE WORKPLACE

- . List all hazardous chemicals known to be present in your workplace. Use a name that appears both on the MSDS and the container label. A convenient form is provided in Exhibit 1A.
- . The list is to be an inventory of everything for which a MSDS must be obtained. It will be part of the written program, and must be available to employees upon request.
- . In addition to obvious chemicals such as solvents, one should also include commercial products such as adhesives, aerosols, cleaning agents, detergents, glues, inks, janitorial supplies, paints and surfactants.

Appendix C

Minimum List ("Floor List") of Known Hazardous Substances and Designator

SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
Acetaldehyde	X	X		X	Benzyl chloride	X	X		
Acetic Acid	X	X			Benzotrichloride				X
Acetic Anhydride	X	X			Benzyl violet				X
Actinolite asbestos	X		X	X	Beryl		X		X
Actinomycin D				X	Beryllium and Beryllium Compounds	X	X	X	X
Acetone	X	X			Beryllium oxide				X
Acetonitrile	X	X			Beryllium sulphate				X
2-acetylaminofluorene	X		X		Biphenyl (diphenyl)	X	X		
Acetylene		X			BCNU (Bischloroethyl nitrosourea)			X	X
Acetylene tetrabromide	X	X			N,N-bis(2-chloroethyl)-2-naphthylamine			X	X
Acetylsalicylic acid (Aspirin)		X			Bis (chloromethyl) ether				X
Acrolein	X	X			Bismuth Telluride Sedoped		X		
Acrylamide	X	X	X	X	Borates, Tetra, Sodium Salts		X		
Acrylic Acid		X			Boron Oxide	X	X		
Acrylonitrile	X	X	X	X	Boron tribromide		X		
Adriamycin			X	X	Boron trifluoride	X	X		
Aflatoxins			X	X	Bromacil		X		
Aldrin	X	X			Bromine	X	X		
Allyl Alcohol	X	X			Bromine pentafluoride		X		
Allyl Chloride	X	X			Bromoform	X	X		
Allyl Glycidyl Ether (AGE)	X	X			1-3-butadiene	X	X	X	X
Allyl Propyl Disulfide	X	X			Butane		X		
Alumina		X			1,4-Butanediol dimethane sulfonate			X	X
Alumina (metal, fume, cmpds)		X			2-Butanone (methyl ethyl ketone)	X	X		
2-Aminoanthraquinone			X		2-Butoxyethanol	X	X		
o-Aminoazotoluene			X	X	n-Butyl acetate	X	X		
4-Aminodiphenyl	X	X	X	X	sec-Butyl Acetate	X	X		
1-Amino-2-methyl-anthraquinone			X		tert-Butyl acetate	X	X		
2-Amino-3-methyl-9H-pyrido[2,3-b] indole				X	Butyl acrylate		X		
2-Amino-6-methyl dipyrido[1,2-a:3',2'-d]imidazole				X	n-Butyl alcohol	X	X		
2-Amino-5-(5-nitrofuryl)-1,3,4-thiadazole				X	sec-Butyl alcohol	X	X		
2-Amino-9H-pyrido [2,3-b] indole				X	tert-Butyl alcohol	X	X		
2-Amino dipyrido[1,2-a:3',2'-d]imidazole				X	Butylated hydroxyanisole				X
2-Aminopyridine	X	X			Butylamine	X	X		
Amitrole		X	X	X	tert-Butyl chromate (as CrO3)	X	X		
Ammonia	X	X			n-Butyl glycidyl ether (BGE)	X	X		
Ammonium Chloride Fume		X			n-Butyl lactate		X		
Ammonium Sulfamate (Ammate)	X	X			Butyl mercaptan	X	X		
Amosite asbestos	X	X	X	X	o-sec-butylphenol		X		
n-Amyl acetate	X	X			p-tert-Butyltoluene	X	X		
sec-Amyl acetate	X	X			B-butyrolactone				X
Aniline	X	X			Cadmium dusts and fumes	X	X		X
Anisidine (o,p-isomers)	X	X	X	X	Cadmium Compounds (Cd)			X	X
o-Anisidine Hydrochloride			X		Cadmium chloride				X
Anthracene oils				X	Cadmium oxide fume		X	X	X
Antimony & Compounds, as Sb	X	X			Cadmium sulphate			X	X
Antimony Trioxide		X			Cadmium sulphide			X	X
Anthophyllite asbestos	X	X	X	X	Calcium arsenate		X		
ANTU (alpha naphthyl thiourea)	X	X			Calcium carbonate			X	X
Aramite			X	X	Calcium chromate		X		
Argon		X			Calcium cyanamide		X		
Aroclor 1260			X		Calcium hydroxide		X		
Arsenic Organic Compounds	X		X		Calcium oxide	X	X		
Arsenic & Soluble Compounds		X	X		Calcium silicate		X		
Arsenic & Certain Arsenic Compounds			X	X	Calcium sulfate		X		
Arsenic Inorganic	X		X	X	Camphor, synthetic	X	X		
Arsenic Trioxide Production		X			Caprolactam		X		
Arsine	X	X			Captadol		X		
Asbestos	X	X	X	X	Captan		X		
Asphalt (Petroleum fumes)		X			Carbaryl (Sevin)	X	X		
Atrazine		X			Carbofuran		X		
Auramine			X	X	Carbon black	X	X		
Azaserine				X	Carbon dioxide	X	X		
Azathioprine			X	X	Carbon disulfide	X	X		
Azinphos-methyl	X	X			Carbon Monoxide	X	X		
Barium (soluble compounds)	X	X			Carbon tetrabromide		X		
Barium chromate				X	Carbon tetrachloride	X	X	X	X
Benomyl		X			Carbonyl fluoride		X		
Benz(a)anthracene			X	X	Catechol		X		
Benzene	X	X	X	X	Cellulose (paper fiber)		X		
Benzidine	X	X	X	X	Cesium hydroxide		X		
Benzoyl peroxide	X	X			Chlorambucil			X	X
Benzo(k)fluoranthene			X	X	Chloramphenicol				X
Benzo(b)fluoranthene			X	X	Chlordane	X	X		
Benzo(i)fluoranthene			X	X	Chlordecone (kepone)			X	X
Benzo(a)pyrene		X	X	X	1, (2-chloroethyl)-3-cyclohexy-1 nitrosourea (CCNU)				X
					Chlorendic acid			X	

Appendix C

Minimum List ("Floor List") of Known Hazardous Substances and Designator

SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
Chlorinated camphene	X	X			Cyclopentadiene		X	X	
Chlorinated diphenyl oxide	X	X			Cyclopentane			X	
Chlorine	X	X			Cyclophosphamide				X X
Chlorine dioxide	X	X			Cyhexatin			X	
Chlorine trifluoride	X	X			2,4-D		X	X	
Chloronaphazine			X	X	Dacabazine				X X
Chloroacetaldehyde	X	X			Daunomycin				X
Chloroacetophenone (phenacyl chloride)	X	X			DDT (Dichlorodiphenyl-trichloroethane)	X	X	X	X
Chloroacetyl chloride		X			DDVP		X		
Chlorobenzene (monochlorobenzene)	X	X			Decaborane		X	X	
o-Chlorobenzylidene Malonitrile (OCBM)	X	X			Decabromobiphenyl				X
Chlorobromomethane	X	X			Demeton		X	X	
Chlorodifluoromethane		X			Diacetone Alcohol		X	X	
Chlorodiphenyl (42% chlorine)	X	X			N,N'-diacetylbenzidine				X
Chlorodiphenyl (54% chlorine)	X	X	X		2,4,-diaminoanisole sulfate				X X
Chloroethyl cyclohexyl nitrosourea			X		4,4'-diaminodiphenyl ether				X X
Chloroform (trichloromethane)	X	X	X	X	2,4-diaminotoluene				X X
bis-Chloromethyl ether		X		X	Diazinon			X	
Chloromethyl methyl ether		X	X	X	Diazomethane		X	X	
Chloromethyl propene			X		Dibenz(a,h) Acridine				X X
1-chloro-1-nitropropane	X	X			Dibenz(a,j) Acridine				X X
4-chloro-o-phenylenediamine				X	Dibenz(a,h) Anthracene				X X
Chloropentafluoroethane		X			7H-dibenzo(c,g) Carbazole				X X
Chlorophenols				X	Dibenzo(a,e) pyrene				X X
Chloropicrin	X	X			Dibenzo(a,h) pyrene				X X
Chloroprene	X	X			Dibenzo(a,i) pyrene				X X
o-Chlorostyrene		X			Dibenzo(a,l) pyrene				X X
o-Chlorotoluene		X			Diborane		X	X	
p-Chloro-o-toluidine				X	1,2-dibromo-3-chloropropane		X		X X
Chlorpyrifos		X			1,2-dibromoethane				X
Chromium metal	X	X	X		2-N-Dibutylaminoethanol			X	
Chromium (II) Compounds		X	X		Dibutyl phosphate		X	X	
Chromium (III) Compounds		X	X		Dibutyl phthalate		X	X	
Chromium (VI) Compounds		X	X		Dichloroacetylene			X	
Chromium Compounds			X		o-Dichlorobenzene		X	X	
Chromium sol. Chromic, chromous salts	X			X	p-Dichlorobenzene		X	X	X
Chromic Acid and chromates	X			X	3,3'-dichlorobenzidine and salts		X	X	X X
Chromyl chloride		X			3,3'-dichloro-4,4'-diaminodiphenyl ether				X
Chrysene		X			Dichlorodifluoromethane		X	X	
Chrysotile asbestos	X	X	X	X	1,3-dichloro-5,5-dimethyl hydantoin		X	X	
C.I. Basic Red			X		1,1-dichloroethane		X	X	
C.I. Direct Black 38			X	X	1,2-dichloroethane (ethylene dichloride)		X	X	X X
C.I. Direct Blue 6			X	X	1,2-dichloroethylene		X	X	
C.I. Direct Brown 95				X	Dichloroethyl ether		X	X	
C.I. Disperse Orange 11			X		Dichlorofluoromethane		X	X	
Citrus Red #2				X	1,1-dichloro-1-nitroethane		X	X	
Cisplatin				X	2,4-Dichlorophenol				X
Clopidol		X			Dichloropropene			X	X X
Coal Dust	X	X			2,2-dichloropropionic acid			X	
Coal soot			X	X	Dichlorotetrafluoroethane		X	X	
Coal Tar Pitch Volatiles	X	X	X	X	Dichlorvos			X	
Cobalt Dust & Fume	X	X			Dicrotophos			X	
Cobalt Carbonyl		X			Dicyclopentadiene			X	
Cobalt chromium alloys			X	X	Dicyclopentadienyl iron			X	
Cobalt hydrocarbonyl		X			Dieldrin		X	X	
Coke oven emissions	X		X		Dienestrol				X
Copper - Fume, Dusts & Mists (Cu)	X	X			Diepoxybutane				X X
Cotton Dust (raw)	X	X			Diethanolamine			X	
Crag (herbicide)	X				Diethylamine		X	X	
Creosote			X	X	Diethylaminoethanol		X	X	
p-Cresidine			X	X	Diethylene triamine			X	
Cresol, All isomers	X	X			Di(2-ethylhexyl)phthalate				X X
Crotonaldehyde	X	X			1,2-diethylhydrazine				X
Cruformate		X			Diethyl ketone			X	
Cumene	X	X			Diethyl phthalate			X	
Cupferran			X		Diethylstilbestrol				X X
Cutting oils			X	X	Diethyl sulphate				X
Cyanamide		X			Difluorodibromomethane		X	X	
Cyanides (as CN)	X	X			Diglycidyl ether (DGE)		X	X	
Cyanogen		X			Diglycidyl resorcinol ether				X X
Cyanogen chloride		X			Dihydrosafrole				X
Cycasin			X	X	Diisobutyl ketone		X	X	
Cyclohexane	X	X			Diisopropylamine		X	X	
Cyclohexanol	X	X			3,3'-dimethoxybenzidine (o-Dianisidine)				X X
Cyclohexanone	X	X			Dimethyl acetamide		X	X	
Cyclohexene	X	X			Dimethylamine		X	X	
Cyclohexylamine		X			4-dimethylaminoazo-benzene				X X
Cyclonite		X			2(dimethylamino)Methylimino)-5-(2-(5-				X

Appendix C

Minimum List ("Floor List") of Known Hazardous Substances and Designator

SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
nitro2-furyl vinyl 1,3,4-oxadiazole					Fenamiphos				X
Dimethylaniline (N,N-dimethylaniline)	X	X			Fensulfothion				X
Dimethyl carbamoyl chloride		X	X	X	Fenthion				X
Dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate (Dibrom)	X				Ferbam		X	X	
Dimethylformamide	X	X			Ferrovanadium dust		X	X	
1,1-dimethylhydrazine	X	X		X	Fibrous glass dust				X
1,2-dimethylhydrazine				X	Fluorides (as F)		X	X	
Dimethylphthalate	X	X			Fluorine		X	X	
Dimethyl sulphate	X	X	X	X	Fluorotrichloromethane		X	X	
Dimethyl vinyl chloride			X		Fonofos				X
Dinitrolmide		X			Formaldehyde (gas)		X	X	X X
Dinitrobenzene (All isomers)	X	X			Formamide				X
Dinitro-o-cresol	X	X			Formic acid		X	X	
Dinitrotoluene	X	X			2-(2-formylhydrazino)-4-(5-nitro-2-furyl)thiazole				X
Dioxane (Diethylene dioxide)	X	X	X	X	Furfural		X	X	
Dioxathion		X			Furfuryl alcohol		X	X	
Diphenyl	X				Gasoline				X
Diphenylamine		X			Germanium tetrahydride				X
1,2-Diphenylhydrazine			X		Glutaraldehyde				X
Dipropylene glycol methyl ether	X	X			Glycerin mist				X
Dipropyl ketone		X			Glycidaldehyde				X
Diquat		X			Glycidol (2,3-epoxy-1-propanol)		X	X	
Direct Black #38			X	X	Graindust				X
Direct Blue #6			X	X	Graphite		X	X	
Direct Brown #95			X	X	Gypsum				X
Di-sec Octyl phthalate (Di-2-ethyl hexylphthalate)	X	X	X		Gyromitrin				X
Disulfiram		X			Hafnium		X	X	
Disulfoton		X			Halothane				X
2,6-Ditert-butyl-p-cresol		X			Helium				X
Diuron		X			Hematite underground mining				X
Divinyl benzene		X			Heptachlor		X	X	
Emery		X			Heptane (n-heptane)		X	X	
Endosulfan		X			Hexabromobiphenyl				X
Endrin	X	X			Hexachlorobenzene				X X
Epichlorohydrin	X	X	X	X	Hexachlorobutadiene			X	
EPN	X	X			Hexachlorocyclohexane isomers				X
Erionite				X	Hexachlorocyclopentadiene			X	
Estradiol			X	X	Hexachloroethane		X	X	
Estrogens, conjugated			X	X	Hexachloronaphthalene		X	X	
Estrone			X	X	Hexafluoroacetone				X
Ethane		X			Hexamethylene diisocyanate				X
Ethanolamine	X	X			Hexamethyl phosphoramidate				X X
Ethenylamine, N-methyl-N-nitroso			X	X	Hexane (n-hexane) other isomers		X	X	
Ethinylloestradiol			X	X	2-hexanone		X	X	
Ethion		X			sec-hexyl acetate		X	X	
2-ethoxyethanol	X	X			Hexylene glycol				X X
2-ethoxyethyl acetate	X	X			Hydrazine		X	X	
Ethyl acetate	X	X			Hydrazine sulfate				X
Ethyl acrylate	X	X	X	X	Hydrazobenzene				X
Ethyl alcohol (ethanol)	X	X			Hydrogen				X
Ethylamine	X	X			Hydrogenated terphenyls				X
Ethyl amyl ketone	X	X			Hydrogen bromide		X	X	
Ethyl benzene	X	X			Hydrogen chloride		X	X	
Ethyl bromide	X	X			Hydrogen cyanide		X	X	
Ethyl butyl ketone	X	X			Hydrogen fluoride (as F)		X	X	
Ethyl carbamate				X	Hydrogen peroxide		X	X	
Ethyl chloride	X	X			Hydrogen selenide		X	X	
Ethyl carbamate			X		Hydrogen sulfide		X	X	
Ethylene		X			Hydroquinone		X	X	
Ethylene chlorohydrin	X	X			2-Hydroxypropyl acrylate				X
Ethylenediamine	X	X			Indene				X
Ethylene dibromide	X	X	X	X	Indeno (1,2,3 cd) pyrene				X X
Ethylene dichloride	X	X	X	X	Indium & Compounds, as In				X
Ethylene glycol		X			Iodine		X	X	
Ethylene glycol dinitrate	X	X			Iodoform				X
Ethylene oxide	X	X	X	X	IQ (amino-3-methylimidazo[4,5-f]quinoline				X
Ethylene thiourea			X	X	Iron dextran complex				X X
Ethylenimine	X	X			Iron oxide fume (Fe2O3)		X	X	
Ethyl ether	X	X			Iron pentacarbonyl				X
Ethyl formate	X	X			Iron salts soluble (Fe)				X
Ethylidene norbornene		X			Isoamyl acetate		X	X	
Ethyl mercaptan	X	X			Isoamyl alcohol		X	X	
Ethyl methanesulphonate				X	Isobutyl acetate		X	X	
N-ethylmorpholine	X	X			Isobutyl alcohol		X	X	
Ethyl silicate	X	X			Isooctyl alcohol				X
Ethylene thiourea			X	X	Isophorone		X	X	

Appendix C

Minimum List ("Floor List") of Known Hazardous Substances and Designator

SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
Isophorone diisocyanate		X			4,4'-methylene dianiline		X	X	X
Isopropoxyethanol		X			Methyl ethyl ketone	X	X		
Isopropyl acetate	X	X			Methyl ethyl ketone peroxide		X		
Isopropyl alcohol	X	X			Methyl formate	X	X		
Isopropylamine	X	X			Methyl hydrazine		X		
N-isopropylaniline		X			Methyl iodide	X	X	X	X
Isopropyl ether	X	X			Methyl isoamyl ketone		X		
Isopropyl glycidyl ether (IGE)	X	X			Methyl isobutyl carbinol	X	X		
Isosafrole				X	Methyl isobutyl ketone	X	X		
Kaolin		X			Methyl isocyanate	X	X		
Kepone (chlordecane)		X	X		Methyl isopropyl ketone		X		
Ketene	X	X			Methyl mercaptan	X	X		
Laslocarpine				X	Methyl methacrylate	X	X		
Lead, (dusts and fumes)	X	X			Methyl methanesulphonate				X
Lead acetate			X	X	2-methyl-1-nitroanthraquinone				X
Lead arsenate		X			N-methyl-N'-Nitro-N-nitrosoguanidine				X
Lead chromate		X			Methyl parathion		X		
Lead phosphate			X	X	Methyl propyl ketone	X	X		
Lead subacetate				X	Methyl silicate		X		
Lindane	X	X	X		a-methyl styrene	X	X		
Lithium hydride	X	X			Methylthiouracil				X
L.P.G. (liquified petroleum gas)	X	X			Metribuzin		X		
Magnesite		X			Metronidazole			X	X
Magnesium oxide fume	X	X			Mevinphos (phosdrin)	X	X		
Malathion	X	X			Mica	X	X		
Maleic anhydride	X	X			Micler's ketone			X	
Melphalan			X	X	Mineral Oil, petroleum distillates				X
Manganese (dust and compounds, fume)	X	X			-acid-treated heavy naphthenic				X
Manganese cyclopentadienyl tricarbonyl		X			-acid-treated heavy paraffinic				X
Mercury (organic/inorganic compounds)	X	X			-acid-treated light naphthenic				X
Mercury - elemental		X			-acid-treated light paraffinic				X
Merphalan				X	-heavy naphthenic				X
Mesityl oxide	X	X			-heavy paraffinic				X
Mestranol			X	X	-hydrotreated heavy naphthenic				X
Methacrylic acid		X			-hydrotreated light naphthenic				X
Methane		X			-hydrotreated light paraffinic				X
Methomyl		X			-light naphthenic				X
Methoxsalen w/ultraviolet A therapy				X	-light paraffinic				X
Methoxychlor	X	X			-solvent-dewaxed light naphthenic				X
2-methoxyethanol (methyl cellulosolve)	X	X			-solvent-dewaxed light paraffinic				X
2-methoxyethyl acetate (methyl cellulosolve acetate)	X	X			-solvent-refined light naphthenic				X
4-methoxyphenol		X			-solvent-refined light paraffinic				X
3-Methoxypropylene		X			Mineral oil, petroleum extracts				X
Methyl acetate	X	X			-heavy naphthenic distillate solvent				X
Methyl acetylene (propyne)	X	X			-heavy paraffinic distillate solvent				X
Methyl acetylene-propadiene mixture MAPP	X	X			-light naphthenic distillate solvent				X
Methyl acrylate	X	X			-light paraffinic distillate solvent				X
Methylacrylonitrile		X			-residual oil solvent				X
Methylal	X	X			Mineral oils, acid treated oils				X
Methyl alcohol (methanol)	X	X			-aromatic oils				X
Methylamine	X	X			-mildly hydrotreated oils				X
Methyl n-amyl ketone	X	X			-mildly solvent-refined oils				X
N-methyl aniline		X			-untreated vacuum distillates				X
2-methylazridine				X	-used gasoline-engine oil				X
Methylazoxymethanol acetate				X	Mineral wool fiber		X		
Methyl bromide	X	X			Mirex			X	X
Methyl n-butyl ketone		X			Mitomycin C				X
Methyl cellosolve	X				Molybdenum soluble & insoluble cmpds.	X	X		
Methyl cellosolve acetate	X				Monocrotaline				X
Methyl chloride	X	X			Monocrotophos		X		
Methyl chloroform	X	X			Monomethyl aniline	X			
5-Methyl chrysene			X	X	Monomethyl hydrazine	X			
Methyl 2-cyanoacrylate		X			Morpholine	X	X		
Methyl cyclohexane	X	X			5-(morpholinomethyl)-3(5-nitrofurfurylidene) (amino)2-oxazolidinone				X
Methylcyclohexanol	X	X			Mustard gas			X	X
o-Methylcyclohexanone	X	X			Nafenopin				X
Methyl chloromethyl ether	X				Naled		X		
Methyl cyclopentadienyl manganese tricarbonyl		X			Naphthalene	X	X		
Methyl demeton		X			a-naphthylamine	X			
Methylene bisphenyl isocyanate (MDI)	X	X			b-naphthylamine	X	X	X	X
Methylene chloride	X	X	X	X	Naphtha (coaltar)	X			
4,4'-methylene-bis(2-chloroaniline) MOCA		X	X	X	Neon		X		
4,4'-methylene-bis(N,N-dimethyl)benzenamine			X		Nickel			X	X
4,4'-methylene-bis(2-methylaniline)				X	Nickel carbonyl	X	X		
Methylene bis(4-cyclohexylisocyanate)	X				Nickel compounds	X	X	X	X
					Nickel sulfide roasting fumes & dust		X		
					Nickel subsulfide			X	X

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SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
Nickelocene				X	Phenazopyridine hydrochloride				X
Nicotine	X	X			Phenol	X	X		
Niridazole				X	Phenoxyacetic acid herbicides				X
Nitrapyrin		X			Phenothiazine		X		
Nitric acid	X	X			Phenoxybenzamine & its hydrochloride				X
Nitric oxide	X	X			N-phenyl-beta-naphthylamine		X		
Nitriiotriacetic acid			X		p-phenylene diamine	X	X		
5-nitroacenaphthene				X	Phenyl ether (vapor)	X	X		
p-nitroaniline	X	X			Phenyl ether-biphenyl mixture (vapor)	X			
5-nitro-o-anisidine			X		Phenyl glycidyl ether (PGE)	X	X		
Nitrobenzene	X	X			Phenylhydrazine	X	X		
p-Nitrochlorobenzene	X	X			Phenyl mercaptan		X		
4-nitrodiphenyl	X	X			Phenylphosphine		X		
Nitroethane	X	X			Phenytoin & Na salt of phenytoin			X	X
Nitrofen			X	X	Phorate		X		
1-(5-nitrofurfurylidene)amino)-2-imidazolidone)				X	Phosdrin (Mevinphos)	X	X		
N-(4-5-nitro-2-furyl)-2-thiazolyl acetamide				X	Phosgene	X	X		
Nitrogen dioxide	X	X			Phosphine	X	X		
Nitrogen mustard			X	X	Phosphoric acid	X	X		
Nitrogen mustard N-oxide				X	Phosphorus (yellow)	X	X		
Nitrogen trifluoride	X	X			Phosphorus oxychloride		X		
Nitroglycerine	X	X			Phosphorus pentachloride	X	X		
Nitromethane	X	X			Phosphorus pentasulfide	X	X		
1-nitropropane	X	X			Phosphorus trichloride	X	X		
2-Nitropropane	X	X			Phthalic anhydride	X	X		
N-Nitrosodi-n-butylamine			X	X	m-phthalodinitrile		X		
N-nitrosodiethanolamine			X	X	Picloram		X		
N-nitrosodiethylamine			X	X	Picric acid	X	X		
N-nitroso-N-ethylurea			X	X	Pindone (2-pivalyl-1-3-idandione) (pival)	X	X		
N-nitrosodimethylamine	X	X	X	X	Piperazine dihydrochloride		X		
N-nitrosodiphenylamine			X		Plaster of paris (calcium sulfate)		X		
N-nitrosomethylethylamine			X	X	Platinum (metal)		X		
N-nitroso-n-methylurea			X	X	Platinum (soluble salts)	X	X		
N-nitroso-N-methylurethane			X	X	Polybrominated biphenyls			X	
N-nitrosomethylvinylamine			X	X	Polychlorinated biphenyls		X	X	X
N-nitrosomorpholine			X	X	Polytetrafluoroethylene decomposition products		X		
N-nitrosornicotine			X	X	Ponceau MX				X
N-nitrosopiperidine			X	X	Ponceau 3R				X
N-nitroso-n-propylamine			X	X	Portland cement	X	X		
N-nitrosopyrrolidine			X	X	Potassium bromate				X
Nitrososarcosine			X	X	Potassium hydroxide		X		X
Nitrotoluene	X	X			Procarbazine				X
Nonane		X			Procabazine hydrochloride				X
Norethisterone				X	Progesterone				X
Nuisance particles		X		X	Propane	X	X		
Octachloronaphthalene	X	X			Propane sulfone (1,3-propane sulfone)		X	X	X
Octane	X	X			Propargyl alcohol		X		
Cestradiol-17B				X	b-propiolactone	X	X	X	X
Gestron				X	Propionic acid		X		
Oil mist, mineral	X	X			Propoxur		X		
Oil orange SS				X	n-propyl acetate	X	X		
Oral contraceptives, combined				X	Propyl alcohol	X	X		
Osmium tetroxide	X	X			Propylene		X		
Oxalic acid	X	X			Propylene dichloride	X	X		
Oxygen difluoride	X	X			Propylene glycol dinitrate		X		
Oxymetholone			X	X	Propylene glycol monomethyl ether		X		
Ozone	X	X			Propylene imine	X	X	X	X
Panfuran S (dihydroxymethylfuratrizine)				X	Propylene oxide	X	X	X	X
Paraffin wax fume		X			n-propyl nitrate	X	X		
Paraffin waxes and hydrocarbon waxes chlorinated			X		Propylthiouracil			X	X
Paraquat	X	X			Pyrethrum	X	X		
Parathion	X	X			Pyridine	X	X		
Pentaborane	X	X			Quartz (silica, crystalline)	X	X		
Pentachloronaphthalene	X	X			Quinone	X	X		
Pentachlorophenol	X	X			Reserpine				X
Pentaerythritol		X			Resorcinol		X		
Pentane	X	X			Rhodium (soluble, insoluble cmpds)	X	X		
2-pentanone (methyl propyl ketone)	X	X			Ronnel	X	X		
Perchloroethylene		X			Rosin core solder pyrolysis products, as formaldehyde		X		
Perchloromethyl mercaptan	X	X			Rotenone (commercial)	X	X		
Perchloryl fluoride	X	X			Rouge		X		
Perlite		X			Rubber solvent (naphtha)		X		
Petroleum distillates (naphtha)	X	X			Saccharin				X
Phenacetin			X	X	Safrole				X
Phenazopyridine			X	X	Selenium compounds (as Se)	X	X		X
					Selenium hexafluoride	X	X		

Appendix C

Minimum List ("Floor List") of Known Hazardous Substances and Designator

SUBSTANCE	OSHA	ACGIH	NTP	IARC	SUBSTANCE	OSHA	ACGIH	NTP	IARC
Selenium sulfide			X		4,4'-Thiobis (6-tert.butyl-m-cresol)		X		
Sesone		X			4,4'-Thiodianiline				X
Shale oils			X		Thioglycolic acid		X		
Silica: crystalline-quartz	X	X			Thionyl chloride		X		
Silica cristobalite	X	X			Thiourea			X	X
Silica tridymite	X	X			Thiram	X	X		
Silica: silica, fused		X			Thorium dioxide			X	
Silica: tripoli		X			Tin (organic & inorganic compounds)	X	X		
Silica: amorphous incl. diatomaceous earth (uncalcined); precipitated silica; silica gel	X	X			Titanium dioxide	X	X		
Silicon		X			o-Tolidine		X	X	X
Silicon carbide		X			Toluene (toluol)	X	X		
Silicon tetrahydride (silane)		X			Toluene diisocyanate				X
Silver - metals and soluble compounds	X	X			Toluene-2,4-diisocyanate	X	X		
Sintered calcium chromate				X	2,6-toluene diisocyanate				X
Sintered chromium trioxide				X	o-Toluidine (o,m,p - isomers)	X	X	X	X
Soapstone	X	X			o-Toluidine hydrochloride			X	
Sodium arsenate				X	Toxaphene (chlorinated camphene)	X	X	X	X
Sodium arsenite				X	Tremolite asbestos	X	X	X	X
Sodium azide		X			Treosulphan				X
Sodium bisulfite		X			Tributyl phosphate	X	X		
Sodium fluoroacetate	X	X			Trichloroacetic acid		X		
Sodium hydroxide	X	X			1,2,4-trichlorobenzene		X		
Sodium metabisulfite		X			1,1,2-trichloroethane	X	X		
Sodium saccharin				X	Trichloroethylene	X	X		
Soots, tars and mineral oils			X	X	Trichlorofluoromethane		X		
Starch		X			Trichloronaphthalene	X	X		
Stearates		X			2,4,6-trichlorophenol (and 2,4,5-)			X	X
Sterigmatocystin				X	Trichlorophenoxy acetic acid				X
Stibine	X	X			1,2,3-trichloropropane	X	X		
Stoddard solvent	X	X			1,1,2-trichloro-1,2,2-trifluoroethane	X	X		
Streptozotocin				X	Triethylamine	X	X		
Strontium chromate				X	Trifluorobromomethane	X	X		
Strychnine	X	X			Trimellitic anhydride		X		
Styrene (monomer)	X	X			Trimethylamine		X		
Styrene oxide				X	Trimethyl benzene		X		
Subtilisins (proteolytic enzymes as 100% pure crystalline enzyme)		X			Trimethylphosphite		X		
Sucrose		X			2,4,6-Trinitrotoluene (TNT)	X	X		
Sulfallate			X	X	Triorthocresyl phosphate	X	X		
Sulfotep (TEDP)	X	X			Triphenyl amine		X		
Sulfur dioxide	X	X			Triphenyl phosphate	X	X		
Sulfur hexafluoride	X	X			Tris (1-aziridinyl) phosphine sulfide			X	X
Sulfuric acid	X	X			Tris (2,3-dibromopropyl) phosphate			X	X
Sulfur monochloride	X	X			Trp-p-1 and -2				X
Sulfur pentafluoride	X	X			Trypan blue (commercial grade)				X
Sulfur tetrafluoride		X			Tungsten insol. and soluble compounds		X		
Sulfuryl fluoride	X	X			Turpentine	X	X		
Sulprofos		X			Uracil mustard				X
2,4,5-T	X	X		X	Uranium-soluble & insoluble compounds	X	X		
Talc	X	X			Urethane			X	X
Talc fibrous (use asbestos)	X	X			Valeraldehyde		X		
Tantalum	X	X			Vanadium (dust and fume)	X	X		
Tellurium & compounds (Te)	X	X			Vegetable oil - mists		X		
Tellurium hexafluoride	X	X			Vinyl acetate		X		
Temephos		X			Vinyl bromide		X		X
TEPP	X	X			Vinyl chloride		X	X	X
Terphenyls	X	X			Vinyl cyclohexene dioxide		X		
Testosterone				X	Vinylidene chloride		X		
Testosterone oenanthate				X	Vinyl toluene	X	X		
Testosterone propionate				X	VM & P naphtha		X		
2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)			X	X	Warfarin	X	X		
1,1,1,2-tetrachloro-2,2-difluoroethane	X	X			Welding fumes		X		
1,1,2,2-tetrachloro-1,2-difluoroethane	X	X			Wood dust		X		
1,1,2,2-tetrachloroethane	X	X			Xylene (o,m,p,-isomers)	X	X		
Tetrachloroethylene	X	X		X	Xylene-a,a-diamine		X		
Tetrachloronaphthalene	X	X			Ylidine	X	X		
Tetraethyl lead (as Pb)	X	X			Yttrium	X	X		
Tetrahydrofuran	X	X			Zinc beryllium silicate				X
Tetramethyl lead (as Pb)	X	X			Zinc chloride fume	X	X		
Tetramethyl succinonitrile	X	X			Zinc chromate and hydroxide		X	X	X
Tetranitromethane	X	X			Zinc oxide (fume and dust)	X	X		
Tetrasodium pyrophosphate		X			Zirconium compounds (as Zr)	X	X		
Tetryl	X	X							
Thallium-soluble compounds (TI)	X	X							
Thioacetamide			X	X					

APPENDIX D

MATERIAL SAFETY DATA SHEET USER'S GUIDE

INTRODUCTION

University employees handle, store, and use a variety of chemicals each day. In order to minimize the risk of chemical exposure to employees, it is important to understand how to protect yourself and what to do in the event of an emergency. A Material Safety Data Sheet (MSDS) provides the user with this information.

DOSH regulations specify the information that must be contained in a completed MSDS; however, the MSDS does not have to follow any set format. Consequently, the MSDSs received from various manufacturers may appear different. However, each must contain certain types of information.

The following information is intended to serve as a general guide to assist in the evaluation and understanding of a MSDS. This MSDS User's Guide is presented using the Occupational Safety and Health Administration (OSHA) form No. 174 (see Exhibit 1D) to describe data typically found in an MSDS and the general arrangement or location of data. An explanation of each section of the form follows.

SECTION I: PRODUCT IDENTIFICATION

General Comments:

The identity of the material must be included on the MSDS. This identity will usually be a systematic, scientific name, often with a unique Chemical Abstract Service (CAS) registry number. the product identity on the MSDS must match the identity on the label affixed to the chemical container.

Sometimes common synonyms are used for the products. Every known chemical designation or competitor's trade name is not necessarily listed.

Manufacturer's Name, Address, and Telephone Number

The manufacturer of the product is listed along with the manufacturer's address and telephone number for non-emergency information.

Emergency Telephone Number

The telephone number for information on the chemical in

emergency situations (spill, explosion, fire, or container leak).

Chemical Name and Synonyms

Refers to the chemical name of the material and any synonyms. Refers only to products consisting of a single element or compound, and not to mixtures.

Trade Name and Synonyms

The trade name (or name the product is sold by) is listed along with any synonyms.

Chemical Family

This indicates the general class of compounds to which a material belongs, such as ethers, acids, ketones, etc.

Formula

Refers to the chemical formula for single element or compound products.

Date Prepared

Date the MSDS was prepared or last revised.

SECTION II: HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

General Comments:

The terms listed in this section should be those components in the product which individually meet any criteria for a defined hazardous substance. A component of a multi-component product might be listed based on its toxicity, flammability, reactivity, or combination of these. CAS numbers are not required to be listed under the Federal or Hawaii Hazard Communication Standard, but are required under California's Hazard Communication Standard.

Chemical Names

Names of the product's hazardous ingredients.

CAS Number

A unique identification number assigned to a chemical or product by the Chemical Abstract Service (CAS).

TLV

Threshold Limit Value (TLV) is a term used by the American Conference of Governmental Industrial Hygienists (ACGIH) to express the

airborne concentration of a material to which nearly all adults can be repeatedly exposed day-after-day without adverse effects.

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

Percent Describes the percent by weight or volume of each ingredients listed. The percentages of hazardous ingredients in a product may be given, but are not required in the present regulation.

SECTION III: PHYSICAL/CHEMICAL CHARACTERISTICS

General Comments:

The data in this section should be for the total mixture or product. The information provided in this section is useful for the control of toxic vapors and for designing proper ventilation systems.

Vapor Density Relative density or weight of a vapor or gas compared to the weight of an equal volume of air. Materials lighter than air will have vapor densities less than 1.0. Materials heavier than air will have vapor densities greater than 1.0.

Specific Gravity The ratio of the weight of a volume of materials to the weight of an equal volume of water.

Solubility in Water The percentage of a material that will dissolve in water at a specified temperature. Less than 0.1% considered negligible; 0.1% to 10% is moderate; more than 10% is appreciable and, if it can be dissolved in all proportions, it has complete solubility.

Vapor Pressure The pressure exerted by gas or vapor from the surface of the liquid in a closed container.

A high vapor pressure indicates that a liquid will evaporate easily.

Evaporation Rate The rate at which a material will evaporate when compared to a reference material (such as butyl acetate). If a substance has an evaporation rate greater than 1, it evaporates more easily than the reference material. If the rate is less than 1, it evaporates more slowly than the reference material.

Appearance and Odor The color, form, and other identifying features of the material, to help identify the substance.

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

Boiling Point The temperature at which a liquid changes to vapor state at a given pressure.

Percent Volatile by Volume Refers to the percentage of a liquid or solid (by volume) that will evaporate at an ambient temperature of 70 degrees Fahrenheit or 15.5 degrees Centigrade. This information may be found in place of melting point.

SECTION IV: FIRE AND EXPLOSION HAZARD DATA

General Comments:

This section should contain the appropriate fire and explosion data for the product. If the product poses no fire hazard, a statement to that effect should be included in this section.

Flash Point (Method Used) The lowest temperature at which a liquid gives off enough vapor to form a ignitable mixture in air in a test container. Since flashpoints vary according to how they are obtained, the methods used are also listed. Tag Closed Cup (TCC), Penshymartens Closed Cup (PMCC), and Setaflash (SETA) methods are those used most extensively.

Flammable Limits When flammable vapors are mixed with air in the proportions, the mixture can be ignited by a spark or flame. The range of concentrations over which the flash will occur is

designated by the lower explosive limit (LEL) and the upper explosive limit (UEL). Flammable limits (explosive limits) are expressed in the percent by volume of vapor in air.

Extinguishing Media

The selection of fire extinguishing media is based on the type of chemical, its physical properties, and flammable characteristics. The most common types of extinguishing media are water, CO, dry chemical and foam.

Special Fire-fighting Procedures

Special handling procedures and personal protective equipment for fighting fires as applicable.

Special Fire-fighting Procedures and Precautions

General fire fighting methods are not described but special "exception to the rule" procedures are listed.

Unusual Fire and Explosion Hazards

Described are hazards associated with a chemical reaction or change in chemical composition which might occur under heat or fire conditions. Also described are hazards which may need to be considered while extinguishing fire with one of the available types of extinguishing media.

SECTION V: REACTIVITY DATA

General Comments:

This section relates to safe storage and handling of unstable hazardous substances. Essential information regarding the instability or incompatibility of the product to common substances or circumstances such as water, direct sunlight, metals used in piping, or containers, acids alkalies, etc. Under "Hazardous Decomposition Products", dangerous products created by aging should be included, like the production of peroxides in the decomposition of some ethers. The product's shelf life should also be indicated under this section when applicable.

Stability

An indication of the ability of the material to remain unchanged under reasonably foreseeable conditions. Conditions which may cause instability are stated.

<u>Incompatibility</u>	Common materials that could cause dangerous reactions when in contact with the product are listed.
<u>Hazardous Decomposition Products</u>	Hazardous products that may be produced when the material breaks down (by heat, chemical reaction, oxidation, decay, or other processes).
<u>Hazardous Polymerization</u>	Polymerization is a chemical reaction in which two or more small molecules combine to form larger molecules that contain repeating structural units of the original molecules. A hazardous polymerization is the above reaction with an uncontrolled release of energy.

SECTION VI: HEALTH HAZARD DATA

General Comments:

This section should be a combined estimate of the hazard of the total product. Severity of the effect of exposure and basis for the finding, such as animal or human studies may be included.

<u>Symptoms of Overexposure</u>	Physical signs of overexposure (inhalation, skin, or eye contact, absorption through the skin and ingestion).
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<u>Health Effects or Risks From Exposure</u>	Acute health effects which develop quickly from a single dose or short exposure to a substance are described. Chronic health effects which develop slowly over a long period of time, or recur frequently are also described.
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<u>First Aid and Emergency Procedure</u>	First Aid procedures to follow until professional medical help is available in case of eye contact, skin contact swallowing, or breathing excessive amounts of the material are described.
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<u>Suspect Cancer Agent</u>	This section states whether the product has been found to be a carcinogen (cancer causing agent) by any of the sources listed.
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<u>Medical Conditions Aggravated by Exposure</u>	Medical conditions which are aggravated by exposure to the material are listed.
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Carcinogenicity

The product has the ability to produce cancer. A chemical or product is considered to be a carcinogen or potential carcinogen if it is listed in the International Agency for monographs, National Toxicology Program (NTP) report, or OSHA list of regulated carcinogens.

SECTION VII: PRECAUTIONS FOR SAFE HANDLING AND USE

Spill and Leak Procedures

This describes methods for control and cleanup of spills or leaks. Appropriate materials, equipment, and personal protective equipment clothing are also listed.

Preparing Wastes for Disposal

Methods for packaging, neutralizing, or otherwise preparing waste product for disposal are described. Methods should be explicit, including proper labeling and handling of containers holding cleanup residue and specify acceptable disposal methods, such as sanitary landfill, incineration, etc.

SECTION VIII: CONTROL MEASURES

Ventilation and Engineering Controls

The type of ventilation which may be used is described. General exhaust removes contaminated air circulation or exchange system. Local captures and removes contaminants from the air at the point where the contaminants are released.

Respiratory Protection

Devices (respirators) for use in conditions exceeding exposure limits when properly selected, maintained, operated, and worn by the user, will protect the user's respiratory system from overexposure to air borne contaminants by inhalation.

Eye Protection

The type of eye protection needed for handling the product.

<u>Gloves</u>	The type and material of gloves to use for protection of skin.
<u>Other Clothing and Equipment</u>	Additional clothing or personal protective equipment which may be needed to prevent exposure to a material.
<u>Work/Hygienic Practices</u>	Any specific practices for working with the material are described.
<u>Other Handling and Storage Requirements</u>	Specific requirements for storing and handling the material described.
<u>Protective Measures During Maintenance of Contaminated Equipment</u>	Additional precautions for handling contaminated equipment.

EXHIBIT 1A

Date of Inventory: _____

Department: _____

Building and Room #: _____

Completed By: _____

Trade Name	Manufacturer	Label* (Y/N/I)	Date of MSDS

* Y = Yes, label or MSDS present
N = No, label or MSDS not present
I = Inadequate label or MSDS

EXHIBIT 1B

OUTLINE FOR HAZARD COMMUNICATION TRAINING

- I. OVERVIEW OF HAZARD COMMUNICATION REGULATIONS
 - A. HIOSH HAZARD COMMUNICATION STANDARD (Title 12, Subtitle 8, Chapter 203)
 - B. WHAT IS THE PURPOSE?
 - 1. Evaluation of Hazards
 - 2. Transmit Information
 - C. WHO MUST COMPLY?
 - 1. Manufacturers, Importers, Distributors of Hazardous Substances
 - 2. Employers: Users of Hazardous Substances
 - D. WHAT IS CONSIDERED A HAZARDOUS SUBSTANCE?
 - 1. Physical or Health hazards
 - 2. 29 CFR Part 1910, Subpart Z (OSHA)
 - 3. HIOSH (Chapter 202 - Toxic Materials and Harmful Physical Agents)
 - 4. TLV's (ACGIH)
 - E. CARCINOGENS
 - 1. IARC Monographs (International Agency for Research on Cancer)
 - 2. HIOSH (Chapter 202)
 - F. REQUIREMENTS
 - 1. Manufacturers, Importers, Distributors
 - a. Evaluate
 - b. Label Containers
 - c. Provide MSDSs
 - 2. Employers
 - a. Develop Written Hazard Communication Program
 - b. Label Containers
 - c. Obtain Material Safety Data Sheets
 - d. Inform/Train Employees

G. WRITTEN HAZARD COMMUNICATION PROGRAM

1. Labels
2. Material Safety Data Sheets
3. Employee Information and Training
4. List of Hazardous Substances
5. Non-routine Tasks
6. Unlabeled Pipes
7. Contractor Procedures

II. LABELS

A. MANUFACTURER'S LABEL

1. Identify Hazardous Substances
2. Appropriate Hazard Warning
3. Name and Address of Manufacturer

B. SECONDARY CONTAINERS

1. Identify Hazardous Substance
2. Appropriate Hazard Warning

III. MATERIAL SAFETY DATA SHEETS

See Separate Handout

IV. EMPLOYEE INFORMATION AND TRAINING

- A. Hazard Communication Requirements
- B. Operations Where Hazardous Substances are Present
- C. Location and Availability of Written Program
- D. Detecting Hazardous Substances Presence or Release
- E. Physical/Health Hazards
- F. Protective Measures
- G. Labeling System
- H. Material Safety Data Sheet (MSDS)
- I. Obtaining Hazard Information

EXHIBIT 1C

HAZARD COMMUNICATION TRAINING RECORD

Training Topics:

- . Requirements of Hazard Communication Program
- . Employee Rights
- . MSDS - How to and Contents
- . Written Program
- . Physical and Health Effects of Hazardous Substances
- . Detection of Hazardous Substances
- . How to Prevent Exposure

Instructor(s): _____

Date: _____

Location: _____

Name (Please Print)	Department	Signature
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____
11. _____	_____	_____
12. _____	_____	_____

HAZCOM Training Record
Page 2

13.	_____	_____	_____
14.	_____	_____	_____
15.	_____	_____	_____
16.	_____	_____	_____
17.	_____	_____	_____
18.	_____	_____	_____
19.	_____	_____	_____
20.	_____	_____	_____

Section V—Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable		

Incompatibility (*Materials to Avoid*)

Hazardous Decomposition or Byproducts

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur		

Section VI—Health Hazard Data

Route(s) of Entry	Inhalation?	Skin?	Ingestion?
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Health Hazards (*Acute and Chronic*)

Carcinogenicity	NTP?	IARC Monographs?	OSHA Regulated?
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Signs and Symptoms of Exposure

Medical Conditions
Generally Aggravated by Exposure

Emergency and First Aid Procedures

Section VII—Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

Waste Disposal Method

Precautions to Be Taken in Handling and Storing

Other Precautions

Section VIII—Control Measures

Respiratory Protection (*Specify Type*)

Ventilation	Local Exhaust	Special
	Mechanical (<i>General</i>)	Other

Protective Gloves	Eye Protection
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Other Protective Clothing or Equipment

Work/Hygienic Practices
