Dr. Miller - Outside Hallway Files

File: 1985 Product Safety Program

PLAINTIFF'S EXHIBIT
UC-1006

A23185

UCAR EMULSION SYSTEMS

UNION CARBIDE CORPORATION • 410 GREGSON DRIVE, CARY, N.C. 27511 (919) 469-6700

UNION CARBIDE

MEMORANDUM

TO:
B. F. Cole - Somerset
H. V. Hooper - Garland
K. G. Morlock - Alsip
H. Ortiz - Bayamon
D. H. Reed - Tucker
G. W. Sanders - Torrance

CC:
A. S. Amatangelo - Cary
G. L. Miller - Cary
W. P. Miller - Cary

DATE: April 19, 1985

SUBJECT: Community Hazard Communication

Here is additional information to support Community Hazard Communication.

1. A list of chemicals on inventory at Cary which we believe meet the OSHA Definition of Hazardous, prepared by W. P. Miller.

2. A list of Latex products which may be considered hazardous because they may contain carcinogens in excess of 0.1 percent.

3. A guideline from J. A. Leonard which breaks the various OSHA Hazard Category definitions down and makes hazard determination easier.

4. A National Safety Council listing of hazardous chemicals.

5. A copy of the OSHA Hazard Communication Standard.

More information will follow.

Regards,

Val

V. D. Dutcher

Attachment
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HAZARDOUS SUBSTANCES

CARY INVENTORY

* Greater than one gallon or 10 lbs.

A. Acids and Bases

Acetic Acid
* Hydrochloric Acid
* Sulfuric Acid
Pyridine
4 (p-nitrobenzyl) pyridine
* Ammonium Hydroxide
* Sodium Hydroxide
Cycat 4040
pH 10 Buffer
* Dimethylaminoethanol
Polyglycolamine H-221
Triethylene pentamine

B. Oxidizing/Reducing Agents

tert-Butyl Hydroperoxide
tert-Butyl Peroxybenzoate
Hydrogen Peroxide
Sodium Sulfite
Ammonium Persulfate
Sodium Persulfate
Potassium Persulfate
t-Amyl Hydroperoxide
Lupersol 575-M75
Lupersol 533-M75
Lupersol 531-80M
Sodium Metabisulfite
Hydrosulfite A WC
Sodium Formaldehyde Sylfoxylate
Thiox

C. Monomers

Propylenimine
* Acrylonitrile
* 2-Hydroxyethyl Acrylate
* Butyl Acrylate
* Acrylic Acid
* Methacrylic Acid
Hydroxypropyl Acrylate
* Vinyl Acetate
Trimethylolpropane Triacrylate
* 2-Ethylhexyl Acrylate
* Methyl Methacrylate
* Styrene
* Vinyl Chloride (Cylinders)
Vinylidene Chloride
* 81-007 DeSoto

D. Solvents

* Methyl Ethyl Ketone
* Toluene
  Phenyl Glycol Ether
* Acetone
  N.N.-Dimethylformamide
* Ethylene Glycol
* Isopropyl Alcohol
* Propasol Solvent P
* Propasol Solvent B
  Methyl Sulfoxide
* Propylene Glycol
* Mineral Spirits
* Methanol
* Butyl CELLOSOLVE

E. Preservatives

Proxel GX2
Kathon LX (10%)
Nuosept 95
Cosan 101 LP
Troysan Polyphase AF-1
Cosan 145
Troysan 364
Vancide 51Z
Amerstat 251
Troysan PMA-30
Troysan 192
Skane M-8

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F. Surfactants/Dispersants/Antifoams/Thickeners

Triton GR-5M
Triton GR-7M
Drewplus L-414
Abex JKB
Trem LF40
Chemax EPX-570
Chemax EPX-571
Triton X-102
Triton X-202
Triton X-100
Triton X-301
Triton N-57
Triton N-101
Abex JKB
Zonyl FSC
Aerosol TR 70%
Byk 070
* Bykumen
Byk 020
Byk 065
* Aerosol OT (75%)
Lactimon WC
* TERGITOL NP-10
* TERGITOL NP-4
Patcote 577
Patcote 519
Patcote 512
Patcote 513
Patcote 847
Drewplus 240
Nopco ND W
Triton X-101
Triton QS-44
Triton QS-30
Strodex PK 80A
Polystep A4
Polystep RA-35S
* Potassium Oleate
Byk 341
Byk 321
Byk 301
Drewgard 432
* Hydroxyethyl Cellulose
Methocel 228
Dowfax 2A1
Aerosol C-61
* SCT Thickener

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G. Pigments

Antimonic Oxide
* Mica
* Silica
* Talc (Non-Asbestos)
* Talc (Fibrous)
* Titanium Dioxide
* Zinc Chromate
* Strontium Chromate
* Calcium Carbonate (Limestone)
* Zinc Oxide
* Barium Metaborate
Manganese Oxide
Molydate Orange
Carbon Black
* Halox Pigments (Calcium Silicates)
* Oncor M-50
* Chrome Oxide Green
* Barium Chromate

H. Miscellaneous

Syn-O-Ad 8484 LA/LW
Bromotrichloromethane
Butyl Mercaptan
Fyrarestov 330
Paroil 170-8
Chlorowax 40
Dicyclohexyl
Slip-Ayd SL-523
Cymel 327
Resimene 717
Nuocure CK 10%
Cymel 370
Cymel 380
Nuocune Calcium 6%
Nuocure Manganese 6%
Intercar Zinco 12%
Intercar Manganese 6%
* QP 8-5314 Intermediate
Flat-Ayd W-34
Dapro DF-880
Slip-Ayd SL-18
Dapro W-77
Dapro DF-1181
Dapro DF-944
Dapro DF-900

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H. Miscellaneous (continued)

Slip Ayd S2-404
Slip Ayd SL295A
Nuocure Zirconium 12%
Nuocure Cobalt 10%
Intercar Calcium 6%
Ferrous Sulfate
* Cymel 325
* Hysol Mold Release
* Cove Base Adhesive

I. Compressed Gases and Liquids

Air
* Nitrogen
Helium
Hydrogen
* Halon Fire Extinguishers

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The following products may be considered hazardous mixtures because they contain carcinogens above 0.1% according to their MSDS or EPSDS.

UCAR Latex BX-3001
UCAR Latex 828
UCAR Latex 163
UCAR Latex 872
UCAR Latex 154
UCAR Latex 874
UCAR Latex 153
UCAR Latex 879
UCAR Latex 336
UCAR Latex 442
UCAR Latex 828
UCAR Latex 803
UCAR Latex BX-3148
UCAR Latex BX-3178
UCAR Vehicle 4550

The following products, probably obsolete, also would be considered hazardous mixtures for the same reason.

UCAR Latex BX-3003
UCAR Latex BX-3006
UCAR Latex ICX-7113
UCAR Latex BX-3550
UCAR Latex 171
UCAR Latex 189
UCAR Latex 822
UCAR Latex 878
UCAR Latex 152
UCAR Latex 177

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11/27/84 J A Leonard

HOW TO DETERMINE IF PRODUCT IS HAZARDOUS

1] What chemicals are in the product at .1% or greater ?(Weight or volume)

2] Evaluate each component in the product using Hazardous Determination criteria.

3] All questions are intended to be used to evaluate materials present at 1% or greater in the product.

4] Question number 1 must also be used to evaluate materials present at .1% to1%.

5] If a material is present below 1%, or in the case of a carcinogen, less than .1% , but could be released at concentrations greater than the TLV (PEL) then the hazard is presumed present in the product.

WHAT TO DO WITH THE INFORMATION.....

1] Prepare a list of hazardous chemicals.

2] Prepare an MSDS for hazardous chemicals being manufactured.

3] Collect an MSDS for all hazardous chemicals being used.

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1910.1200 Hazard Communications

Hazard Determination Criteria (all components 1% or greater- all questions)

1] Is the material carcinogenic ?

(use this criteria for all components of the product inconcentrations of .1% or more by wt. or vol.)

Criteria:

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] Is the material corrosive ?

Criteria:

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] Is the material highly toxic ?

Criteria:

Highly toxic: A chemical falling within any of the following categories:
(a) A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
(b) A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
(c) A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

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4] IS the material an irritant ?

Criteria:

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

5] Is the material a sensitizer ?

Criteria:

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

6] Is the material toxic ?

Criteria:

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

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

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

(c) A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

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7] Does the material demonstrate target organ effects ?

Criteria:

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 or hemopoietic system:	Decrease 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.
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.

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8] Is the material a combustible liquid ?

Criteria:

"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.

9] Is the material a compressed gas ?

Criteria:

"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.

10] Is the material an explosive ?

Criteria:

"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.

11] Is the material flammable ?

Criteria:

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

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

(ii) "Gas, flammable" means:

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

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

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

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

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12] Is the material an organic peroxide ?

Criteria:

"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.

13] Is the material an oxidizer ?

criteria:

"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.

14] Is the material pyrophoric ?

Criteria:

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

15] Is the material unstable(reactive) ?

Criteria:

"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.

16] Is the material water-reactive ?

Criteria:

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

17] Are there any other known hazards significiant enough to include ?

Criteria:

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.

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18] For materials listed in
a) 29 CFR 1910 Subpart Z
b) ACGIH (latest) :

The material is established as hazardous and the hazard must be evaluated using the criteria in questions 1-17.

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

(i) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

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

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

A23198

ATTACHMENT I

HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Acetaldehyde	X	X		
Acetic acid	X	X		
Acetic anhydride	X	X		
Acetone	X	X		
Acetonitrile	X	X		
2-Acetylaminofluorene	X			
Acetylene		X		
2-Acetylaminofluorene			X	
Acetylene dichloride, see 1, 2-Dichloroethylene				
Acetylene tetrabromide	X	X		
Acetylsalicylic acid (Asprin)		X		
Acrolein	X	X		
Acrylamide	X	X		
Acrylic acid		X		
Acrylonitrile	X	X	X	X
Adriamycin				X
Aflatoxins			X	X
Aldrin	X	X		
Allyl alcohol	X	X		
Allyl chloride	X	X		
Allyl glycidyl ether (AGE)	X	X		
Allyl propyl disulfide	X	X		
alpha-Alumina		X		
Aluminum		X		
Metal & oxide		X		
Pyro powders		X		
Welding fumes		X		
Soluble salts		X		
Alkyls (NOC)		X		
2-Aminoanthrequinone			X	
o-Aminoazotoluene				X
4-Aminobiphenyl, see 4-Aminodiphenyl				
4-Aminodiphenyl	X	X	X	X
2-Aminoethanol, see Ethanolamine				
1-Amino-2-methylanthraquinone			X	
2-Aminopyridine	X	X		
2-Amino-5(5-nitro-2-furyl)-1,3,4-thiadiazole				X
3-Amino 1, 2, 4-triazole, see Amitrole				
Amitrole		X	X	X
Ammonia	X	X		
Ammonium chloride fume		X		
Ammonium sulfamate (Ammate)	X	X		
n-Amyl acetate	X	X		
sec-Amyl acetate	X	X		

Prepared by: Chemical Section Committee [1]
National Safety Council
May, 1984

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE*			
	OSHA	ACGIH	NTP	IARC
Aniline & homologues	X	X		
Anisidine (o-,p-isomers)	X	X		
o-Anisidine			X	X
o-Anisidine hydrochloride			X	
Antimony & compounds, as Sb	X	X		
Antimony trioxide		X		
Handling and use, as Sb		X		
Production		X		
ANTU (alpha naphthyl thiourea)	X	X		
Aramite ©			X	X
Argon		X		
Arsenic & soluble compounds, as As	X	X	X	
Arsenic trioxide production		X		
Arsine	X	X		
Asbestos, also see MINERAL DUSTS, Page 22	X	X	X	X
Asphalt (petroleum) fumes		X		
Atrazine		X		
Auramine manufacture		X	X	
Azaserine				X
Azinphosmethyl (Guthion®)	X	X		
Barium, soluble compounds, as Ba	X	X		
BCNU (bischloroethyl nitrosourea)		X	X	X
Benomyl		X	X	X
Benz(a)anthracene			X	
Benzene	X	X	X	X
Benzidine	X	X	X	
p-Benzoquinone, see Quinone			X	X
Benzo(b)fluoranthene			X	
Benzo(a)pyrene		X	X	X
Benzoyl peroxide	X	X		
Benzotrichloride				X
Benzyl chloride	X	X		
Benzyl violet 4B				X
Beryllium and beryllium compounds	X	X	X	X
Biphenyl, see Diphenyl		X		
Bismuth telluride		X		
Se-doped		X		
Borates, tetra, sodium salts,		X		
Anhydrous		X		
Decahydrate		X		
Pentahydrate		X		
Boron oxide	X	X		
Boron tribromide		X		
Boron trifluoride	X	X		

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Bromacil		X		
Bromine	X	X		
Bromine pentafluoride		X		
Bromochloromethane, see Chlorobromomethane				
Bromoform	X	X		
1,3-Butadiene	X	X		
Butane		X		
Butanethiol, see Butyl mercaptan				
2-Butanone, see Methyl ethyl ketone (MEK)				
2-Butoxyethanol (Butyl Cellosolve)	X	X		
n-Butyl acetate	X	X		
sec-Butyl acetate	X	X		
tert-Butyl acetate	X	X		
Butyl acrylate		X		
n-Butyl alcohol	X	X		
sec-Butyl alcohol	X	X		
tert-Butyl alcohol	X	X		
Butylamine	X	X		
tert-Butyl chromate, as CrO_3	X	X		
n-Butyl glycidyl ether (BGE)	X	X		
n-Butyl lactate		X		
Butyl mercaptan (Butanethiol)	X	X		
alpha-sec-Butylphenol		X		
p-tert-Butyltoluene	X	X		
beta-Butyrolactone				X
Cadmium Dust & salts, as Cd	X	X	X	
Cadmium Chloride				X
Cadmium oxide		X		X
Fume, as Cd	X	X		
Production		X		
Cadmium sulfate				X
Cadmium sulfide				X
Calcium carbonate/marble		X		
Calcium chromate				X
Calcium cyanamide		X		
Calcium hydroxide		X		
Calcium oxide	X	X		
Calcium silicate		X		
Camphor, synthetic	X	X		
Caprolactam		X		
Dust		X		
Vapor		X		
Captafol		X		
Captan		X		

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SUBSTANCE/PROCESS	SOURCE*			
	OSHA	ACGIH	NTP	IARC
Carbaryl (Sevin®)	X	X		
Carbofuran		X		
Carbon black	X	X		
Carbon dioxide	X	X		
Carbon disulfide	X	X		
Carbon monoxide	X	X		
Carbon tetrabromide		X		
Carbon tetrachloride	X	X	X	X
Carbonyl chloride, see Phosgene				
Carbonyl fluoride		X		
Catechol (Pyrocatechol)		X		
CCNU (1-(2-Chloroethyl)-3cylcohexyl-1-nitrosourea)				X
Cellulose (paper fiber)		X		
Cesium hydroxide		X		
Chlorambucil			X	X
Chlordane	X	X		
Chlordecone, see Kepone®				
Chlorinated camphene	X	X	X	X
Chlorinated diphenyl oxide	X	X		
Chlorine	X	X		
Chlorine dioxide	X	X		
Chlorine trifluoride	X	X		
Chlornaphazine			X	
Chloroacetaldehyde	X	X		
alpha-Chloroacetophenone (Phenacyl chloride)	X	X		
Chloroacetyl chloride		X		
Chlorobenzene (Monochlorobenzene)	X	X		
o-Chlorobenzylidene malononitrile (OCBM)	X	X		
Chlorobromomethane (Bromochloromethane)	X	X		
2-Chloro-1,3-butadine, see B-Chloroprene				
Chlorodifluoromethane		X		
1-Chloro, 2, 3-epoxy-propane, see Epichlorohydrin				
2-Chloroethanol, see Ethylene chlorohydrin				
N, N-bis (2-chloroethyl)-2-naphthylamine, see Chlornaphazine				
Chloroethylene, see Vinyl chloride				
Chloroform (trichloromethane)	X	X	X	X
bis-Chloromethyl ether	X	X	X	X
Chloromethyl methyl ether, technical grade		X	X	X
1-Chloro-1-nitropropane	X	X		
Chloropentafluoroethane		X		
4-Chloro-o-phenylenediamine				X
Chloropicrin (nitrotrichloromethane)	X	X		
B-Chloroprene (2-chloro-1,3-butadiene)	X	X		
o-Chlorostyrene		X		

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
o-Chlorotoluene		X		
2-Chloro-6-(trichloromethyl) pyridine, see Nitrapyrin				
Chlorpyrifos		X		
Chromic acid and chromates	X	X		
Chromite ore processing (Chromate), as Cr		X		
Chromium Metal	X	X	X	
Chromium (II) compounds, as Cr	X	X	X	
Chromium (III) compounds, as Cr	X	X	X	
Chromium (VI) compounds, as Cr	X	X	X	
Water soluble	X	X	X	
Certain water insoluble	X	X	X	
Chromyl chloride		X		
Chrysene		X		
Citrus Red No. 2				X
Clopidol		X		
Coal dust, see MINERAL DUSTS, page 22				
Coal tar pitch volatiles (as benzene soluble fractions; anthracene, BaP, phenanthrene, acridine, chrysene, pyrene)	X	X		
Cobalt, as Co metal, dust & fume	X	X		
Cobalt carbonyl, as Co		X		
Cobalt hydrocarbonyl, as Co		X		
Coke oven emissions	X		X	
Copper				
Fume	X	X		
Dusts & mists, as Cu	X	X		
Cotton dust, raw	X	X		
Crag® herbicide	X			
p-Cresidine			X	X
Cresol, all isomeres	X	X		
Crotonaldehyde	X	X		
Crufomate		X		
Cumene	X	X		
Cupferron			X	
Cyanamide		X		
Cyanides, as CN	X	X		
Cyanogen		X		
Cyanogen chloride		X		
Cycasin			X	X
Cyclohexane	X	X		
Cyclohexanol	X	X		
Cyclohexanone	X	X		
Cyclohexene	X	X		
Cyclohexylamine		X		

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SUBSTANCE/PROCESS	SOURCE*			
	OSHA	ACGIH	NTP	IARC
Cyclonite		X		
Cyclopentadiene	X	X		
Cyclopentane		X		
Cyclophosphamide			X	X
Cyhexatin		X		
2,4-D	X	X		
DDT (Dichlorodiphenyltrichloroethane)	X			X
DDVP	X			X
Dacarbazine				X
Daunomycin				X
Decaborane	X	X		
Demeton®	X	X		
Diacetone alcohol (4-hydroxy-4 methyl-2-pentanone)	X	X		X
N,N'-Diacetylbenzidine			X	X
2,4-Diaminoanisole sulfate			X	X
4,4'-Diaminodiphenyl ether				X
1,2-Dieminoethane, see Ethylenediamine				
2,4-Diaminotoluene			X	X
Diazinon		X		
Diazomethane	X	X		
Dibenz (a,h) acridine			X	X
Dibenz (a,j) acridine			X	X
Dibenz (a,h) anthracene			X	X
7H-Dibenzo (c,g) carbazole			X	X
Dibenzo (a,e) pyrene				X
Dibenzo (a,h) pyrene			X	X
Dibenzo (a,i) pyrene			X	X
Diborane	X	X		
1,2 Dibromo-3-Chloropropane	X		X	X
1,2-Dibromoethane, see Ethylene dibromide				
2-N-Dibutylaminoethanol		X		
Dibutyl phosphate	X	X		
Dibutyl phthalate	X	X		
Dichloroacetylene		X		
o-Dichlorobenzene	X	X		
p-Dichlorobenzene	X	X		
3,3'-Dichlorobenzidine (and its salts)	X	X	X	X
3,3'-Dichloro-4,4'-diaminodiphenyl ether				X
Dichlorodifluoromethane	X	X		
1,3-Dichloro-5,5-dimethyl hydantoin	X	X		
1,1-Dichloroethane (Ethylidene chloride)	X	X		
1,2-Dichloroethane, see Ethylene dichloride				
1,1-Dichloroethylene, see Vinylidene chloride				
1,2-Dichloroethylene (Acetylene dichloride)	X	X		

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Dichloroethyl ether	X	X		
Dichlorofluoromethane		X		
Dichloromethane, see Methylene chloride				
Dichloromonofluoromethane	X			
1,1-Dichloro-1-nitroethane	X	X		
1,2-Dichloropropane, see Propylene dichloride				
Dichloropropene		X		
2,2-Dichloropropionic acid		X		
Dichlorotetrafluoroethane	X	X		
Dichlorvos		X		
Dicrotophos		X		
Dicyclopentadiene		X		
Dicyclopentadienyl iron		X		
Dieldrin	X	X		
Diepoxybutene			X	X
Diethanololamine		X		
Diethylamine	X	X		
Diethylaminoethanol	X	X		
Diethylene triamine		X		
Diethyl ether, see Ethyl ether				
Di (2-ethylhexyl) phthalate			X	X
1,2-Diethylhydrazine				X
Diethyl ketone		X		
Diethyl phthalate		X		
Diethylstilbestrol			X	X
Diethyl sulfate				X
Difluorodibromomethane	X	X		
Diglycidyl ether (DGE)	X	X		
Dihydroxybenzene, see Hydroquinone				
Dihydrosafrole				X
Diisobutyl ketone (2,6-Dimethyl-4-heptanone)	X	X		
Diisopropylamine	X	X		
3, 3'-Dimethoxybenzidine (o-Dianisidine)			X	X
Dimethoxymethane, see Methylal				
Dimethyl acetamide	X	X		
Dimethylamine	X	X		
p-Dimethylaminoazobenzene	X		X	X
Dimethylaminobenzene, see Xylidene				
trans-2 [(Dimethylamino)methylimino]-5-[2-(5-nitro-2-furyl)vinyl]-1,3,4-oxadiazole				X
Dimethylaniline (N, N-Dimethylaniline)	X	X		
Dimethylbenzene, see Xylene				
3,3'-Dimethylbenzidine (o-Tolidine)			X	X
Dimethyl carbamyl chloride		X	X	X
Dimethyl-1,2-dibromo-2-dichloroethyl phosphate, See Naled (Dibrom)				

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Dimethylformamide	X	X		
2,6-Dimethyl-4-heptanone, see Diisobutyl ketone				
1,1-Dimethylhydrazine	X	X		X
1,2-Dimethylhydrazine				X
Dimethylphthalate	X	X		
Dimethyl sulfate	X	X	X	X
Dinitolmide (3,5-Dinitro-o-toluamide)		X		
Dinitrobenzene (all isomers)	X	X		
Dinitro-o-cresol	X	X		
3,5-Dinitro-o-toluamide, see Dinitolmide				
Dinitrotoluene	X	X		
1,4-Dioxane, tech. grade (Diethylene dioxide)	X	X	X	X
Dioxathion		X		
Diphenyl (Biphenyl)	X	X		
Diphenylamine		X		
Diphenylmethane diisocyanate, See Methylene bisphenyl isocyanate (MDI)				
Dipropylene glycol methyl ether	X	X		
Dipropyl ketone		X		
Diquat		X		
Direct Black 38			X	X
Direct Blue 6			X	X
Di-sec, octyl phthalate (Di-2-ethylhexylphthalate)	X	X		
Disulfiram		X		
Disulfoton		X		
2,6-Ditert. butyl-p-cresol		X		
Diuron		X		
Divinyl benzene		X		
Emery		X		
Endosulfan		X		
Endrin	X	X		
Epichlorohydrin (1-Chloro,2,3-epoxy-propane)	X	X		X
EPN	X	X		
1,2-Epoxypropane, see Propylene oxide				
2,3-Epoxy-1-propanol, see Glycidol				
Ethane		X		
Ethanethiol, see Ethyl mercaptan				
Ethanolamine (2-Aminoethanol)	X	X		
Ethinyloestradiol				X
Ethion		X		
2-Ethoxyethanol (Glycol monoethyl ether)	X	X		
2-Ethoxyethyl acetate (cellosolve acetate)	X	X		

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Ethyl acetate	X	X		
Ethyl acrylate	X	X		
Ethyl alcohol (Ethanol)	X	X		
Ethylamine	X	X		
Ethyl amyl ketone (5-methyl-3-heptanone)	X	X		
Ethyl benzene	X	X		
Ethyl bromide	X	X		
Ethyl butyl ketone (3-heptanone)	X	X		
Ethyl chloride	X	X		
Ethylene		X		
Ethylene chlorohydrin (2 Chloroethanol)	X	X		
Ethylenediamine (1,2 Diaminoethane)	X	X		
Ethylene dibromide (1,2 Dibromoethane)	X	X	X	X
Ethylene dichloride (1,2 Dichloroethane)	X	X	X	X
Ethylene glycol				
Particulate		X		
Vapor		X		
Ethylene glycol dinitrate and/or Nitroglycerin	X	X		
Ethylene glycol methyl ether acetate, see 2-Methoxyethyl acetate				
Ethylene oxide	X	X		
Ethyleneimine	X	X		
Ethylene thiourea			X	X
Ethyl ether (Diethyl ether)	X	X		
Ethyl formate	X	X		
Ethylidene chloride, see 1,1-Dichloroethane				
Ethylidene norbornene		X		
Ethyl mercaptan (Ethanethiol)	X	X		
Ethyl methanesulfonate				X
N-Ethylmorpholine	X	X		
Ethyl silicate	X	X		
Fensulfothion		X		
Fenthion		X		
Ferbam	X	X		
Ferrovanadium dust	X	X		
Fibrous glass dust (Glass, fibrous or dust)		X		
Fluorides, as F	X	X		
Fluorine	X	X		
Fluorotrichloromethane, see Trichlorofluoromethane				
Fonofos		X		
Formaldehyde	X	X	X	
Formaldehyde gas				X
Formamide		X		

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Formic acid	X	X		
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole				X
Furfural	X	X		
Furfuryl alcohol	X	X		
Gasoline		X		
Germanium tetrahydride		X		
Glass, fibrous or dust, see Fibrous glass dust				
Glutaraldehyde		X		
Glycerin mist		X		
Glycidaldehyde				X
Glycidol (2,3-Epoxy-1-propanol)	X	X		
Glycol monoethyl ether, see 2-Ethoxyethanol				
Graphite (Natural), see MINERAL DUSTS, page 22				
Graphite (Synthetic)		X		
Guthion®, see Azinphosmethyl				
Gypsum		X		
Hafnium	X	X		
Helium		X		
Hematite underground mining			X	
Heptachlor	X	X		
Heptane (n-Heptane)	X	X		
2-Heptanone, see Methyl n-amyl ketone				
3-Heptanone, see Ethyl butyl ketone				
Hexachlorobenzene			X	X
Hexachlorobutadiene		X		
Hexachlorocyclohexane isomers			X	
Hexachlorocyclopentadiene		X		
Hexachloroethane	X	X		
Hexachloronophthalene	X	X		
Hexafluoroacetone		X		
Hexamethyl phosphoramide		X		X
Hexane (n-Hexane)	X	X		
Other isomers		X		
2-Hexanone, see Methyl n-butyl ketone				
Hexone, see Methyl isobutyl ketone				
sec-Hexyl acetate	X	X		
Hexylene glycol		X		
Hydrazine	X	X	X	X
Hydrazine sulfate			X	
Hydrazobenzene			X	
Hydrogen		X		
Hydrogenated terphenyls		X		
Hydrogen bromide	X	X		
Hydrogen chloride	X	X		

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SUBSTANCE/PROCESS	SOURCES			
	OSHA	ACGIH	NTP	IARC
Hydrogen cyanide	X	X		
Hydrogen fluoride, as F		X		
Hydrogen peroxide	X	X		
Hydrogen selenide, as Se	X	X		
Hydrogen sulfide	X	X		
Hydroquinone (Dihydroxybenzene)	X	X		
4-Hydroxy-4-methyl-2-pentanone, see Diacetone alcohol				
2-Hydroxypropyl acrylate		X		
Indene		X		
Indeno (1,2-cd) pyrene				X
Indeno (1,2,3-cd) pyrene			X	
Indium & compounds, as In		X		
Inert (nuisance) dust, see MINERAL DUSTS, page 22				
Iodine	X	X		
Iodoform		X		
Iron dextran complex			X	X
Iron oxide fume (Fe_2O_3), as Fe	X	X		
Iron pentacarbonyl, as Fe		X		
Iron salts, soluble, as Fe		X		
Isoamyl acetate	X	X		
Isoamyl alcohol	X	X		
Isobutyl acetate	X	X		
Isobutyl alcohol	X	X		
Isooctyl alcohol		X		
Isophorone	X	X		
Isophorone diisocyanate		X		
Isopropoxyethanol		X		
Isopropyl acetate	X	X		
Isopropyl alcohol	X	X		
Isopropylamine	X	X		
Manufacture (strong-acid process)			X	
N-Isopropylaniline		X		
Isopropyl ether	X	X		
Isopropyl glycidyl ether (IGE)	X	X		
Isosafrole				X
Kaolin		X		
Kepone® (Chlordecone)			X	X
Ketene	X	X		
Lasiocarpine				X
Lead, inorg., dusts & fumes, as Pb	X	X		
Lead acetate			X	X
Lead arsenate, as $Pb_3(AsO_4)_2$		X		
Lead chromate, as Cr		X		X

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Lead phosphate			X	X
Lead subacetate				X
Limestone		X		
Lindane	X	X	X	
Lithium hydride	X	X		
L.P.G. (Liquified petroleum gas)	X	X		
Magnesite		X		
Magnesium oxide fume	X	X		
Malathion	X	X		
Maleic anhydride	X	X		
Manganese, as Mn; Dust & compounds	X	X		
Fume	X	X		
Manganese cyclopentadienyl tricarbonyl, as Mn		X		
Manganese tetroxide		X		
Marble/calcium carbonate		X		
Melphalan			X	X
Mercury, as Hg; Alkyl compounds	X	X		
All forms except alkyl; Vapor	X	X		
Aryl & inorganic compounds	X	X		
Merphalan				X
Mesityl oxide	X	X		
Mestranol				X
Methacrylic acid		X		
Methane		X		
Methanethiol, see Methyl mercaptan				
Methomyl		X		
Methoxsalen with ultra-violet A therapy (PUVA)				X
Methoxychlor	X	X		
2-Methoxyethanol, see Methyl cellosolve				
2-Methoxyethyl acetate (Ethylene glycol methyl ether acetate)		X		
4-Methoxyphenol		X		
Methyl acetate	X	X		
Methyl acetylene (propyne)	X	X		
Methyl acetylene-propadiene mixture (MAPP)	X	X		
Methyl acrylate	X	X		
Methylacrylonitrile		X		
Methylal (Dimethoxymethane)		X		
Methyl alcohol (methanol)	X	X		
Methylamine	X	X		
Methyl amyl alcohol, see Methyl isobutyl carbinol				
Methyl n-amyl ketone (2-Heptanone)	X	X		
N-Methyl aniline		X		
2-Methylaziridine				X
Methylazoxymethanol and its acetate				X

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Methyl bromide	X	X		
Methyl n-butyl ketone (2-Hexanone)	X	X		
Methyl cellosolve (2-Methoxyethanol)	X			
Methyl cellosolve acetate	X			
Methyl chloride	X	X		
Methyl chloromethyl ether	X			
Methyl chloroform	X	X		
Methyl 2-cyanoacrylate		X		
Methylcyclohexane	X	X		
Methylcyclohexanol		X		
o-Methylcyclohexanone	X	X		
Methylcyclopentadienyl manganese tricarbonyl, as Mn		X		
Methyl demeton		X		
Methylene bisphenyl isocyanate (MDI) (Diphenyl methane diisocyanate)	X	X		
Methylene chloride (Dichloromethane)	X	X		
4,4'-Methylene bis (2-chloroaniline) (MOCA)		X	X	X
Methylene bis (4-cyclohexylisocyanate)		X		
4,4'-Methylene bis (N,N-dimethyl) benzenamine			X	
4,4'-Methylene bis (2-methylaniline)				X
4,4-Methylene dianiline		X		
Methyl ethyl ketone (MEK) (2-Butanone)	X	X		
Methyl ethyl ketone peroxide		X		
Methyl formate	X	X		
5-Methyl-3-heptanone, see Ethyl amyl ketone				
Methyl hydrazine		X		
Methyl iodide	X	X		X
Methyl isoamyl ketone		X		
Methyl isobutyl carbinol (Methyl amyl alcohol)	X	X		
Methyl isobutyl ketone (MIBK) (Hexone)	X	X		
Methyl isocyanate	X	X		
Methyl isopropyl ketone		X		
Methyl mercaptan (Methanethiol)	X	X		
Methyl methacrylate	X	X		
Methyl methanesulfonate				X
2-Methyl-1-nitroanthraquinone (of uncertain purity)				X
N-Methyl-N'-nitro-N-nitrosoguanidine				X
Methyl parathion		X		
Methyl propyl ketone, see 2-Pentanone				
Methyl silicate		X		
a-Methyl styrene	X	X		
Methylthiouracil				X
Metronidazole				X
Mevinphos		X		

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Michler's ketone			X	
Mirex			X	X
Mitomycin C				X
Molybdenum, as Mo Soluble compounds	X	X		
Insoluble compounds	X	X		
Monocrotaline				X
Monocrotophos		X		
Monomethyl aniline	X			
Monomethyl hydrazine	X			
Morpholine	X	X		
5-(Morpholinomethyl)-3[(5-nitrofurfurylidene)amino]-2-oxazolidinone				X
Mustard gas, see Nitrogen mustard				
Nafenopin				X
Naled (Dimethyl-1,2-dibromo-2-dichloroethyl phosphate)		X		
Naphtha (coal tar)	X			
Naphthalene	X	X		
alpha-Naphthylamine	X			X
B-Naphthylamine	X	X		X
Neon		X		
Nickel				
Metal	X	X	X	
Soluble compounds, as Ni	X	X	X	
Nickel carbonyl, as Ni	X	X		
Nickel subsulfide				X
Nickel sulfide roasting, fume & dust, as Ni		X		
Nicotine	X	X		
Niridazole				X
Nitrapyrin (2-Chloro-6-(trichloromethyl)pyridine)		X		
Nitric acid	X	X		
Nitric oxide	X	X		
Nitrilotriacetic acid			X	
5-Nitroacenaphthene				X
p-Nitroaniline	X	X		
5-Nitro-o-anisidine			X	
Nitrobenzene	X	X		
4-Nitrobiphenyl	X			
p-Nitrochlorobenzene	X	X		
4-Nitrodiphenyl		X		
Nitroethane	X	X		
Nitrofen			X	
1-[(5-Nitrofurfurylidene)amino]-2-imidazolidinone				X
N-[4-(5-Nitro-2-furyl)-2-thiazolyl]acetamide				X
Nitrogen dioxide	X	X		

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SUBSTANCE/PROCESS	OSHA	ACGIH	NTP	IARC
Nitrogen trifluoride	X	X		
Nitrogen mustard and Nitrogen mustard N-oxide				X
Nitroglycerin (NG)	X	X		
Nitromethane	X	X		
1-Nitropropane	X	X		
2-Nitropropane	X	X		X
N-Nitrosodi-n-butylamine			X	X
N-Nitrosodiethanolamine			X	X
N-Nitrosodiethylamine			X	X
N-Nitrosodimethylamine (dimethylnitrosoamine)	X	X	X	X
p-Nitrosodiphenylamine			X	
N-Nitrosodi-n-propylamine			X	X
N-Nitroso-N-ethylurea			X	X
N-Nitrosomethylethylamine				X
N-Nitroso-N-methylurea			X	X
N-Nitroso-N-methylurethane				X
N-Nitrosomethylvinylamine			X	X
N-Nitrosomorpholine			X	X
N-Nitrosonornicotine			X	X
N-Nitrosopiperidine			X	X
N-Nitrosopyrrolidine			X	X
N-Nitrososarcosine			X	X
Nitrotoluene	X	X		
Nitrotrichloromethane, see Chloropicrin				
Nonane		X		
Norethisterone				X
Octachloronaphthalene	X	X		
Octane	X	X		X
Oestradiol-17B				X
Oestrone				X
Oil mist, mineral	X	X		
Oil orange SS				X
Osmium tetroxide, as Os	X	X		
Oxalic acid	X	X		
Oxygen difluoride	X	X		
Oxymetholone			X	
Ozone	X	X		
Panfuran S (Pihydroxymethylfuratrizine)				X
Paraffin wax fume		X		
Paraquate, respirable sizes	X	X		
Parathion	X	X		
Particulate polycyclic aromatic hydrocarbons (PPAH), see Coal tar pitch volatiles				

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Pentaborane	X	X		
Pentachloronaphthalene	X	X		
Pentachlorophenol	X	X		
Pentaerythritol		X		
Pentane	X	X		
2-Pentanone (Methyl propyl ketone)	X	X		
Perchloroethylene		X		
Perchloromethyl mercaptan	X	X		
Perchloryl fluoride	X	X		
Petroleum distillates (naphtha)	X			
Phenacetin			X	X
Phenazopyradine and its hydrochloride			X	X
Phenol	X	X		
Phenothiazine		X		
Phenoxybenzamine and its hydrochloride				X
N-Phenyl-beta-naphthylamine		X		
p-Phenylene diamine	X	X		
Phenyl ether, vapor	X	X		
Phenyl ether-biphenyl mixture, vapor	X			
Phenylethylene, see Styrene, monomer				
Phenyl glycidyl ether (PGE)	X	X		
Phenylhydrazine	X	X		
Phenyl mercaptan		X		
Phenylphosphine		X		
Phenytoin and its sodium salt			X	
Phorate		X		
Phosdrin, see Mevinphos®				
Phosgene (carbonyl chloride)	X	X		
Phosphine	X	X		
Phosphoric acid	X	X		
Phosphorus (yellow)	X	X		
Phosphorus oxychloride		X		
Phosphorus pentachloride	X	X		
Phosphorus pentasulfide	X	X		
Phosphorus trichloride	X	X		
Phthalic anhydride	X	X		
m-Phthalodinitrile		X		
Picloram		X		
Picric acid	X	X		
Pindone		X		
Piperazine dihydrochloride		X		
2-Pivalyl-1, 3-indandione, see Pindone (Pival®)				
Plaster of Paris		X		
Platinum		X		
Metal		X		
Soluble salts, as Pt	X	X		

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SUBSTANCE/PROCESS	SOURCES			
	OSHA	ACGIH	NTP	IARC
Polybrominated biphenyls (PBB's)			X	
Polychlorinated biphenyls (PCB's)	X	X	X	X
Polytetrafluoroethylene decomposition products		X		
Ponceau MX				X
Ponceau 3R				X
Potassium hydroxide		X		
Procarbazine and its hydrochloride			X	X
Progesterone				X
Propane	X	X		
1,3-Propane sultone		X		X
Propargyl alcohol		X		
β-Propiolactone	X	X	X	X
Propionic acid		X		
Propoxur		X		
n-Propyl acetate	X	X		
Propyl alcohol	X	X		
n-Propyl nitrate	X	X		
Propylene		X		
Propylene dichloride (1,2 Dichloropropane)	X	X		
Propylene glycol dinitrate		X		
Propylene glycol monomethyl ether		X		
Propyleneimine	X	X		
Propylene oxide (1,2 Epoxypropane)	X	X		
Propylthiouracil				X
Propyne, see Methyl acetylene				
Pyrethrum	X	X		
Pyridine	X	X		
Quinone (p-Benzoquinone)	X	X		
RDX, see Cyclonite				
Reserpine			X	
Resorcinol		X		
Rhodium				
Metal, fume and dusts, as Rh	X	X		
Soluble salts, as Rh	X	X		
Ronnel	X	X		
Rosin core solder pyrolysis products, as formaldehyde		X		
Rotenone (commercial)	X	X		
Rouge		X		
Rubber solvent (Naphtha)		X		
Saccharin, see Sodium saccharin				
Safrole			X	X

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Selenium compounds, as Se	X	X		
Selenium hexafluoride, as Se	X	X		
Selenium Sulfide			X	
Sesone (Sodium 2,4-dichloro-phenoxyethyl sulfate)		X		
Silane, see Silicon tetrahydride				
Silica, Silicates - See MINERAL DUSTS, page 22				
Silicon		X		
Silicon carbide		X		
Silicon tetrahydride (Silane)		X		
Silver,				
as Ag Metal	X	X		
Soluble compounds	X	X		
Sintered calcium chromate				X
Sintered chromium trioxide				X
Sodium azide		X		
Sodium bisulfite		X		
Sodium 2, 4-dichloro-phenoxyethyl sulfate, see Sesone				
Sodium fluoroacetate (1080)	X	X		
Sodium hydroxide	X	X		
Sodium metabisulfite		X		
Sodium saccharin			X	X
Soots, tars and mineral oils				X
Starch		X		
Stibine	X	X		
Sterigmatocystin				X
Stoddard solvent	X	X		
Streptozotocin			X	X
Strontium chromate				X
Strychnine	X	X		
Styrene, monomer	X	X		
Subtilisins (Proteolytic enzymes as 100% pure crystalline enzyme)		X		
Sucrose		X		
Sulfallate			X	
Sulfotep		X		
Sulfur dioxide	X	X		
Sulfur hexafluoride	X	X		
Sulfuric acid	X	X		
Sulfur monochloride	X	X		
Sulfur pentafluoride	X	X		
Sulfur tetrafluoride		X		
Sulfuryl fluoride	X	X		
Systox, see Demeton®				

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
2, 4, 5-T	X	X		
Tantalum	X	X		
TEDP, see Sulfotep				
Tellurium & compounds, as Te	X	X		
Tellurium hexafluoride, as Te	X	X		
Temephos		X		
TEPP	X	X		
Terphenyls	X	X		
Testosterone and its esters				X
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)			X	X
1,1,1,2-Tetrachloro-2, 2-difluoroethane	X	X		
1,1,2,2-Tetrachloro-1, 2-difluoroethane	X	X		
1,1,2,2-Tetrachloroethane	X	X		
Tetrachloroethylene, see Perchloroethylene				
Tetrachloromethane, see Carbon tetrachloride				
Tetrachloronaphthalene	X	X		
Tetraethyl lead, as Pb	X	X		
Tetrahydrofuran	X	X		
Tetramethyl lead, as Pb	X	X		
Tetramethyl succinonitrile	X	X		
Tetranitromethane	X	X		
Tetrasodium pyrophosphate		X		
Tetryl (2,4,6-trinitrophenyl-methylnitramine)	X	X		
Thallium Soluble compounds, as Tl	X	X		
Thioacetamide			X	X
4,4'-Thiobis (6-tert. butyl-m-cresol)		X		
4,4'-Thiodianiline				X
Thioglycolic acid		X		
Thiourea			X	X
Thiram	X	X		
Tin				
Metal		X		
Oxide & inorganic compounds, except SnO_4, as Sn		X		
Inorganic compounds, except oxides	X			
Organic compounds, as Sn	X	X		
Titanium dioxide, as Ti	X	X		
o-Tolidine		X		
Toluene (toluol)	X	X		
Toluene-2, 4-diisocyanate (TDI)	X	X		
o-Toluidine	X	X	X	X
o-Toluidine hydrochloride			X	
Toxaphene, see Chlorinated camphene				
Tributyl phosphate	X	X		
Trichloroacetic acid		X		

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SUBSTANCE/PROCESS	SOURCE[a] OSHA	ACGIH	NTP	IARC
1,2,4-Trichlorobenzene		X		
1,1,1-Trichloroethane, see Methyl chloroform				
1,1,2-Trichloroethane	X	X		
Trichloroethylene	X	X		
Trichlorofluoromethane (fluorotrichloromethane)		X		
Trichloromethane, see Chloroform				
2,4,6-Trichlorophenol				X
Trichloronaphthalene	X	X		
Trichloronitromethane, see Chloropicrin				
2,4,6-Trichlorophenol			X	
1,2,3-Trichloropropane	X	X		
1,1,2-Trichloro-1,2,2-trifluoroethane	X	X		
Tricyclohexyltin hydroxide, see Cyhexatin				
Triethylamine	X	X		
Trifluorobromomethane		X		
Trifluoromonobromomethane	X			
Trimellitic anyhdride		X		
Trimethylamine		X		
Trimethyl benzene		X		
Trimethyl phosphite		X		
2,4,6-Trinitrophenol, see Picric acid				
2,4,6-Trinitrophenyl-methylnitramine, see Tetryl				
2,4,6-Trinitrotoluene (TNT)	X	X		
Triorthocresyl phosphate	X	X		
Triphenyl amine		X		
Triphenyl phosphate	X	X		
Tris (1-aziridinyl) phosphine sulfate (Thiotepa)				X
Tris (1-aziridinyl) phosphine sulfide			X	
Tris (2,3-dibromopropyl) phosphate			X	
Trypan Blue (commercial grade)				X
Tungsten, as W				X
Insoluble compounds		X		
Soluble compounds		X		
Turpentine	X	X		
Uracil Mustard				X
Uranium (natural), Soluble	X	X		
& Insoluble compounds, as U	X	X		
Urethane			X	X
Valeraldehyde		X		
Vanadium, as V_2O_5, respirable dust & fume	X	X		
Vegetable oil mists		X		
Vinyl acetate		X		
Vinyl benzene, see Styrene				
Vinyl bromide		X		

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SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
Vinyl chloride (Chloroethylene)	X	X		X
Vinyl cyanide, see Acrylonitrile				
Vinyl cyclohexene dioxide		X		
Vinylidene chloride (1,1 Dichloroethylene)		X		
Vinyl toluene	X	X		
VM & P Naphtha		X		
Warfarin	X	X		
Welding fumes		X		
Wood dust (certain hard woods as beech & oak)		X		
Soft wood		X		
Xylene (o-, m-, p-isomers)(xylol)(Dimethyl benzene)	X	X		
m-Xylene a, a'-diamine		X		
Xylidine (Dimethylaminobenzene)	X	X		
Yttrium	X	X		
Zinc beryllium silicate				X
Zinc chloride fume	X	X		
Zinc chromate, as Cr		X		X
Zinc oxide				
Fume	X	X		
Dust		X		
Zinc stearate		X		
Zirconium compounds, as Zr	X	X		

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE (FOR USE IN COMPLYING WITH OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200)

SUBSTANCE/PROCESS	SOURCE* OSHA	ACGIH	NTP	IARC
MINERAL DUSTS				
Silica, SiO2				
Crystalline	X	X		
Quartz	X	X		
Cristobalite	X	X		
Tridymite	X	X		
Silica, fused		X		
Tripoli		X		
Amorphous, including natural diatomaceous earth	X	X		
Silicates (1% quartz)	X	X		
Asbestos	X	X	X	X
Graphite	X	X		
Mica	X	X		
Mineral Wool Fiber		X		
Perlite		X		
Portland Cement	X	X		
Soapstone	X	X		
Talc (non-asbestos)	X	X		
Talc (fibrous)	X	X		
Tremolite (talc, fibrous)	X			
Coal Dust	X	X		
Inert (Nuisance) Dust	X	X		

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HAZARDOUS CHEMICAL CLASSIFICATION GUIDE

*Sources used in compling this listing are as follows:

OSHA: 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration

ACGIH: Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment, 1983-1984 edition, American Conference of Governmental Industrial Hygienists

NTP: Annual Report on Carcinogens, third edition, National Toxicology Program, Public Health Service, U. S. Department of Health and Human Services

IARC: Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, 1982, International Agency for Research on Cancer, World Health Organization.

The OSHA Hazard Communication Standard, 29 CFR 1910.1200 (d)(3), states: "The chemical manufacturer, importer or employer (emphasis added) shall treat the (above) sources as establishing that the chemicals listed in them are hazardous."

This listing is considered a "baseline" for identification of chemicals designated as a "health hazard," and should not be considered all-inclusive. In addition to "health hazards," the OSHA definition of a "hazardous chemical" includes those representing "physical hazards" as well. A "physical hazard" is defined as any substance which is combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable or water-reactive. Any such substance must also be treated as a "hazardous chemical" for purposes of complying with the standard, regardless of whether it is included in this listing.

* Prepared by: Chemical Section Committee
National Safety Council
May, 1984

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WORLD HEALTH ORGANIZATION

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IARC MONOGRAPHS

ON THE

EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO HUMANS

Chemicals, Industrial Processes and Industries Associated with Cancer in Humans
IARC Monographs, Volumes 1 to 29

SUPPLEMENT 4

Report of an IARC *ad hoc* Working Group which met in Lyon, 8-12 February 1982 to advise the Director, IARC, on chemicals, industrial processes and industries that are carcinogenic for humans

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Group 2

The chemical, group of chemicals, industrial process or occupational exposure is probably carcinogenic to humans. This category includes exposures for which, at one extreme, the evidence of human carcinogenicity is almost '*sufficient*', as well as exposures for which, at the other extreme, it is inadequate. To reflect this range, the category was divided into higher (*Group A*) and lower (*Group B*) degrees of evidence. Usually, category 2A was reserved for exposures for which there was at least *limited evidence* of carcinogenicity to humans. The data from studies in experimental animals played an important role in assigning studies to category 2, and particularly those in Group B; thus, the combination of *sufficient evidence* in animals and inadequate data in humans usually resulted in a classification of 2B.

In some cases, the Working Group considered that the known chemical properties of a compound and the results from short-term tests allowed its transfer from Group 3 to 2B or from Group 2B to 2A.

Group 3

The chemical, group of chemicals, industrial process or occupational exposure cannot be classified as to its carcinogenicity to humans.

RESULTS AND CONCLUSIONS

The assessments of degrees of evidence for carcinogenicity to humans and in experimental animals and for activity in short-term tests, as well as the summary evaluations of carcinogenic risk to humans are given in Table 1.

Group 1: The Working Group concluded that the following 7 industrial processes and occupational exposures and 23 chemicals and groups of chemicals are causally associated with cancer in humans*.

Industrial processes and occupational exposures:

- Auramine manufacture
- Boot and shoe manufacture and repair (certain occupations)
- Furniture manufacture
- Isopropyl alcohol manufacture (strong-acid process)
- Nickel refining
- Rubber industry (certain occupations)
- Underground haematite mining (with exposure to radon)

Chemicals a:

4-Aminot
Analgesi:
Arsenic c
Asbestos
Azathiop
Benzene
Benzidine
N,N-Bis(2
Bis(chlor:
1,4-Buta:
Certain c
Chloram:
Chromiur
Conjuga:
Cyclophc
Diethylst
Melphala
Methoxs:
Mustard
2-Naphth
Soots, ta
Treosulp:
Vinyl chl

Group 2: T:
probably carcin

Group 2

Acrylonit:
Aflatoxin:
Benzo[a]:
Beryllium
Combine
Diethyl s:
Dimethyl
Manufac:
Nickel an
Nitrogen
Oxymeth:
Phenace
Procarba:
ortho-To:

* This list does not include known human carcinogens such as tobacco smoke, betel quid and alcoholic beverages, since they have not yet been covered in the *Monographs* programme

* The compound:
* Procarbazine, n
* Mineral oils m:
hydrocarbons.

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Chemicals and groups of chemicals:

4-Aminobiphenyl
Analgesic mixtures containing phenacetin[a]
Arsenic and arsenic compounds[a]
Asbestos
Azathioprine
Benzene
Benzidine
N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)
Bis(chloromethyl)ether and technical-grade chloromethyl methyl ether
1,4-Butanediol dimethanesulphonate (Myleran)
Certain combined chemotherapy for lymphomas[a] (including MOPP[b])
Chlorambucil
Chromium and certain chromium compounds[a]
Conjugated oestrogens[a]
Cyclophosphamide
Diethylstilboestrol
Melphalan
Methoxsalen with ultra-violet A therapy (PUVA)
Mustard gas
2-Naphthylamine
Soots, tars and oils[a,c]
Treosulphan
Vinyl chloride

Group 2: The following 61 chemicals, groups of chemicals or industrial processes are *probably* carcinogenic to humans

Group 2A

Acrylonitrile
Aflatoxins
Benzo[*a*]pyrene
Beryllium and beryllium compounds[a]
Combined oral contraceptives[a]
Diethyl sulphate
Dimethyl sulphate
Manufacture of magenta[a]
Nickel and certain nickel compounds
Nitrogen mustard
Oxymetholone
Phenacetin
Procarbazine
ortho-Toluidine

[a] The compound(s) responsible for the carcinogenic effect in humans cannot be specified.
[b] Procarbazine, nitrogen mustard, vincristine and prednisone
[c] Mineral oils may vary in composition, particularly in relation to their content of carcinogenic polycyclic aromatic hydrocarbons.

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Group 2B

Actinomycin D
Adriamycin
Amitrole
Auramine (technical grade)
Benzotrichloride
Bischloroethyl nitrosourea (BCNU)
Cadmium and cadmium compounds
Carbon tetrachloride
Chloramphenicol
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU)
Chloroform
Chlorophenols (occupational exposure to)[a]
Cisplatin
Dacarbazine
DDT
3,3'-Dichlorobenzidine
Dienoestrol
3,3'-Dimethoxybenzidine (*ortho*-Dianisidine)
Dimethylcarbamoyl chloride
1,4-Dioxane
Direct Black 38 (technical grade)
Direct Blue 6 (technical grade)
Direct Brown 95 (technical grade)
Epichlorohydrin
Ethinyloestradiol
Ethylene dibromide
Ethylene oxide
Ethylene thiourea
Formaldehyde (gas)
Hydrazine
Mestranol
Metronidazole
Norethisterone
Oestradiol-17β
Oestrone
Phenazopyridine
Phenytoin
Phenoxyacetic acid herbicides (occupational exposure to)[a]
Polychlorinated biphenyls
Progesterone
Propylthiouracil
Sequential oral contraceptives[a]
Tetrachlorodibenzo-*para*-dioxin (TCDD)
2,4,6-Trichlorophenol
Tris(aziridinyl)-*para*-benzoquinone (Triaziquone)
Tris(1-aziridinyl)phosphine sulphide (Thiotepa)
Uracil mustard

Group 3: The remaining 64 chemicals, groups of chemicals, industrial processes and occupational exposures could not be classified as to their carcinogenicity to humans.

[a] The compound(s) responsible for the probable carcinogenic effect in humans cannot be specified.

Table 1
process
animals

Chemica
or indus

Acryloni
Actinom
Adriamy
Aflatoxi
Aldrin
4-Amino
Amitrole
Anaesth
Analges
phena
Phena
Aniline
Arsenic
compo
Asbesto
Auramin
Manufac
Azathio
Benzene
Benzidir
Benzidir
Direct
gra
Direct
gra
Direct
gra
Beryllium
compo
N,N-Bis
napht
(Chlor
Bischlor
(BCN
Bis(chlo
techn
chlorc

[a] In *IA*
† This
beverages

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Table 1. Summary evaluations of carcinogenic risk to humans from chemicals, industrial processes and industries* based on evidence for carcinogenicity to humans and to animals and for activity in short-term tests†

Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
Acrylonitrile	limited	sufficient	sufficient	2A
Actinomycin D	inadequate	limited	sufficient	2B
Adriamycin	inadequate	sufficient	sufficient	2B
Aflatoxins	limited	sufficient	sufficient	2A
Aldrin	inadequate	limited	inadequate	3
4-Aminobiphenyl	sufficient	sufficient	sufficient	1
Amitrole	inadequate	sufficient	inadequate	2B
Anaesthetics, volatile	inadequate	inadequate	inadequate	3
Analgesic mixtures containing phenacetin	sufficient	limited	no data	1
Phenacetin	limited	sufficient	limited	2A
Aniline	inadequate	limited	inadequate	3
Arsenic and certain arsenic compounds	sufficient	inadequate	limited	1
Asbestos	sufficient	sufficient	inadequate	1
Auramine (technical grade)	limited	limited	sufficient	2B
Manufacture of auramine	sufficient	-	-	1
Azathioprine	sufficient	limited	sufficient	1
Benzene	sufficient	limited	limited	1
Benzidine	sufficient	sufficient	sufficient	1
Benzidine-based dyes				
Direct Black 38 (technical grade)	inadequate	sufficient	inadequate	2B
Direct Blue 6 (technical grade)	inadequate	sufficient	no data	2B
Direct Brown 95 (technical grade)	inadequate	limited	no data	2B
Beryllium and beryllium compounds	limited	sufficient	inadequate	2A
N,N-Bis(2-chloroethyl)-2-naphthylamine (Chlornaphazine)	sufficient	limited	limited	1
Bischloroethyl nitrosourea (BCNU)	inadequate	sufficient	sufficient	2B
Bis(chloromethyl)ether and technical-grade chloromethylmethyl ether	sufficient	sufficient	limited	1

rocesses and
ans.

* In *IARC Monographs* 1-29, for which data in humans were available

† This table does not include known human carcinogens such as tobacco smoke, betel quid and alcohol beverages, since they have not yet been considered in the *IARC Monographs*.

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Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
Bleomycins	inadequate	inadequate	sufficient	3
1,4-Butanediol dimethanesulphonate (Myleran)	sufficient	limited	sufficient	1
Cadmium and cadmium compounds	limited	sufficient	inadequate	2B
Carbon tetrachloride	inadequate	sufficient	inadequate	2B
Certain combined chemotherapy for lymphomas (including MOPP)	sufficient	-	inadequate	1
Chlorambucil	sufficient	sufficient	sufficient	1
Chloramphenicol	limited	inadequate	inadequate	2B
Chlordane/Heptachlor	inadequate	limited	inadequate	3
1-(2-Chloroethyl)-3-cyclohexyl-1-nitrosourea (CCNU)	inadequate	sufficient	sufficient	2B
Chlorinated toluenes (production of):				
Benzyl chloride	inadequate	limited	sufficient	3
Benzoyl chloride	inadequate	inadequate	inadequate	3
Benzal chloride	inadequate	limited	limited	3
Benzotrichloride	inadequate	sufficient	limited	2B
Chloroform	inadequate	sufficient	inadequate	2B
Chlorophenols (occupational exposure to)	limited	-	-	2B
Chloroprene	inadequate	inadequate	sufficient	3
Chromium and certain chromium compounds	sufficient	sufficient	sufficient (Cr VI) inadequate (Cr III)	1
Cisplatin	inadequate	limited	sufficient	2B
Clofibrate	inadequate	limited	inadequate	3
Clomiphene	inadequate	inadequate	no data	3
Cyclamates	inadequate	limited	inadequate	3
Cyclophosphamide	sufficient	sufficient	sufficient	1
2,4-D and esters (See also Phenoxyacetic acid herbicides, occupational exposure to)	inadequate	inadequate	inadequate	3
Dacarbazine	inadequate	sufficient	limited	2B
Dapsone	inadequate	limited	inadequate	3
DDT	inadequate	sufficient	inadequate	2B
ortho-Dichlorobenzene and *para*-Dichlorobenzene	inadequate	inadequate	inadequate	3

Chemica
or indus:

3,3'-Dich:
Dichloror
Dieldrin
Diethyl s:
3,3'-Dime
Dianisic
Dimethyic
Dimethyl
1,4-Dioxa:
Epichlorc
Ethylene
Ethylene
Ethylene
5-Fluorou:
Formalder
Hexachlor
Hydralazir
Hydrazine
Industries
Boot an
and re
occup
Carpent
expos
Furniture
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Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
3,3'-Dichlorobenzidine	inadequate	sufficient	sufficient	2B
Dichloromethane	inadequate	inadequate	limited	3
Dieldrin	inadequate	limited	inadequate	3
Diethyl sulphate	limited	sufficient	sufficient	2A
3,3'-Dimethoxybenzidine (*ortho*-Dianisidine)	inadequate	sufficient	limited	2B
Dimethylcarbamoyl chloride	inadequate	sufficient	sufficient	2B
Dimethyl sulphate	inadequate	sufficient	sufficient	2A
1,4-Dioxane	inadequate	sufficient	inadequate	2B
Epichlorohydrin	inadequate	sufficient	sufficient	2B
Ethylene dibromide	inadequate	sufficient	sufficient	2B
Ethylene oxide	inadequate	limited	sufficient	2B
Ethylene thiourea	inadequate	sufficient	limited	2B
5-Fluorouracil	inadequate	inadequate	limited	3
Formaldehyde (gas)	inadequate	sufficient	sufficient	2B
Hexachlorocyclohexane	inadequate	limited	inadequate	3
Hydralazine	inadequate	limited	sufficient	3
Hydrazine	inadequate	sufficient	sufficient	2B
Industries				
Boot and shoe manufacture and repair (certain occupations)	sufficient	-	-	1
Carpentry and joinery (certain exposures)	inadequate	-	-	3
Furniture manufacture	sufficient	-	-	1
Leather goods manufacture	inadequate	-	-	3
Leather tanning	inadequate	-	-	3
Lumber and sawmill industry	inadequate	-	-	3
Pulp and paper manufacture (certain exposures)	inadequate	-	-	3
Rubber industry (certain occupations)	sufficient	-	-	1
Iron dextran complex	inadequate	sufficient	inadequate	3
Isonicotinic acid hydrazide	inadequate	limited	limited	3
Lead and lead compounds	inadequate	sufficient (for some salts)	inadequate	3
Manufacture of isopropyl alcohol (strong-acid process)	sufficient	-	-	1
Isopropyl oils	inadequate	inadequate	no data	3
Manufacture of magenta	limited	-	-	2A
Magenta (technical grade)	inadequate	inadequate	inadequate	3
Melphalan	sufficient	sufficient	sufficient	1
6-Mercaptopurine	inadequate	inadequate	sufficient	3

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Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
Methotrexate	inadequate	inadequate	sufficient	3
Methoxsalen with ultraviolet A therapy (PUVA)	sufficient	sufficient	sufficient	1
Metronidazole	inadequate	sufficient	limited	2B
Mustard gas	sufficient	limited	sufficient	1
1-Naphthylamine	inadequate	inadequate	sufficient	3
2-Naphthylamine	sufficient	sufficient	sufficient	1
Nickel refining	sufficient	-	-	1
Nickel and certain nickel compounds	limited	sufficient	inadequate	2A
Nitrogen mustard (See also Certain combined chemotherapy for lymphomas)	inadequate	sufficient	sufficient	2A
Oestrogens and progestins				
Combined oral contraceptives	limited*	-	inadequate	2A
Sequential oral contraceptives	limited	-	-	2B
Other oestrogen-progestin combinations	inadequate	-	-	3
Conjugated oestrogens	sufficient	inadequate	inadequate	1
Oestrogens				
Dienoestrol	limited	inadequate	inadequate	2B
Diethylstilboestrol	sufficient	sufficient	inadequate	1
Ethinyloestradiol	inadequate	sufficient	inadequate	2B
Mestranol	inadequate	sufficient	inadequate	2B
Oestradiol-17β	inadequate	sufficient	inadequate	2B
Oestrone	inadequate	sufficient	inadequate	2B
Progestins:				
Chlormadinone acetate	inadequate	limited	inadequate	3
Dimethisterone	inadequate	inadequate	inadequate	3
Ethynodiol diacetate	inadequate	limited	inadequate	3
17α-Hydroxyprogesterone caproate	inadequate	inadequate	no data	3
Lynoestrenol	inadequate	inadequate	inadequate	3
Medroxyprogesterone acetate	inadequate	limited	inadequate	3
Megestrol acetate	inadequate	limited	inadequate	3
Norethisterone	inadequate	sufficient	inadequate	2B
Norethynodrel	inadequate	limited	inadequate	3
Norgestrel	inadequate	inadequate	no data	3
Progesterone	inadequate	sufficient	inadequate	2B

* Sufficient for liver adenomas

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Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
Oxymetholone	limited	no data	no data	2A
Pentachlorophenol (See also Chlorophenols, occupational exposure to)	inadequate	inadequate	inadequate	3
Phenazopyridine	inadequate	sufficient	no data	2B
Phenelzine	inadequate	limited	inadequate	3
Phenobarbital	inadequate	limited	inadequate	3
Phenoxyacetic acid herbicides (occupational exposure to)	limited	-	-	2B
Phenylbutazone	inadequate	no data	inadequate	3
N-Phenyl-2-naphthylamine	inadequate	inadequate	inadequate	3
Phenytoin	limited	limited	inadequate	2B
Polychlorinated biphenyls	inadequate	sufficient	inadequate	2B
Prednisone (See also Certain combined chemotherapy for lymphomas)	inadequate	inadequate	inadequate	3
Procarbazine (See also Certain combined chemotherapy for lymphomas)	inadequate	sufficient	sufficient	2A
Propylthiouracil	inadequate	sufficient	no data	2B
Reserpine	inadequate	limited	inadequate	3
Saccharin	inadequate	limited	inadequate	3
Soots, tars and oils	sufficient	sufficient	-	1
Benzo[*a*]pyrene	inadequate	sufficient	sufficient	2A
Spironolactone	inadequate	limited	no data	3
Styrene	inadequate	limited	sufficient	3
Styrene oxide	inadequate	limited	sufficient	3
Sulfafurazole	inadequate	inadequate	inadequate	3
Sulfamethoxazole	inadequate	limited	inadequate	3
2,4,5-T and esters (See also Phenoxyacetic acid herbicides, occupational exposure to)	inadequate	inadequate	inadequate	3
Tetrachlorodibenzo-*para*-dioxin (TCDD)	inadequate	sufficient	inadequate	2B
Tetrachloroethylene	inadequate	limited	inadequate	3
ortho-Toluidine	inadequate	sufficient	sufficient	2A
Treosulphan	sufficient	no data	inadequate	1
Trichloroethylene	inadequate	limited	inadequate	3
2,4,5-Trichlorophenol (See also Chlorophenols, occupational exposure to)	inadequate	inadequate	no data	3
2,4,6-Trichlorophenol (See also Chlorophenols, occupational exposure to)	inadequate	sufficient	no data	2B

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Chemical, process or industry	Evidence for carcinogenicity in humans	Evidence for carcinogenicity in animals	Evidence for activity in short-term tests	Summary evaluation of carcinogenic risk to humans
Tris(aziridinyl)-*para*-benzoquone (Triaziquone)	inadequate	limited	sufficient	2B
Tris(1-aziridinyl)phosphine sulphide (Thiotepa)	inadequate	sufficient	sufficient	2B
Underground haematite mining (with exposure to radon)	sufficient	-	-	1
Haematite	inadequate	inadequate	inadequate	3
Uracil mustard	inadequate	sufficient	sufficient	2B
Vinblastine	inadequate	inadequate	inadequate	3
Vincristine (See also Certain combined chemotherapy for lymphomas)	inadequate	inadequate	inadequate	3
Vinyl chloride	sufficient	sufficient	sufficient	1
Vinylidene chloride	inadequate	limited	sufficient	3

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1983 NTP Carcinogen List

TABLE 43

CHEMICALS, SUBSTANCES AND MANUFACTURING PROCESSES
INCLUDED IN THE THIRD ANNUAL REPORT ON CARCINOGENS

1. 2-Acetylaminofluorene
2. Acrylonitrile
3. Aflatoxins
4. 2-Aminoanthraquinone
5. 4-Aminobiphenyl
6. 1-Amino-2-Methylanthraquinone
7. Amitrole
8. o-Anisidine Hydrochloride
9. Aramite
10. Arsenic and certain arsenic compounds
11. Asbestos
12. Auramine, Manufacture of
13. Benz(a)anthracene
14. Benzene
15. Benzidine
16. Benzo(b)fluoranthene
17. Benzo(a)pyrene
18. Beryllium and Certain Beryllium Compounds
19. N,N-bis(2-chloroethyl)-2-naphthylamine
20. Bis(chloromethyl)ether and technical grade chloromethylmethyl ether
21. Cadmium and Certain Cadmium Compounds
22. Carbon Tetrachloride
23. Chlorambucil
24. Chloroform
25. Chromium and certain chromium compounds
26. Coke oven emissions
27. p-Cresidine
28. Cupferron
29. Cycasin
30. Cyclophosphamide
31. 2,4-Diaminoanisole Sulfate
32. 2,4-Diaminotoluene
33. Dibenz(a,h)acridine
34. Dibenz(a,j)acridine
35. Dibenz(a,h)anthracene
36. 7H-Dibenzo(c,g)carbazole
37. Dibenzo(a,h)pyrene
38. Dibenzo(a,i)pyrene
39. 1,2-Dibromo-3-chloropropane
40. 1,2-Dibromoethane
41. Dichlorobenzidine
42. 1,2-Dichloroethane
43. Diepoxybutane
44. Di(2-ethylhexyl)phthalate

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TABLE 43 (Continued)

45. Diethylstilboestrol
46. 3,3'-Dimethoxybenzidine
47. 3,3'-Dimethylbenzidine
48. 4-Dimethylaminoazobenzene
49. Dimethylcarbamoyl Chloride
50. Dimethyl Sulfate
51. 1,4-Dioxane
52. Direct Black 38
53. Direct Blue 6
54. Ethylene Thiourea
55. Formaldehyde
56. Haematite underground mining
57. Hexachlorobenzene
58. Hydrazine and Hydrazine Sulfate
59. Hydrazobenzene
60. Indeno(1,2,3-cd)pyrene
61. Iron Dextran
62. Isopropyl Alcohol
63. Kepone
64. Lead Acetate and Lead Phosphate
65. Lindane and Other Hexachlorocyclohexane Isomers
66. Melphalan
67. 4,4'-Methylene bis(2-chloroaniline)
68. 4,4'-Methylene bis(N,N-dimethyl) benzenamine
69. Michler's Ketone
70. Mirex
71. Mustard gas
72. 2-Naphthylamine
73. Nickel refining
74. Nitrilotriacetic acid
75. Nitrofen
76. 5-Nitro-o-anisidine
77. N-Nitrosodi-n-butylamine
78. N-Nitrosodiethanolamine
79. N-Nitrosodiethylamine
80. N-Nitrosodimethylamine
81. p-Nitrosodiphenylamine
82. N-Nitrosodi-n-propylamine
83. N-Nitroso-N-ethylurea
84. N-Nitroso-N-methylurea
85. N-Nitrosomethylvinylamine
86. N-Nitrosomorpholine
87. N-Nitrosonornicotine
88. N-Nitrosopiperidine
89. N-Nitrosopyrrolidine
90. N-Nitrososarcosine
91. Oxymetholone
92. Phenacetin

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TABLE 43 (Continued)

93. Phenazopyridine hydrochloride
94. Phenytoin
95. Polybrominated Biphenyls
96. Polychlorinated Biphenyls
97. Procarbazine and Procarbazine Hydrochloride
98. β-Propiolactone
99. Reserpine
100. Saccharin
101. Safrole
102. Selenium Sulfide
103. Soots, tars and mineral oils
104. Streptozotocin
105. Sulfallate
106. 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)
107. Thioacetamide
108. Thiourea
109. Thorium dioxide
110. o-Toluidine Hydrochloride
111. Toxaphene
112. 2,4,6-Trichlorophenol
113. Tris(1-aziridinyl)phosphine sulfide
114. Tris(2,3-dibromopropyl)phosphate
115. Urethane
116. Vinyl chloride

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[Editor's note: The Occupational Safety and Health Administration's cotton dust standard was vacated and remanded to OSHA by the U.S. Court of Appeals for the Fifth Circuit November 14, 1980, for further consideration of issue of significant risk of material health impairment that may be remedied by a reasonably necessary and appropriate standard.]

§ 1910.1046 Exposure to cotton dust in cotton gins.

[Section 1910.1046 deleted by 46 FR 32021, June 19, 1981]

§ 1910.1200 Hazard communication.

[Sec. 1910.1200 added by 48 FR 53280, November 25, 1983]

(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 requirements 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),

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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.

"Container" means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that containes 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, grounds maintenance personnel, security personnel or non-resident management are generally not included, unless their job performance routinely involves potential exposure to hazardous chemicals.

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

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

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

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

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

(ii) "Gas, flammable" means:

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

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

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

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

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

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24–1979 (ASTM D 56–79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100°F (37.8°C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (see American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7–1979 (ASTM D 93–79)) for liquids with a viscosity equal to or greater than 45 SUS a 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

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

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

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

"Importer" means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or 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 (including chemical name or other unique chemical identifier) that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it.

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

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

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

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

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

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

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

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

(i) 29 CFR Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA); or,

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

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

(4) Chemical manufacturers, importers and employers evaluating chemicals shall treat the following sources as

[Sec. 1910.1200(d)(4)]

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establishing that a chemical is a carcinogen or potential carcinogen for hazard communication purposes:

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

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

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

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

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

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

(ii) If a mixture has not been tested as a whole to determine whether the mixture is a health hazard, the mixture shall be assumed to present the same health hazards as do the components which comprise one percent (by weight or volume) or greater of the mixture, except that the mixture shall be assumed to present a carcinogenic hazard if it contains a component in concentrations of 0.1 percent or greater which 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 percent) could be released in concentrations which would exceed an established OSHA permissible exposure limit or ACGIH Threshold Limit Value, or could present a health 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

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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:

(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,

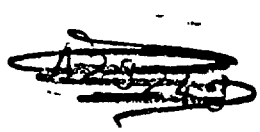
(xii) The name, address and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the material safety data sheet, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

(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 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



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[Sec. 1910.1200(g)(6)]



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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 the used; and,

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

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

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

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

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

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

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

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

(i) the request is in writing;

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

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

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

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

(D) To provide medical treatment to exposed employees;

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

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

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

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

(A) The properties and effects of the chemical;

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

(C) Methods of monitoring and

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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,

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

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

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

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

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

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

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

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

(i) Be provided to the health professional within thirty days of the request;

(ii) Be in writing;

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

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

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

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

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

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

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

(iii) The health professional has demonstrated adequate means to protect the confidentiality.

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

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

(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 referrable 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.

(j) *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, including 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),

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[Appendix A to Sec. 1910.1200]

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health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body—such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees—such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(b) A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

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

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

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

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

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

(c) A chemical that has a median lethal concentration (LC_{50}) in air of

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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 Hygienists, 6500 Glenway Avenue, Bldg. D-5, Cincinnati, OH 45211

Note.—The following documents are on sale by the Superintendent 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 Occupational Safety and Health
1. Criteria for a recommended standard • • • Occupational Exposure to "——"
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Toxicology Data Bank (TDB)
MEDLIN
TOXLINE
CANCERLIT
RTECS

§1910.1499 Source of standards.

Section 1910.1000— 41 FR 50-204.50, except for Table Z-3, the source of which is American National Standards Institute, Z37 series

[Sec. 1910.1499 added at 40 FR 23073, May 28, 1975]

§ 1910.1500 Standards organizations.

Specific standards of the following organizations have been referred to in this subpart. Copies of the standards may be obtained from the issuing organization.

American Conference of Governmental Industrial Hygienists.
1014 Broadway
Cincinnati, Ohio 45202

American National Standards Institute
1430 Broadway.
New York, New York 10018

[Section 1910.1500 added at 40 FR 23073, May 28, 1975; corrected at 43 FR 57601, December 8, 1978, to delete listing of National Tire Protection Association]

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PRODUCT SAFETY COMMUNICATIONS COMMITTEE MEETING
Danbury, Connecticut - December 9, 1981

ATTENDEES:

R. W. Rebholz - Metals Division
W. G. Whitehead - Home and Automotive
S. H. Henry - Linde
Eleanor Jensen - Linde
J. S. Lovell - Agricultural Products
S. R. Converse - Battery Products
M. D. Michaud - Distribution
M. G. Manetti - Law Department
L. A. Crisorio - HS&EA
R. N. Wheeler, Jr. - HS&EA

I. Classification of Carcinogens

Mr. L. A. Crisorio reviewed the Health Effects Review Process (HERB). The Health Effects Review Board has the primary responsibility for gathering input from all interested components, departments and outside organizations to screen materials for review, request studies and other data on the material and to recommend classification of the hazard with necessary exposure standards. (See Figure I)

The Toxicity Assessment and Advisory Committee (TAAC) is one of the resources available to HERB for use in classification of hazardous materials and in recommending exposure standards. TAAC is composed of scientific, medical and safety personnel whose function is to impartially review available health effects data on a material and recommend classification of the material as a particular type of health hazard. In the case of carcinogens the classifications and their definitions to be used by TAAC are shown on Figure II. Persons assigned to TAAC are shown on Figure III. Most of these persons have been functioning as the disbanded MUCAT Committee.

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Concern was expressed that TAAC might consider only substances in its classification of materials as carcinogens and not consider the product which could be relatively non-hazardous by virtue of its form, the concentration of the carcinogen in the product or the lack of a route for human exposure. An addition to the TAAC definitions of carcinogens such as the following:

Product Classification. Individual products containing the carcinogenic substances identified by TAAC will be evaluated considering the substance in the product it or the products form, the substances concentration in the product and the probability of human exposure by various routes. A product containing a carcinogen may be exempted from the labeling and other requirements if the carcinogen is present in very low concentrations, if the product form obviates possible human exposure or if other factors render it not a carcinogenic hazard.

The Health Effects Review Board is a new concept and its operating procedures are not well defined. Currently, HERB is working on criteria for screening materials, i.e., do they require HERB action and review or not? Persons assigned to HERB are shown on Figure IV. There are no permanently assigned component members since these are to vary depending on the subject for board action. When a material is selected for review interested component personnel will be notified so that they may attend and provide their input.

COMMENTS:

Concern was expressed as to how many governmental departments require MSDS as defined by OSHA Form-20. The Department of Defense was identified as requiring the OSHA Form-20.

Linde was concerned as to TAAC initiating material inquiry and classification independently of HERB.

Home and Automotive would like to see a common vocabulary for medical, toxicity data and warning statements for labels and MSDS.

II. Chronic Health Hazard Labeling - Carcinogens Policy Draft

Mr. Crisorio introduced a new draft policy on carcinogen labeling (Figure V), replacing the draft provided in his letter dated December 1, 1981. The change was made to comply more fully with Category I policy.

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The Committee discussed the proposed policy at length and modified it as shown in Figure VI. Other comments offered for consideration are:

1. Proposed Policy - Page 1

   Purpose and Background

   ....

   The first three paragraphs might be modified slightly and used as a general purpose background for an overall chronic health hazard labeling policy since other chronic hazards will be the subject of further policies.

2. The TAAC definition of animal carcinogen should be modified to include the following:

   If there is sufficient credible evidence to suggest that a chemical substance which could otherwise be classified as an animal carcinogen may not be carcinogenic in man (metabolism studies, etc.), such chemical substance need not be labeled pursuant to this policy. However, in such instances, the appropriate information shall be noted in the MSDS and other relevant product safety communications.

3. An item 5 should be added to the policy such as:

   If there is sufficient credible evidence to suggest that a chemical substance which could otherwise be classified as an animal carcinogen, may not be carcinogenic in man (metabolism studies, etc.), such chemical substance need not be labeled pursuant to this policy provided HERB and TAAC concur. However, in such instances, the appropriate information shall be noted in the MSDS and other relevant product safety communications.

The Committee will meet January 15, 1982 in Danbury to review the new draft of the Chronic Health Hazard - Carcinogen Labeling Policy incorporating these changes as well as the draft Distributor Policy.

R. N. Wheeler

R. N. Wheeler, Jr.

RNWjr/dh

Attachments

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Decision Flowchart - Health Effects Review Process

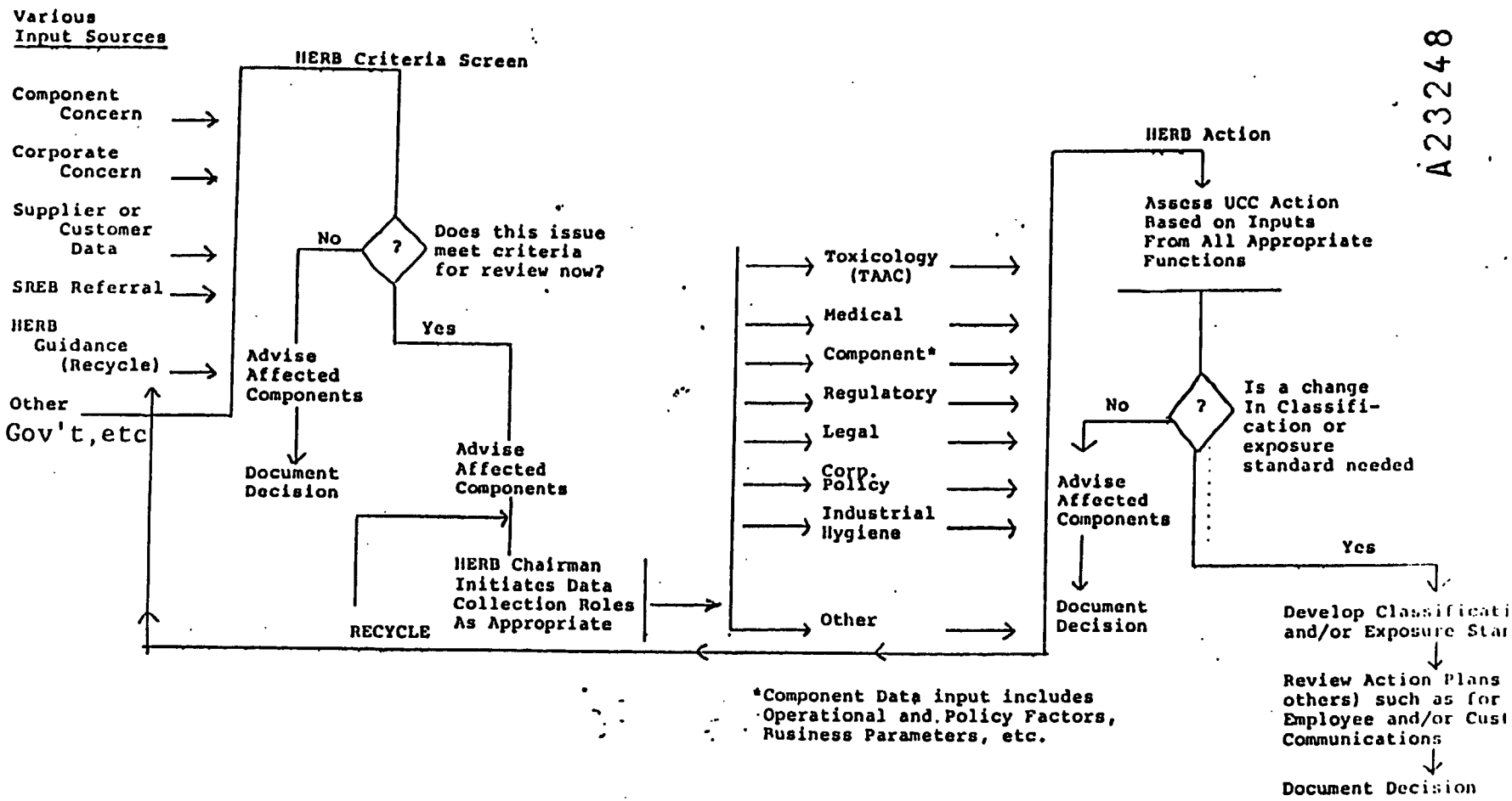


FIGURE I

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DEFINITIONS

KNOWN HUMAN CARCINOGEN - APPLIED TO ANY MATERIAL WHERE THERE IS SUFFICIENT CREDIBLE AND RELEVANT EVIDENCE, BASED PRINCIPALLY ON OBSERVATIONS OF EXPOSED HUMAN POPULATIONS, WHICH DEMONSTRATES THAT THE MATERIAL HAS CAUSED CANCER IN HUMANS.

SUSPECT HUMAN CARCINOGEN - APPLIED TO ANY MATERIAL FOR WHICH THERE IS SUFFICIENT CREDIBLE EVIDENCE, BASED ON ANIMAL AND OTHER RELATED STUDIES, THAT THE MATERIAL IS CARCINOGENIC IN LABORATORY ANIMALS, AND FOR WHICH OTHER RELEVANT INFORMATION IS AVAILABLE TO DETERMINE THAT THE MATERIAL MIGHT ALSO BE CARCINOGENIC FOR HUMANS.

ANIMAL CARCINOGEN - APPLIED TO ANY MATERIAL FOR WHICH THERE IS SUFFICIENT CREDIBLE EVIDENCE, BASED ON ANIMAL AND OTHER RELATED STUDIES, THAT THE MATERIAL IS CARCINOGENIC IN LABORATORY ANIMALS, BUT FOR WHICH THERE IS INSUFFICIENT EVIDENCE TO ALLOW A DETERMINATION OF THE POTENTIAL FOR CARCINOGENICITY IN HUMANS.

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FIGURE II

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TOXICITY ASSESSMENT & ADVISORY COMMITTEE (TAAC)

DR. B. BALLANTYNE - CHAIRMAN - DIRECTOR - CORPORATE APPLIED TOXICOLOGY

DR. S. G. AUSTIN - CORPORATE MEDICAL EPIDEMIOLOGY
MR. N. E. BOLTON - HS&EA - INDUSTRIAL HYGIENE
MRS. S. D. CONNER - CORP. APPLIED TOXICOLOGY
MR. R. W. COPE - HS&EA - INDUSTRIAL HYGIENE
MR. L. A. CRISORIO - HS&EA - PRODUCT SAFETY
MR. N. W. GAINES - HS&EA - OCCUPATIONAL HEALTH
DR. R. H. GARMAN - BUSHY RUN RES. CNTR. - PATHOLOGY
MR. R. G. HANLON - HS&EA - INDUSTRIAL HYGIENE
DR. W. C. KURYLA - CORP. ALLIED TOXICOLOGY
DR. A. A. LANG - CORPORATE MEDICAL DEPT.
DR. T. A. LINCOLN - CORP. MEDICAL DIRECTOR
DR. M. J. MAKOWSKY - CORPORATE MEDICAL DEPT.
DR. R. S. SLESINSKI - BUSHY RUN RES. CNTR. - CYTOGENETICS
DR. T. R. TYLER - CORPORATE APPLIED TOXICOLOGY

OPERATING COMPONENTS BRING CANDIDATE SUBSTANCES TO TAAC FOR CONSIDERATION OF ITS TOXICOLOGICAL PROPERTIES.

FIGURE III

A2325C

HEALTH EFFECTS REVIEW BOARD

MR. A. G. VORESS - CHAIRMAN - HS&EA - OCCUPATIONAL HEALTH DIRECTOR

DR. B. BALLANTYNE - HS&EA - APPLIED TOXICOLOGY
MR. N. E. BOLTON - HS&EA - INDUSTRIAL HYGIENE
MR. R. A. BUTLER - CORPORATE LAW DEPT.
MR. T. W. CARMODY - HS&EA - PRODUCT SAFETY DIRECTOR
DR. F. R. FRANK - HS&EA - BUSY RUN RESEARCH CENTER DIRECTOR
MR. N. W. GAINES - HS&EA - OCCUPATIONAL HEALTH
DR. D. L. HEYWOOD - HS&EA - PRODUCT SAFETY GOV'T REGULATIONS
DR. T. A. LINCOLN - HS&EA - CORPORATE MEDICAL DEPT.
MR. J. W. WHITTLESEY - CORPORATE LAW DEPT.

REPRESENTATIVE FROM PRINCIPALLY AFFECTED COMPONENTS

FIGURE IV

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SUBJECT	SECTION	
CHRONIC HEALTH HAZARD LABELING CARCINOGENS	Policies/Communications	
	DATE 11/30/81	PAGE 1 of 3
	APPLIES TO ☒ UNITED STATES	☐ INTERNATIONAL

PURPOSE/BACKGROUND

One element of an effective precautionary labeling program is inclusion of warnings for chronic health hazards that potentially might arise from improper use and/or exposure to the involved hazardous chemical substance. This policy concerns the hazard warnings that should be used for those hazardous chemical substances that have demonstrated carcinogenic potential.

Some state governments and the Federal Government have exercised authority in mandating hazard warnings for hazardous chemical substances demonstrating carcinogenic activity. This policy will supplement and not supplant such authority.

Precautionary labeling is a part of our product safety program furnishing customers with information about the potential hazard and the safe handling of our products and this policy is merely an extension of our Precautionary Labeling Policy.

The labeling of carcinogens are treated as a special class for several important reasons; they have a long latency period before the adverse effects are observable and the determination of material possessing carcinogen potential is complex and requires the judgement of trained professional toxicologists and/or doctors. Proper product labeling is essential for the safe use of hazardous chemical substances including carcinogens and products demonstrating potential to cause other chronic health hazards.

The purpose of this policy is to provide a basis for management programs to identify potential carcinogen materials and provide for their uniform labeling.

The Corporate Product Safety Policy states:

"Union Carbide will:

"Regularly review product safety information and in the light of new experience of Union Carbide and others,- - - and, if appropriate, - - - - , modify the product safety communications."

It further states:

A23252

"Comply with all applicable governmental laws and regulations relating to product safety."

FIGURE V

SUBJECT	SECTION	
CHRONIC HEALTH HAZARD LABELING CARCINOGENS	Policies/Communications	
	DATE: 11/30/81	PAGE: 2 of 3
	APPLIES TO: ☒ UNITED STATES ☐ INTERNATIONAL	

POLICY

1. Evaluation of potential human health effects is the responsibility of the Health Effects Review Board (HERB).

2. HERB shall, if appropriate, classify particular chemical substances in one of three categories of carcinogen potential;

Known Human Carcinogen

Suspect Human Carcinogen

Animal Carcinogen

3. All government mandated carcinogen labeling requirements will be complied with and in the event that the UCC labeling requirement is different, the government mandated requirement shall be followed, unless there is a need for both labeling requirements.

4. The precautionary labeling of chemical substances which have been evaluated and classified by HERB shall contain the appropriate hazard warning statement:

Category	Warning Statement
Known Human Carcinogen	Human Cancer Agent
Suspect Human Carcinogen	Suspect Cancer Agent
Animal Carcinogen	Has caused Cancer in Laboratory Animals

The elements of the precautionary label of carcinogens shall be placed as follows:

(a) Signal Word: Label will have Signal Word appropriate to most significant hazard. If cancer is the major risk WARNING is the appropriate Signal Word.

(b) Placement: Directly following Hazard Statement for the most immediate and serious risks (such as flammability, poisoning and serious burns); or directly under product name if no more serious product hazards are involved.

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(c) Name: Known or Suspect Human Carcinogens or Animal Carcinogens must be designated by their common or usual chemical name which may be in addition to trade or code names.

(d) Precautionary Measures: Appropriate list of precautions depending on whether risk is from skin absorption, inhalation and/or ingestion.

SCOPE

This policy applies to all parts of UCC except to products and services of the Nuclear Division regulated by the Department of Defense, Department of Energy or Nuclear Regulatory Committee and to all affiliates worldwide in which UCC has a greater than fifty percent equity interest and is recommended for application in affiliates of fifty percent or less equity interest.

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UNION CARBIDE CORPORATE PRODUCT SAFETY MANUAL DRAFT

SUBJECT	SECTION	
CHRONIC HEALTH HAZARD CARCINOGENS LABELING	Policies/Communications	
	DATE 12/9/81	PAGE 1 of 3
	APPLIES TO ☒ UNITED STATES	☐ INTERNATIONAL

PURPOSE/BACKGROUND

One element of an effective precautionary labeling program is inclusion of warnings for chronic health hazards that potentially might arise from improper use and/or exposure to the involved hazardous chemical substance. This policy concerns the hazard warnings that should be used for those hazardous chemical substances that have demonstrated carcinogenic potential.

Some state governments and the Federal Government have exercised authority in mandating hazard warnings for hazardous chemical substances demonstrating carcinogenic activity. This policy will supplement and not supplant such authority.

Precautionary labeling is a part of our product safety program furnishing customers with information about the potential hazard and the safe handling of our products and this policy is merely an extension of our Precautionary Labeling Policy.

The labeling of carcinogens are treated as a special class for several important reasons; they have a long latency period before the adverse effects are observable and the determination of material possessing carcinogen potential is complex and requires the judgement of trained professional toxicologists and/or doctors. Proper product labeling is essential for the safe use of hazardous chemical substances including carcinogens and products demonstrating potential to cause other chronic health hazards.

The purpose of this policy is to provide a basis for management programs to identify potential carcinogen materials and provide for their uniform labeling.

The Corporate Product Safety Policy states:

"Union Carbide will:

"Regularly review product safety information and in the light of new experience of Union Carbide and others,- - -' and, if appropriate, - - - - , modify the product safety communications."

It further states:

A23255

"Comply with all applicable governmental laws and regulations relating to product safety."

FIGURE VI

UNION CARBIDE CORPORATE PRODUCT SAFETY MANUAL DRAFT

SUBJECT	SECTION	
CHRONIC HEALTH HAZARD CARCINOGENS LABELING	Policies/Communications	
	DATE 12/9/81	PAGE 2 of 3
	APPLIES TO ☒ UNITED STATES	☐ INTERNATIONAL

POLICY

1. Evaluation of potential human health effects is the responsibility of the Health Effects Review Board (HERB).

2. HERB shall, if appropriate, classify particular products in one of three categories of carcinogen potential;

Human Carcinogen

Suspect Human Carcinogen

Animal Carcinogen

3. All government mandated carcinogen labeling requirements shall be complied with. If UCC labeling requirements are more stringent than the government's additional labeling statements may be added provided they do not detract from or contradict the government mandated label.

4. Unless governmental regulations mandate otherwise, the precautionary labeling of products which have been evaluated and classified by HERB shall contain the appropriate hazard statement:

Category	Warning Statement
Human Carcinogen	Cancer Hazard
Suspect Human Carcinogen	Suspect Cancer Hazard
Animal Carcinogen	Causes Cancer in Some Laboratory Animals

The elements of the precautionary label of carcinogenic products shall be placed as follows:

(a) Signal Word: Label will have Signal Word appropriate to most significant hazard. If cancer is a risk, no signal word for it is required.

(b) Placement: Directly following Hazard Statement for the most immediate and serious risk (such as flammability, poisoning and serious burns); or directly under product name if no more serious product hazards are involved.

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(c) Name: Human or Suspect Human Carcinogens or Animal Carcinogens must be designated by their common or usual chemical name which may be in addition to trade or code names.

(d) Precautionary Measures: Appropriate list of precautions depending on whether risk is from skin absorption, inhalation and/or ingestion.

5. If there is sufficient credible evidence to suggest that a chemical substance which could otherwise be classified as an animal carcinogen, may not be carcinogenic in man (metabolism studies, etc.), such chemical substance need not be labeled pursuant to this policy provided HERB and TAAC concur. However, in such instances, the appropriate information shall be noted in the MSDS and other relevant product safety communications.

SCOPE

This policy applies to all parts of UCC except to products and services of the Nuclear Division regulated by the Department of Defense, Department of Energy or Nuclear Regulatory Committee and to all affiliates worldwide in which UCC has a greater than fifty percent equity interest and is recommended for application in affiliates of fifty percent or less equity interest.

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side)

NOTES OF EXPLANATION:

1. A material is included on this list on the basis of a detailed review of published toxicological, medical and epidemiological information by the Union Carbide Corporate "Mutagen, Carcinogen and Teratogen (MuCaTT) Committee".

2. This listing is periodically reviewed. New entries are made, or existing ones modified, when the MuCaTT Committee determines that there is sufficient credible evidence for such an action.

3. (a) The entries marked with an asterisk [*] are those which have not yet been formally reviewed and verified by the MuCaTT Committee as part of a current updating procedure. Those so marked will be reviewed during 1981.

   (b) No entry indicates that information has not been located to allow a decision on carcinogenic or teratogenic potential.

   (c) The symbol [—] indicates that the available evidence is sufficient to determine that a material does not cause a given effect.

DEFINITIONS:

1. Known Human Carcinogen means a substance for which there is sufficient credible evidence to determine that the material has caused cancer in humans.

2. Suspect Cancer Agent means a substance for which there is credible scientific evidence, based on animal and other related studies, that the material is carcinogenic in laboratory animals, but for which there is insufficient evidence that the substance causes cancer in man.

3. Teratogen means a chemical substance or physical agent which causes abnormalities in structural and/or functional development during gestation.

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
2-Acetylamino fluorene	53-96-3	Suspect cancer agent	Teratogen*	No exposure (UCC)
Acrylonitrile	107-13-1	Known human carcinogen	Teratogen*	2 ppm 10 ppm C (OSHA)
4-Aminodiphenyl	92-67-1	Known human carcinogen		No exposure (UCC)
Asbestos	1332-21-4	Known human carcinogen		2 Fibers/cc > 5 μm long (ACGIH)
Benzene	71-43-2	Known human carcinogen	Teratogen	10 ppm (OSHA)
Benzidine	92-87-5	Known human carcinogen		No exposure (UCC)
Benzidine-derived dyes		Known human carcinogens		No exposure (UCC)
Bis-2-Chloroethyl ether	111-44-4	Suspect cancer* agent		0.1 ppm (UCC)
Bis-2-Chloroethyl-2-naphthylamine	494-03-1	Known human* carcinogen		No exposure (UCC)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Bis-Chloromethyl ether	542-88-1	Known human carcinogen		0.001 ppm (ACGIH)
Cadmium	7440-43-9	Suspect cancer agent	Teratogen*	40 $\mu g/m^3$ 200 $\mu g/m^3$ C (UCC)
Carbon tetra-chloride	56-23-5	Suspect cancer agent	Teratogen*	2 ppm 4 ppm C (UCC)
Chloroform	67-66-3	Suspect cancer agent	Teratogen*	2 ppm 4 ppm C (UCC)
Chloroprene	126-99-8	Suspect cancer* agent		1 ppm (UCC)
Chromates of Lead and Zinc		Suspect cancer agents		0.05 mg/m^3 (as Cr) (ACGIH)
Chromium-6 compounds (See footnore below)		Suspect cancer agents		1 $\mu g/m^3$ (UCC)
Di-Sec-butoxy-acetophenone	68109-57-9	Suspect cancer* agent		No skin or oral contact (UCC)

Footnote: Structurally related organo-chromates should be regarded as suspect cancer agents (such as Bis-triphenyl silyl chromate.)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
3,3'-Dichloro-benzidine (and salts)	91-94-1	Suspect cancer agent(s)		No exposure (UCC)
Diethyl sulfate	64-67-5	Suspect cancer agent		1 ppm No skin or oral contact (UCC)
Diisopropyl sulfate	2973-10-6	Suspect cancer* agent		1 ppm No skin or oral contact (UCC)
Dimethylacetamide	127-19-5		Teratogen*	10 ppm No skin contact (OSHA, UCC)
4-Dimethylamino-azobenzene	60-11-7	Suspect cancer agent		No exposure (OSHA)
Dimethyl formamide	68-12-2		Teratogen*	10 ppm No skin contact (OSHA, UCC)
Dimethyl sulfate	77-78-1	Suspect cancer agent		0.1 ppm No skin or oral contact (ACGIH, UCC)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Dimethyl sulfoxide	67-68-5		Teratogen*	10 ppm No skin contact (UCC)
1,4-Dioxane	123-91-1	Suspect cancer agent		50 ppm No skin or oral contact (UCC)
Dioxin	1746-01-6	Suspect cancer* agent	Teratogen	No exposure (UCC)
Oripolenes-A,B,C		Suspect cancer agents		600 $\mu g/m^3$ No skin contact (UCC)
Epichlorohydrin	106-89-8	Suspect cancer agent		0.5 ppm (UCC)
Epoxy resin ERL-2774	25068-38-6	Suspect cancer agent		10 ppm No skin or oral contact (UCC)
Epoxy resin ERL-4205	2386-90-5	Suspect cancer agent		10 ppm No skin or oral contact (UCC)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Epoxy resin ERL-4206	106-87-6	Suspect cancer agent		10 ppm No skin or oral contact (UCC)
Epoxy resin ERL-4234	26616-47-7	Suspect cancer agent		10 ppm No skin or oral contact (UCC)
2-Ethoxyethanol (CELLOSOLVE®)	110-80-5		Teratogen	100 ppm (ACGIH)
Ethylene dibromide	106-93-4	Suspect cancer agent		0.1 ppm (UCC)
Ethylene dichloride	107-06-2	Suspect cancer agent		5 ppm (UCC)
Ethyleneimine	151-56-4	Suspect cancer agent		No exposure (OSHA)
Ethylene oxide	75-21-8	Suspect cancer agent		5 ppm (UCC)
Ethylene thiourea	96-45-7	Suspect cancer* agent	Teratogen*	No exposure (UCC)
2-Ethylhexyl acrylate (See footnote below)	103-11-7	Suspect cancer agent		5 ppm (UCC)

Footnote: Provisionally included, pending completion of the Inter-Industry Acrylate Study Committee's chronic toxicity study review.

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Chlorodifluoro-methane (Fluorocarbon-22)	75-45-6		Teratogen*	1000 ppm (UCC)
Formaldenyde	50-00-0	Suspect cancer agent		2 ppm (ACGIH)
Formamide	75-12-7		Teratogen*	20 ppm No skin contact (ACGIH, UCC)
Fuel oil residues		Suspect cancer agents		No skin contact (UCC)
Hexafluoroacetone	684-16-2		Teratogen*	0.1 ppm No skin contact (ACGIH, UCC)
Hydrazine	302-01-2	Suspect cancer agent	(—)	
Lead	7439-92-1	(—)	Teratogen	50 $\mu g/m^3$ (OSHA)
Mercury, Alkyl compounds			Teratogens*	No exposure (UCC)
Methyl chloro-methyl ether	107-30-2	Known human carcinogen		No exposure (OSHA)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Methylene-dianiline	101-77-9	Suspect cancer* agent		0.1 ppm No skin or oral contact (ACGIH, UCC)
α-Naphthylamine	134-32-7	Suspect cancer* agent		No exposure (OSHA)
β-Naphthylamine	91-59-8	Known human carcinogen		No exposure (OSHA)
Neopentyl glycol diacrylate	2223-82-7	Suspect cancer* agent		No skin or oral contact (UCC)
Nickel, Inorganic compounds		Suspect cancer agents		1 mg/m3 (OSHA)
4-Nitrodiphenyl	92-93-3	Known human carcinogen		No exposure (OSHA)
2-Nitropropane	79-46-9	Suspect cancer agent		25 ppm (NIOSH)
N-Nitrosoamine compounds		Suspect cancer* agents		No skin or oral contact (UCC)
N-Nitroso-dimethylamine	62-75-9	Suspect cancer agent	Teratogen*	No exposure (OSHA)

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UNION CARBIDE

LIST OF CARCINOGENS AND TERATOGENS

(See Reverse Side for Explanations and Definitions)

SUBSTANCE	CAS IDENTIFICATION NUMBER	CARCINOGENICITY	TERATOGENICITY	EXPOSURE STANDARD FOLLOWED BY UNION CARBIDE (SOURCE)
Perchloro-ethylene	127-18-4	Suspect cancer* agent	Teratogen*	10 ppm 15 ppm C (UCC)
Pitches		Suspect cancer agents		200 µg/m3 600 µg/m3 C No skin contact (ACGIH, UCC)
Polychlorinated biphenyls (PCBs)		Suspect cancer agents	Teratogens*	1 µg/m3 3 µg/m3 C No skin contact (UCC)
Polycyclic aromatic hydro-carbon compounds		Suspect cancer agents	Teratogens*	200 µg/m3 600 µg/m3 C No skin contact (UCC)
β-Propiolactone	57-57-8	Suspect cancer agent		No exposure (OSHA)
Pyrolysis fuel oil		Suspect cancer agent		200 µg/m3 600 µg/m3 C No skin contact (UCC)
Quench oil		Suspect cancer agent		200 µg/m3 600 µg/m3 C No skin contact (UCC)

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