NIOSH RECOMMENDATIONS FOR OCCUPATIONAL SAFETY AND HEALTH

Compendium of Policy Documents and Statements

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health
Division of Standards Development and Technology Transfer
Cincinnati, Ohio

January 1992
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DHHS (NIOSH) Publication No. 92-100
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### DEFINITIONS OF ABBREVIATIONS AND TERMS

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<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATSDR</td>
<td>Agency for Toxic Substances and Disease Registry</td>
</tr>
<tr>
<td>Ca</td>
<td>agent recommended by NIOSH to be treated as a potential occupational carcinogen</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
</tr>
<tr>
<td>CDC</td>
<td>Centers for Disease Control</td>
</tr>
<tr>
<td>Ceiling</td>
<td>The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assessed as a 15-min TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>CIB</td>
<td>Current Intelligence Bulletin</td>
</tr>
<tr>
<td>CNS</td>
<td>central nervous system</td>
</tr>
<tr>
<td>CPSC</td>
<td>Consumer Product Safety Commission</td>
</tr>
<tr>
<td>dBA</td>
<td>decibels measured on the A scale (which approximates the response of the human ear)</td>
</tr>
<tr>
<td>DHEW</td>
<td>U.S. Department of Health, Education, and Welfare</td>
</tr>
<tr>
<td>DHHS</td>
<td>U.S. Department of Health and Human Services</td>
</tr>
<tr>
<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>fibers/cc</td>
<td>fibers of contaminant per cubic centimeter of air</td>
</tr>
<tr>
<td>J/cm²</td>
<td>joules per square centimeter</td>
</tr>
<tr>
<td>LOQ</td>
<td>limit of quantitation</td>
</tr>
<tr>
<td>μg</td>
<td>microgram</td>
</tr>
<tr>
<td>μm</td>
<td>micrometer</td>
</tr>
<tr>
<td>mg/m³</td>
<td>milligrams of contaminant per cubic meter of air</td>
</tr>
</tbody>
</table>
Definitions

mpcecf  millions of particles per cubic foot of air

MSHA  Mine Safety and Health Administration

mW/cm²  milliwatts per square centimeter

NEG  Nordic Expert Group for Documentation of Occupational Exposure Limits

NESHAP  National Emission Standards for Hazardous Air Pollutants

NIEHS  National Institute of Environmental Health Sciences

NIOSH  National Institute for Occupational Safety and Health

NIOH  National Institute of Occupational Health (Sweden)

nm  nanometer

No.  number

NTIS  National Technical Information Service

OSHA  Occupational Safety and Health Administration

PAHs  polycyclic aromatic hydrocarbons

PEL  permissible exposure limit (OSHA)

ppb  parts of contaminant per billion parts of air at 25°C and 1 atmosphere of pressure

ppm  parts of contaminant per million parts of air at 25°C and 1 atmosphere of pressure

REL  Recommended exposure limit. RELs are occupational exposure limits recommended by NIOSH as being protective of worker health and safety over a working lifetime. The REL is used in combination with engineering and work practice controls, exposure and medical monitoring, labeling, posting, worker training, and personal protective equipment. This limit is frequently expressed as a time-weighted average (TWA) exposure for up to 10 hr/day during a 40-hr workweek. The REL may also be expressed as (1) a short-term exposure limit (STEL) that should never be exceeded and is to be determined in a specified sampling time (usually 15 min), or (2) a ceiling limit that should never be exceeded even instantaneously unless specified over a given time period.

RTECS  Registry of Toxic Effects of Chemical Substances

Skin  The notation "skin" indicates that airborne or direct exposure by the cutaneous route (including mucous membranes and eyes) contributes to overall exposure.

STEL  Short-term exposure limit. Unless otherwise noted, the STEL is the 15-min TWA exposure that shall not be exceeded at any time during a workday.
<table>
<thead>
<tr>
<th>TWA</th>
<th>Time-weighted average. Unless otherwise noted, TWA concentrations of a contaminant are for up to a 10-hr workday during a 40-hr workweek.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL</td>
<td>working level</td>
</tr>
<tr>
<td>WLM</td>
<td>working level month</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

This document was prepared by the Division of Standards Development and Technology Transfer (DSDTT), Richard W. Niemeier, Ph.D., Director. Barbara L. Dames, DSDTT, developed this document. The contributions of other National Institute for Occupational Safety and Health (NIOSH) personnel are gratefully acknowledged: Heinz Ahlers; William D. Bennett; Nancy J. Bollinger; Mary E. Cassinelli; Clayton B. Doak; Peter M. Eller, Ph.D.; Jerome P. Flesch; Bryan D. Hardin, Ph.D.; G. Kent Hatfield, Ph.D.; Douglas L. Johnson; James H. Jones; Howard R. Ludwig; Diane Manning; Robert W. Mason, Ph.D.; Leela I. Murthy, Ph.D.; William H. Perry; Laurie A. Piacitelli; Laurence D. Reed; Leslie T. Stayner, Ph.D.; Doris V. Sweet; David M. Votaw; Joann A. Wess; John J. Whalen; and Ralph D. Zumwalde.

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INTRODUCTION

PURPOSE

This document was developed to provide a comprehensive list of National Institute for Occupational Safety and Health (NIOSH) documents that contain recommendations for safety and health standards in the workplace. Our intention is to make this information conveniently available to workers, employers, occupational health professionals, and union representatives.

BACKGROUND

Under the authority of the Occupational Safety and Health (OSH) Act [29 USC 1900] and the Mine Safety and Health Act [30 USC 80], NIOSH develops and recommends criteria for preventing disease and hazardous conditions in the workplace. NIOSH recommended exposure limits (RELs) are examples of such criteria. NIOSH also recommends preventive measures (e.g., engineering controls, safe work practices, personal protective equipment, and environmental and medical monitoring) for reducing or eliminating the adverse health effects of these hazards. To formulate these recommendations, NIOSH evaluates all relevant scientific information about a given hazard. The recommendations are then transmitted to the Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration (MSHA) of the U.S. Department of Labor for use in promulgating legal standards. These recommendations are generally published in criteria documents, Current Intelligence Bulletins (CIBs), Alerts, Special Hazard Reviews, Occupational Hazard Assessments, and responses to regulatory agencies (see page 2 for a description of these documents).

SCOPE

This document contains two major sections, A and B. Section A lists all NIOSH documents containing recommendations for chemical, physical, and other hazards in the workplace. Section B contains the NIOSH RELs for all of these hazards as well as the adverse health effects for the chemical and physical hazards. Five appendices contain additional information about (1) classes of chemicals and (2) RELs adopted or revised during OSHA rulemaking activity in 1988.*

Section A. Documents Containing NIOSH Recommendations for Safety and Health

This section lists all NIOSH documents that contain recommendations for safety and health standards in the workplace. These documents are listed by publication date under the occupational hazard they discuss. Each occupational hazard is arranged alphabetically. The types of documents included are as follows:

*This activity is referred to hereafter as the OSHA PEL Project. The final rule was published in the Federal Register on January 19, 1989 [54 FR 2329–2984 (1989)].
Compendium of Policy Documents

- **NIOSH publications** (criteria documents, CIBs, Alerts, Special Hazard Reviews, Occupational Hazard Assessments, and miscellaneous statements and reports)

- **Written testimony** from NIOSH about rules proposed by regulatory agencies such as OSHA, MSHA, or the U.S. Environmental Protection Agency (EPA)

- **Testimony presented by NIOSH** at regulatory hearings convened by OSHA or MSHA

These documents are described here briefly and are available through NIOSH or the National Technical Information Service (NTIS).*

**Criteria Documents.** —Criteria documents are developed to provide the basis for the comprehensive occupational safety and health standards sought by Congress. These documents generally contain a critical review of the scientific and technical information available on the prevalence of hazards, the existence of safety and health risks, and the adequacy of methods to identify and control hazards. Recommendations for minimizing safety and health risks include medical monitoring, exposure assessment, worker training, control technology, personal protective equipment, and recordkeeping as well as RELs where appropriate. Criteria documents are developed primarily for the U.S. Department of Labor (OSHA and MSHA); however, they are also distributed to health professionals in academia, industry, organized labor, public interest groups, and other Federal, State, and local government agencies.

**Current Intelligence Bulletins (CIBs).** —CIBs review and evaluate new and emerging information about occupational hazards. A CIB may draw attention to a previously unrecognized hazard, report new data on a known hazard, or disseminate information about hazard control. These documents are distributed to representatives of academia, industry, organized labor, public health agencies, and public interest groups as well as to Federal agencies responsible for ensuring the safety and health of workers.

**Alerts.** —NIOSH Alerts briefly present new information about occupational illnesses, injuries, and deaths. Alerts urgently request assistance in preventing, solving, and controlling newly identified occupational hazards. Workers, employers, and safety and health professionals are asked to take immediate action to reduce risks and implement controls.

**Special Hazard Reviews, Occupational Hazard Assessments, and Miscellaneous Statements and Reports.** —Special Hazard Reviews, Occupational Hazard Assessments, and miscellaneous statements and reports are other types of NIOSH documents that complement NIOSH recommendations for standards. These documents assess safety and health problems and recommend appropriate methods for control and monitoring. Although these documents do not supplant the more comprehensive criteria documents, they are prepared to assist OSHA or MSHA in the formulation of regulations.

**Responses to Regulatory Agencies.** —NIOSH periodically presents written comments and testimony before Congressional committees and at regulatory hearings convened by OSHA or MSHA. The testimony always includes the current NIOSH policy concerning the hazard in question.

*National Technical Information Service, Port Royal Road, Springfield, VA 22161. Order desk telephone: (703) 487-4650.
Section B. NIOSH RELs and General Recommendations for Safety and Health

This section contains three tables listing occupational hazards and the NIOSH RELs and general recommendations for safety and health. Table 1 lists chemical hazards, Table 2 presents physical hazards, and Table 3 contains industry, process, and work environment hazards. Health effects cited in Tables 1 and 2 are those generally associated with the hazard; they are for humans unless otherwise noted. Consult the primary sources listed in Section A for definitive information. The Chemical Abstracts Service (CAS) number and the Registry of Toxic Effects of Chemical Substances (RTECS) number are included in Table 1 where appropriate.

Appendix I. Classes of Chemicals

Several RELs apply to entire classes of chemicals. Appendix I lists these classes (e.g., alkanes, ketones, etc.) and the individual members of each that are listed by RTECS. Table 1 of Section B refers the reader to Appendix I whenever a class name is mentioned. Readers may use the class name to locate source documents in Section A.

Appendix II. Chemicals for Which NIOSH Adopted RELs During the OSHA PEL Project

Appendix II lists chemicals for which NIOSH adopted exposure limits on the basis of their comments during the OSHA PEL Project. These RELs are included in Table 1 of Section B. For further information about these chemicals, readers should refer to OSHA's final rule on air contaminants in the Federal Register [54 FR 2641 (1989)] and to the 1988 NIOSH testimony on OSHA's proposed rule on air contaminants [NTIS No. PB-91-115-337].

Appendix III. Chemicals for Which NIOSH Did Not Adopt RELs During the OSHA PEL Project

Appendix III lists chemicals for which NIOSH did not adopt RELs during the OSHA PEL Project. After a limited review of these chemicals, NIOSH concluded that adverse health effects could occur at the proposed OSHA PELs.

Appendix IV. Chemicals for Which NIOSH Revised Existing RELs During the OSHA PEL Project

Appendix IV lists chemicals for which NIOSH revised existing RELs during the OSHA PEL Project. These chemicals are listed with their previous and current RELs.

Appendix V. Categories of Pesticides

Appendix V lists pesticides according to three categories of toxicity defined in the 1978 NIOSH criteria document on pesticides (Criteria for a Recommended Standard: Occupational Exposure During the Manufacturing and Formulation of Pesticides, DHEW (NIOSH) Publication No. 78-174, NTIS No. PB-81-227-001). Many of the chemicals listed as pesticides have other applications and are presented in Sections A and B.
SECTION A

DOCUMENTS CONTAINING NIOSH RECOMMENDATIONS FOR SAFETY AND HEALTH

This section lists all NIOSH documents that contain recommendations for safety and health standards in the workplace. These documents are listed by publication date under the occupational hazard they discuss. Each occupational hazard is arranged alphabetically.

2-Acetylaminofluorene

Acetylene

Acrylamide


Acrylonitrile


Air contaminants (MSHA)

Air contaminants (OSHA)
Aldehydes


Aldrin/dieldrin


Alkanes


Allyl chloride


4-Aminodiphenyl

Ammonia


Aniline


Animal waste pits
Antimony

Arsenic, inorganic


Arsine


Art materials (CPSC)

Asbestos (EPA)


Asbestos (OSHA)


Asphalt fumes


Azides, explosive

Benzene


Benzidine

Benzidine-based dyes


Benzoyl peroxide


Benzyl chloride


Beryllium


Biotechnology


Bloodborne diseases


Boron trifluoride


Brakes


1,3-Butadiene


Cadmium


Carbaryl


Carbon black


Carbon dioxide


Carbon disulfide


Carbon monoxide


Carbon tetrachloride


Carcinogen policy


Carcinogens (OSHA 13)


Carpal tunnel syndrome

Carpet layer's knee

Chemical process safety


Chlorine


Chloroethanes


Chloroform


bis-Chloromethyl) ether

Chloromethyl methyl ether

β-Chloroprene


Chrome pigment

Chromic acid


Chromite ore processing

Chromium(VI)


Chrysene (also see Coal tar products)

Coal gasification plants

Coal liquefaction

Coal tar products


Cobalt


Coke oven emissions


Compressed air


Concrete, concrete forms, and shoring

1985. Comments on OSHA’s Proposed Rule on Concrete and Masonry Construction, December


Confined spaces, working in


Construction industry


Cotton dust


Cresol


Cumulative trauma disorders

DDT


2,4-Diaminoanisole

4,4-Diaminodiphenylmethane (DDM)

o-Dianisidine-based dyes

1,2-Dibromo-3-chloropropane (DBCP)

3,3'-Dichlorobenzidine

Dieldrin (see Aldrin)

Diesel exhaust


Diethylcarbamoyl chloride (DECC)

Di-2-ethylhexylphthalate (DEHP)


Diisocyanates


4-Dimethylaminoazobenzene

Dimethylcarbamoyl chloride (DMCC)

Dimethylethylamine (DMEA)

Dimethylformamide (DMF)

Dinitro-o-cresol


Dinitrotoluences


Dioxane


Dioxin (see 2,3,7,8-Tetrachlorodibenzo-p-dioxin)

Dyes, benzidine-, o-tolidine-, and o-dianisidine-based

Electrical safety


Electrocutions


1986. NIOSH Alert: Request for Assistance in Preventing Electrocutons Due to Damaged Receptacles and Connectors. DHHS (NIOSH) Publication No. 87-100, NTIS No. PB-87-174-249.


1984. NIOSH Alert: Request for Assistance in Preventing Electrocutons of Workers in Fast Food Restaurants. DHHS (NIOSH) Publication No. 85-104, NTIS No. PB-85-244-598.

Emergency egress from elevated work stations

Epichlorohydrin


Ethylene dibromide


Ethylene dichloride


Ethylene glycol monobutyl ether/ethylene glycol monobutyl ether acetate (see Glycol ethers)
Ethylene glycol monoethyl ether/ethylene glycol monomethyl ether acetate (see Glycol ethers)

Ethylene glycol monomethyl ether/ethylene glycol monomethyl ether acetate (see Glycol ethers)

Ethylencimine

Ethylene oxide


1981. Current Intelligence Bulletin 35: Ethylene Oxide (EtO); Evidence of Carcinogenicity. DHHS (NIOSH) Publication No. 81-130, NTIS No. PB-85-119-121.

1977. Special Occupational Hazard Review with Control Recommendations for the Use of Ethylene Oxide as a Sterilant in Medical Facilities. DHEW (NIOSH) Publication No. 77-200, NTIS No. PB-274-793.

Ethylene thiourea

Excavations


Explosives

Exposure measurements (EPA)

Fall protection

Fibrous glass (see Synthetic vitreous fibers)

Field sanitation


Fire brigades

Fluorides, inorganic

Fluorocarbon polymers, decomposition products of
1977. Criteria for a Recommended Standard: Occupational Exposure to Decomposition Products of

Formaldehyde
PB–91–115–337.


1986. Post-Hearing Comments to OSHA Following the Regulatory Hearing on Formaldehyde,


1986. Testimony to OSHA on the Proposed Rule: Occupational Exposure to Formaldehyde, May 5,

1985. Comments to OSHA on Advance Notice of Proposed Rulemaking: Occupational Exposure to

1985. Comments to OSHA: Submission of Criteria Document and Current Intelligence Bulletin,

1981. Current Intelligence Bulletin 34: Formaldehyde; Evidence of Carcinogenicity. DHHS

1976. Criteria for a Recommended Standard: Occupational Exposure to Formaldehyde. DHEW

Foundries
1985. NIOSH Recommendations for Control of Occupational Safety and Health Hazards: Foundries.

Freon
1989. NIOSH Alert: Request for Assistance in Preventing Death from Excessive Exposure to
PB–90–103–391.

Furfuryl alcohol
PB–91–115–337.

1979. Criteria for a Recommended Standard: Occupational Exposure to Furfuryl Alcohol. DHEW

Gallium arsenide
1987. NIOSH Alert: Request for Assistance in Reducing the Potential Risk of Developing Cancer
from Exposure to Gallium Arsenide in the Microelectronics Industry. DHHS (NIOSH) Publication
No. 88–100, NTIS No. PB–88–188–826.
Glycidyl ethers


Glycol ethers


1990. NEG and NIOSH basis for an occupational standard: Propylene Glycol Ethers and Their Acetates. DHHS (NIOSH) Publication No. 91-103.


Grain dust


Grain elevators


Hand-arm vibration


Hazard communication (MSHA)


Hazard communication (OSHA)


Hazardous energy
See Lockout/tagout

Hazardous waste (EPA)
Hazardous waste (OSHA)


Health care workers


Hexamethylphosphoramic triamide (HMPA)


Hot environments


Hydrazines


Hydrogen cyanide and cyanide salts


Hydrogen fluoride


Hydrogen sulfide


Hydroquinone

Indoor Air Quality


Isopropyl alcohol


Kepone
Ketones


Laboratory safety


Lead, inorganic (see Respirators for respirator issues regarding Lead Standards)


Lift-slab construction

Lockout/tagout


Logging


Malathion


Manual lifting


Mechanical power presses


Medical waste


Mercury, aryl and inorganic


Methods of compliance


Methyl alcohol


Methyl iodide


Methyl isocyanate

4,4’-Methylene bis(2-chloroaniline) (MOCA)


Methyl parathion


Methylene chloride


4,4’-Methylenedianiline (MDA)


Mine lamps


Mining (air contaminants)


Mobile equipment

Monohalomethanes


α-Naphthylamine

β-Naphthylamine, metabolic precursors

NIAX catalyst ESN

Nickel carbonyl


Nickel, inorganic and compounds


Nitric acid


Nitriles


4-Nitrophenyl

Nitroglycerin and ethylene glycol dinitrate


2-Nitropropane


Nitrosamines

N-nitrosodimethylamine

Noise


Oil and gas


Organotin compounds

Oxides of Nitrogen


Paint and allied coatings manufacture

Parathion


Pattern of Violations (MSHA)

Personal protective equipment (OSHA)


Pesticides manufacturing and formulation


Phenol


Phosgene
Polychlorinated biphenyls (PCB's)


Polynuclear aromatic hydrocarbons (PAH's)
See Carbon black and Coal tar products.

Precast concrete


β-Propioloactone

Propylene oxide

Radiation, ionizing


Radiation, nonionizing

Radiofrequency sealers


Radon progeny


Recordkeeping guidelines


Refined petroleum solvents

Rendering processes, animal


Respirable dust


Respirators (Coast Guard)


Respirators (NIOSH)


Respirators (OSHA)


Robotics


Safety and health programs


Scaffolds


Shipyards

Silica, crystalline


Silos, oxygen-liming

Skylights

Sodium hydroxide

Solvents

Stairways and ladders

Styrene


Suffocation

Sulfur dioxide


Sulfuric acid

Surveillance systems


Synthetic vitreous fibers (manmade mineral fibers)


Telecommunications

2,3,7,8-Tetrachlorodibenzo-p-dioxin


1,1,2,2-Tetrachloroethane


Tetrachloroethylene (Perchloroethylene)


Thiols


Tobacco smoke


o-Tolidine


o-Tolidine-based dyes (see Dyes)

Toluene


Toluene diisocyanate (TDI)


o-Toluidine


1,1,1-Trichloroethane


Trichloroethylene


Trimellitic anhydride


Tungsten and cemented tungsten carbide


Ultraviolet radiation

Underground construction

Vanadium


Vehicle Safety (OSHA)


Ventilation


Vibration syndrome (see Hand-arm vibration)

Video display terminals


Vinyl acetate


Vinyl chloride


Vinyl halides


Walking and Working Surfaces (OSHA)


Waste anesthetic gases and vapors


Water spray (fog)

Welding


Wood dust

Worker notification

Xylene


Zinc oxide

SECTION B

NIOSH RELs AND GENERAL RECOMMENDATIONS FOR SAFETY AND HEALTH

This section contains three tables listing occupational hazards and the NIOSH RELs and general recommendations for safety and health. Table 1 lists chemical hazards, Table 2 presents physical hazards, and Table 3 contains industry, process, and work environment hazards. Health effects cited in Tables 1 and 2 are those generally associated with the hazard; they are for humans unless otherwise noted. Consult primary sources in Section A for definitive information. The Chemical Abstracts Service (CAS) number and the Registry of Toxic Effects of Chemical Substances (RTECS) number are included in Table 1 where appropriate.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaldehyde†</td>
<td>75-07-0 AB1925000</td>
<td>Ca (18 ppm LOQ)</td>
<td>Potential for cancer; eye, skin, and respiratory irritation; nasal tumors in animals; mutagenesis in vitro</td>
</tr>
<tr>
<td>Acetic acid‡‡</td>
<td>64-19-7 AF1225000</td>
<td>10 ppm (25 mg/m³) TWA, 15 ppm (37 mg/m³) STEL</td>
<td>Skin, eye, and mucous membrane irritation</td>
</tr>
<tr>
<td>Acetic anhydride†</td>
<td>108-24-7 AK1925000</td>
<td>5 ppm (20 mg/m³) ceiling</td>
<td>Skin, eye, and respiratory irritation</td>
</tr>
<tr>
<td>Acetone‡</td>
<td>67-64-1 AL3150000</td>
<td>250 ppm (590 mg/m³) TWA</td>
<td>Narcosis; CNS depression; eye, nose, throat, and skin irritation</td>
</tr>
<tr>
<td>Class: Ketones‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetone cyanhydrin</td>
<td>75-86-5 OD9275000</td>
<td>1 ppm (4 mg/m³) ceiling (15-min)</td>
<td>Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects resulting from dissociation of the compound to hydrogen cyanide</td>
</tr>
<tr>
<td>Class: Nitrides‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetonitrile</td>
<td>75-05-8 AL7700000</td>
<td>20 ppm (34 mg/m³) TWA</td>
<td>Eye, nose, and throat irritation from vapor; skin and eye irritation from liquid; nervous system effects</td>
</tr>
<tr>
<td>Class: Nitrides‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Acetylaminofluorene</td>
<td>53-96-3 AB9450000</td>
<td>Ca; use 29 CFR 1910.1014</td>
<td>Potential for cancer; tumors of the liver, bladder, lungs, pancreas, and skin in animals</td>
</tr>
<tr>
<td>Acetylene</td>
<td>74-86-2 AO9600000</td>
<td>2,500 ppm (2,662 mg/m³) ceiling (15-min)</td>
<td>Asphyxia</td>
</tr>
</tbody>
</table>
Acetylene dichloride  
(see 1,2-Dichloroethylene)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS No.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylene tetrabromide</td>
<td>79-27-6</td>
<td>K18225000</td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetylsalicylic acid†</td>
<td>50-78-2</td>
<td>5 mg/m³ TWA</td>
</tr>
<tr>
<td>(aspirin)</td>
<td>VO0700000</td>
<td>Mucosal irritation, respiratory effects, internal bleeding</td>
</tr>
<tr>
<td>Acrocin††</td>
<td>107-02-8</td>
<td>0.1 ppm (0.25 mg/m³) TWA, 0.3 ppm (0.8 mg/m³) STEL</td>
</tr>
<tr>
<td></td>
<td>AS1050000</td>
<td>Eye, nose, respiratory, and mucous membrane irritation</td>
</tr>
<tr>
<td>Acrylamide**</td>
<td>79-06-1</td>
<td>Ca; 0.03 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td></td>
<td>AS3325000</td>
<td>Potential for cancer, skin irritation, central and peripheral nervous system effects; reproductive effects and tumors of the lung, testes, thyroid, and adrenal glands in animals</td>
</tr>
<tr>
<td>Acrylic acid†</td>
<td>79-10-7</td>
<td>2 ppm (6 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td></td>
<td>AS4375000</td>
<td>Skin, eye, and respiratory irritation</td>
</tr>
<tr>
<td>Acrylonitrile‡</td>
<td>107-13-1</td>
<td>Ca; 1 ppm, 8-hr TWA, 10 ppm ceiling (15-min) (skin)</td>
</tr>
<tr>
<td>(vinylcyanide)</td>
<td>AT5250000</td>
<td>Brain tumors, lung and bowel cancer</td>
</tr>
<tr>
<td>Adiponitrile</td>
<td>111-69-3</td>
<td>4 ppm (18 mg/m³) TWA</td>
</tr>
<tr>
<td>Class: Nitriles§</td>
<td>AV2625000</td>
<td>Skin and eye irritation; respiratory, circulatory, and CNS effects in animals</td>
</tr>
<tr>
<td>Aldehydes§</td>
<td>††</td>
<td>See individual chemical</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.  
†REL adopted during OSHA hearings (Appendix II).  
‡Also listed as a pesticide in Appendix V.  
§Appendix I lists all members of the class indicated; refer to class name in Section A.  
**REL revised during OSHA hearings (Appendix IV).  
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aldrin*</td>
<td>309-00-2, 1O2100000</td>
<td>Ca; 0.25 mg/m³ TWA (skin)</td>
<td>Potential for cancer; tumors of the lungs, liver, thyroid, and adrenal glands in animals</td>
</tr>
<tr>
<td>Alkanes†</td>
<td>‡</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Allyl alcohol*</td>
<td>107-18-6, BA5075000</td>
<td>2 ppm (5 mg/m³) TWA (skin), 4 ppm (10 mg/m³) STEL</td>
<td>Upper respiratory irritation and burns of the eyes and skin</td>
</tr>
<tr>
<td>Allyl chloride*</td>
<td>107-05-1, UC7350000</td>
<td>1 ppm (3 mg/m³) TWA, 2 ppm (6 mg/m³) STEL</td>
<td>Liver, kidney, and lung effects</td>
</tr>
<tr>
<td>Allyl glycidyl ether* (AGE)</td>
<td>106-92-3, RR0875000</td>
<td>5 ppm (22 mg/m³) TWA, 10 ppm (44 mg/m³) STEL (skin)</td>
<td>Skin and mucous membrane effects, dermatitis and eye irritation, possible hematopoietic and reproductive system effects</td>
</tr>
<tr>
<td>Class: Glycidyl ethers†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allyl propyl disulfide†</td>
<td>2179-59-1, JO0350000</td>
<td>2 ppm (12 mg/m³) TWA, 3 ppm (18 mg/m³) STEL</td>
<td>Eye, nose, and upper respiratory irritation</td>
</tr>
<tr>
<td>α-Alumina (see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>TWA/STEL</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------</td>
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</tr>
<tr>
<td>Aluminum metal†</td>
<td>7429-90-5</td>
<td>10 mg/m³ TWA</td>
<td>Lung changes that may lead to pulmonary fibrosis</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td>Respiratory and skin irritation</td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td>Skin irritation</td>
</tr>
<tr>
<td>Pyro powders</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td>Skin irritation</td>
</tr>
<tr>
<td>Welding fumes</td>
<td></td>
<td>2 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Soluble salts</td>
<td></td>
<td>2 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Alkyls</td>
<td></td>
<td>Ca; use 29 CFR 1910.1011</td>
<td></td>
</tr>
<tr>
<td>4-Aminodiphenyl</td>
<td>92-67-1</td>
<td>Ca; use 29 CFR 1910.1011</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>2-Aminoethanol (see Ethanolamine)</td>
<td>DU8925000</td>
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</tr>
<tr>
<td>2-Aminopyridine††</td>
<td>504-29-0</td>
<td>0.5 ppm (2 mg/m³) TWA</td>
<td>CNS excitation, convulsions, severe acute effects</td>
</tr>
<tr>
<td>Amitrole††</td>
<td>61-82-5</td>
<td>Ca; 0.2 mg/m³, 8-hr TWA</td>
<td>Potential for cancer; tumors of the thyroid and pituitary glands in animals</td>
</tr>
<tr>
<td>Ammonia†**</td>
<td>7664-41-7</td>
<td>25 ppm (18 mg/m³) TWA, 35 ppm (27 mg/m³) STEL</td>
<td>Respiratory and eye irritation</td>
</tr>
<tr>
<td>Ammonium chloride fume†</td>
<td>12125-02-9</td>
<td>10 mg/m³ TWA, 20 mg/m³ STEL</td>
<td>Skin and respiratory irritation</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
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<thead>
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<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium sulfamate**</td>
<td>7773-06-0 WO6125000</td>
<td>10 mg/m³ TWA 5 mg/m³ TWA</td>
<td>Eye and nose irritation, interference with vision</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirable dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n-Amyl acetate†</td>
<td>628-63-7 AJ1925000</td>
<td>100 ppm (525 mg/m³) TWA</td>
<td>Acute irritation of the eyes and upper respiratory tract, possible CNS depression, chronic skin irritation</td>
</tr>
<tr>
<td>sec-Amyl acetate*</td>
<td>626-38-0 AJ2100000</td>
<td>125 ppm (650 mg/m³) TWA</td>
<td>Eye and upper respiratory irritation; possible CNS depression (narcosis); lung, liver, and kidney injury</td>
</tr>
<tr>
<td>Aniline and homologs</td>
<td>62-53-3 BW6650000</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; tumors of the spleen in animals</td>
</tr>
<tr>
<td>o-Anisidine†</td>
<td>90-04-0 BZ5410000</td>
<td>Ca; 0.5 mg/m³ TWA (skin)</td>
<td>Potential for cancer; tumors of the bladder, thyroid, and kidneys in animals</td>
</tr>
<tr>
<td>p-Anisidine†</td>
<td>104-94-9 BZ5450000</td>
<td>0.5 mg/m³ TWA (skin)</td>
<td>CNS, blood, urogenital system, liver, and skin effects</td>
</tr>
<tr>
<td>Antimony</td>
<td>7440-36-0 CC4025000</td>
<td>0.5 mg/m³ TWA</td>
<td>Irritation, cardiovascular and lung effects</td>
</tr>
<tr>
<td>α-Naphthylthiourea† (ANTU)</td>
<td>86-88-4 YT9275000</td>
<td>0.3 mg/m³ TWA</td>
<td>Drug rashes, decrease in white blood cells, pulmonary edema</td>
</tr>
<tr>
<td>Chemical</td>
<td>CAS Number</td>
<td>Description</td>
<td>Health Effect</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Arsenic, inorganic</td>
<td>7440-38-2</td>
<td>Ca; 0.002 mg/m³ ceiling (15-min)</td>
<td>Lung and lymphatic cancer, dermatitis</td>
</tr>
<tr>
<td></td>
<td>CG0525000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arsine</td>
<td>7784-42-1</td>
<td>Ca; 0.002 mg/m³ ceiling (15-min)</td>
<td>Cancer, sudden extensive hemolysis</td>
</tr>
<tr>
<td></td>
<td>CG6475000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asbestos</td>
<td>1332-21-4</td>
<td>Ca; 0.1 fiber/cc in a 400-liter air sample (fibers &gt;5 μm long), 100-min TWA; (use 29 CFR 1910.1001)</td>
<td>Lung cancer, mesothelioma, asbestosis</td>
</tr>
<tr>
<td></td>
<td>CI6475000</td>
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</tr>
<tr>
<td>Asphalt fumes</td>
<td>8052-42-4</td>
<td>Ca; 5 mg/m³ ceiling (15-min) measured as total particulates</td>
<td>Potential for cancer; tumors of the skin in animals; eye and respiratory tract irritation</td>
</tr>
<tr>
<td></td>
<td>CI9900000</td>
<td></td>
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</tr>
<tr>
<td>Atrazine</td>
<td>1912-24-9</td>
<td>5 mg/m³ TWA</td>
<td>Primary eye and skin irritation; ingestion can cause ataxia, dyspnea, and convulsions in animals</td>
</tr>
<tr>
<td></td>
<td>XY5600000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azinphos-methyl</td>
<td>86-50-0</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition after metabolic activation</td>
</tr>
<tr>
<td>(Guthion)†,*</td>
<td>TE1925000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium,† soluble compounds</td>
<td>7440-39-3</td>
<td>0.5 mg/m³ TWA</td>
<td>Eye, mucous membrane, and skin irritation</td>
</tr>
<tr>
<td></td>
<td>CQ8370000</td>
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<tr>
<td>Barium sulfate†</td>
<td>7727-43-7</td>
<td></td>
<td>Eye, nose, and upper respiratory irritation; pneumoconiosis</td>
</tr>
<tr>
<td></td>
<td>CR0600000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total dust</td>
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</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
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**REL revised during OSHA hearings (Appendix IV).
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benomyl‡ (see Appendix III)</td>
<td>17804-35-2 DD6475000</td>
<td>Ca; 0.1 ppm (0.32 mg/m³), 8-hr TWA, 1 ppm (3.2 mg/m³) ceiling (15-min)</td>
<td>Cancer (leukemia)</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2 CY1400000</td>
<td>0.1 ppm (0.5 mg/m³) ceiling</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td>Benzenethiol (phenyl mercaptan)</td>
<td>108-98-5 DC0525000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Class: Thiols‡†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzidine</td>
<td>92-87-5 DC9625000</td>
<td>Ca; use 29 CFR 1910.1010</td>
<td>Bladder, liver, and kidney cancer</td>
</tr>
<tr>
<td>Benzidine-based dyes</td>
<td>††</td>
<td>Ca; lowest feasible concentration</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>Benzo(a)pyrene (see Coal tar pitch volatiles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p-Benzoquinone (see Quinone)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzoate peroxide</td>
<td>94-36-0 DM8575000</td>
<td>5 mg/m³ TWA</td>
<td>Respiratory and eye irritation, skin effects</td>
</tr>
<tr>
<td>Benzyl chloride</td>
<td>100-44-7 XS8925000</td>
<td>1 ppm (5 mg/m³) ceiling (15-min)</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS No.</td>
<td>Exposure Limit</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Beryllium§</td>
<td>7440-41-7</td>
<td></td>
<td>Ca; not to exceed 0.0005 mg/m³</td>
</tr>
<tr>
<td>Biphenyl (see Diphenyl)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bismuth telluride,† Se-doped</td>
<td>1304-82-1</td>
<td>5 mg/m³ TWA</td>
<td>Pulmonary lesions in animals</td>
</tr>
<tr>
<td>Bismuth telluride,† undoped</td>
<td>1304-82-1</td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Borates,† tetra sodium salts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anhydrous</td>
<td>1303-43-4</td>
<td>1 mg/m³ TWA</td>
<td>Skin, eye, and upper respiratory irritation;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>possible shortness of breath and nose bleeds</td>
</tr>
<tr>
<td>Decahydrate</td>
<td>1303-96-4</td>
<td>5 mg/m³ TWA</td>
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<tr>
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</tr>
<tr>
<td>Pentahydrate</td>
<td>12179-04-3</td>
<td>1 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Boron oxide,†</td>
<td>1303-86-2</td>
<td>10 mg/m³ TWA</td>
<td>Eye and respiratory irritation</td>
</tr>
<tr>
<td>total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boron tribromide†</td>
<td>10294-33-4</td>
<td>1 ppm (10 mg/m³) ceiling</td>
<td>Pulmonary damage</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Boron trifluoride†</td>
<td>7637-07-2</td>
<td>1 ppm (3 mg/m³) ceiling</td>
<td>Severe irritation of the lungs, eyes, and skin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
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<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromacil†‡</td>
<td>314-40-9 YQ9100000</td>
<td>1 ppm (10 mg/m³) TWA</td>
<td>Eye irritation; thyroid damage in animals</td>
</tr>
<tr>
<td>Bromine†</td>
<td>7726-95-6 EF9100000</td>
<td>0.1 ppm (0.7 mg/m³) TWA, 0.3 ppm (2 mg/m³) STEL</td>
<td>Severe irritation of the eyes, mucous membranes, lungs, and skin</td>
</tr>
<tr>
<td>Bromine pentafluoride†</td>
<td>7789-30-2 EF9350000</td>
<td>0.1 ppm (0.7 mg/m³) TWA</td>
<td>Skin irritation, corneal necrosis</td>
</tr>
<tr>
<td>Bromoform†</td>
<td>75-25-2 PB5600000</td>
<td>0.5 ppm (5 mg/m³) TWA (skin)</td>
<td>Respiratory irritation, CNS depression</td>
</tr>
<tr>
<td>1,3-Butadiene</td>
<td>106-99-0 EI9275000</td>
<td>Ca; lowest feasible concentration (0.19 ppm LOQ)</td>
<td>Hematopoietic cancer, teratogenic and reproductive effects</td>
</tr>
<tr>
<td>Butane†</td>
<td>106-97-8 EI4200000</td>
<td>800 ppm (1,900 mg/m³) TWA</td>
<td>Drowsiness and other narcotic effects</td>
</tr>
<tr>
<td>1-Butanethiol (butyl mercaptan)</td>
<td>Class: Thiols§</td>
<td>0.5 ppm (1.8 mg/m³) ceiling (15-min)</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td>2-Butanone (see Methyl ethyl ketone [MEK])</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Butoxyethanol (see Ethylene glycol monobutyl ether) (EGBE)</td>
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<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>CAS Number</td>
<td>Limitations</td>
<td>Remarks</td>
</tr>
<tr>
<td>-------------------</td>
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<td>------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>n-Butyl acetate</td>
<td>123-86-4</td>
<td>150 ppm (710 mg/m³) TWA, 200 ppm (950 mg/m³) STEL</td>
<td>Mucous membrane and eye irritation; high concentrations cause nervous system effects in animals</td>
</tr>
<tr>
<td>sec-Butyl acetate</td>
<td>105-46-4</td>
<td>200 ppm (950 mg/m³) TWA</td>
<td>Eye and respiratory irritation, CNS depression</td>
</tr>
<tr>
<td>tert-Butyl acetate</td>
<td>540-88-5</td>
<td>200 ppm (950 mg/m³) TWA</td>
<td>Eye and throat irritation, CNS depression</td>
</tr>
<tr>
<td>Butyl acrylate</td>
<td>141-32-2</td>
<td>10 ppm (55 mg/m³) TWA</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>n-Butyl alcohol</td>
<td>71-36-3</td>
<td>50 ppm (150 mg/m³) ceiling (skin)</td>
<td>Eye and mucous membrane irritation, CNS depression</td>
</tr>
<tr>
<td>sec-Butyl alcohol</td>
<td>78-92-2</td>
<td>100 ppm (305 mg/m³) TWA, 150 ppm (455 mg/m³) STEL</td>
<td>Eye and skin irritation; narcosis in animals</td>
</tr>
<tr>
<td>tert-Butyl alcohol</td>
<td>75-65-0</td>
<td>100 ppm (300 mg/m³) TWA, 150 ppm (450 mg/m³) STEL</td>
<td>Narcosis in animals</td>
</tr>
<tr>
<td>Butylamine</td>
<td>109-73-9</td>
<td>5 ppm (15 mg/m³) ceiling (skin)</td>
<td>Eye, mucous membrane, and skin irritation</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
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§ Appendix I lists all members of the class indicated; refer to class name in Section A.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
</table>
| tert-Butyl chromate  
_Class: Chromium§, hexavalent_ | 1189-85-1 GB2900000 | Ca; 0.001 mg/m³ TWA | Lung cancer, skin ulcers, lung irritation |
| Butyl glycidyl ether (BGE)  
_Class: Glycidyl ethers§ | 2426-08-6 TX4200000 | 5.6 ppm (30 mg/m³) ceiling (15-min) | Skin and mucous membrane effects, sensitization potential, possible hematopoietic effects |
| n-Butyl lactate† | 138-22-7 OD4025000 | 5 ppm (25 mg/m³) TWA | Headache, irritation of the pharyngeal and laryngeal mucosa |
| Butyl mercaptan  
(see 1-Butanethiol) | | | |
| o-sec-Butylphenol† | 89-72-5 SJ8920000 | 5 ppm (30 mg/m³) TWA (skin) | Skin, eye, and respiratory irritation; skin burns |
| p-tert-Butyltoluene† | 98-51-1 XS8400000 | 10 ppm (60 mg/m³) TWA, 20 ppm (120 mg/m³) STEL | Mucous membrane irritation |
| n-Butyronitrile  
_Class: Nitriles§ | 109-74-0 ET8750000 | 8 ppm (22 mg/m³) TWA | Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects |
<p>| Cadmium,§ dust and fume | 7440-43-9 EU9800000 | Ca; lowest feasible concentration (0.01 mg/m³ LOQ) | Lung cancer, prostatic cancer, renal system effects |</p>
<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>TWA Concentration</th>
<th>Reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium carbonate†</td>
<td>1317-65-3</td>
<td>10 mg/m³ TWA</td>
<td>Moderate skin irritation, severe eye irritation</td>
</tr>
<tr>
<td></td>
<td>EV9580000</td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Total dust</td>
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<tr>
<td>Respirable fraction</td>
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</tr>
<tr>
<td>Calcium cyanamide‡‡</td>
<td>156-62-7</td>
<td>0.5 mg/m³ TWA</td>
<td>Eye, skin, and lung irritation</td>
</tr>
<tr>
<td></td>
<td>GS6000000</td>
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<td></td>
</tr>
<tr>
<td>Calcium hydroxide†</td>
<td>1305-62-0</td>
<td>5 mg/m³ TWA</td>
<td>Caustic irritation of all exposed body surfaces and the respiratory tract</td>
</tr>
<tr>
<td></td>
<td>EW2800000</td>
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</tr>
<tr>
<td>Calcium oxide†</td>
<td>1305-78-8</td>
<td>2 mg/m³ TWA</td>
<td>Eye, mucous membrane, and skin irritation</td>
</tr>
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<td></td>
<td>EW3100000</td>
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<tr>
<td>Calcium silicate†</td>
<td>1344-95-2</td>
<td>10 mg/m³ TWA</td>
<td>Physical irritation</td>
</tr>
<tr>
<td></td>
<td>VV9150000</td>
<td>5 mg/m³ TWA</td>
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<td>Total dust</td>
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<tr>
<td>Respirable fraction</td>
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<tr>
<td>Calcium sulfate†</td>
<td>7778-18-9</td>
<td>10 mg/m³ TWA</td>
<td>Physical irritation</td>
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<tr>
<td></td>
<td>WS6920000</td>
<td>5 mg/m³ TWA</td>
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<tr>
<td>Total dust</td>
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<tr>
<td>Respirable fraction</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Camphor, synthetic‡‡</td>
<td>76-22-2</td>
<td>2 mg/m³ TWA</td>
<td>Eye, skin, and mucous membrane irritation; CNS effects</td>
</tr>
<tr>
<td></td>
<td>EX1225000</td>
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<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡‡Also listed as a pesticide in Appendix V.
‡‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caprolactam†</td>
<td>105-60-2 CM3675000</td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL, 0.22 ppm (1 mg/m³) TWA, 0.66 ppm (3 mg/m³) STEL</td>
<td>Convulsions, dermal and respiratory irritation, dermal sensitization</td>
</tr>
<tr>
<td>Dust Vapor</td>
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</tr>
<tr>
<td>Captafol†‡ (Difolatan*)</td>
<td>2425-06-1 GW49000000</td>
<td>Ca; 0.1 mg/m³ TWA (skin)</td>
<td>Potential for cancer; skin and respiratory irritation; cancers in mice</td>
</tr>
<tr>
<td>Captan†‡</td>
<td>133-06-2 GW5075000</td>
<td>Ca; 5 mg/m³ TWA</td>
<td>Potential for cancer; duodenal tumors in animals</td>
</tr>
<tr>
<td>Carbaryl‡ (Sevin*)</td>
<td>63-25-2 FC59500000</td>
<td>5 mg/m³ TWA; minimize exposure during pregnancy</td>
<td>CNS and reproductive effects</td>
</tr>
<tr>
<td>Carbofuran†‡ (Furadan*)</td>
<td>1563-66-2 FB9450000</td>
<td>0.1 mg/m³ TWA</td>
<td>Anticholinesterase agent</td>
</tr>
<tr>
<td>Carbon black</td>
<td>1333-86-4 FF58000000</td>
<td>3.5 mg/m³ TWA; In presence of PAHs: Ca; limit PAHs to 0.1 mg/m³ TWA (determined as cyclohexane extractable fraction)</td>
<td>Lung, cardiovascular, and skin effects; cancer of the lymphatic/bone-marrow complex when workers are exposed to carbon black in the presence of PAHs</td>
</tr>
<tr>
<td>Carbon dioxide**</td>
<td>124-38-9 FF64000000</td>
<td>5,000 ppm (9,000 mg/m³) TWA, 30,000 ppm (54,000 mg/m³) STEL</td>
<td>Respiratory effects</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Exposure Limits</td>
<td>Health Effects</td>
</tr>
<tr>
<td>-----------------------------------</td>
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<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Carbon disulfide**</td>
<td>75-15-0</td>
<td>1 ppm (3 mg/m³) TWA (skin), 10 ppm (30 mg/m³) STEL (skin)</td>
<td>Cardiovascular, CNS, and reproductive effects</td>
</tr>
<tr>
<td></td>
<td>FF6650000</td>
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</tr>
<tr>
<td>Carbon monoxide</td>
<td>630-08-0</td>
<td>35 ppm (40 mg/m³) 8-hr TWA, 200 ppm (229 mg/m³) ceiling</td>
<td>Cardiovascular effects</td>
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<tr>
<td></td>
<td>FG3500000</td>
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<tr>
<td>Carbon tetrabromide†</td>
<td>558-13-4</td>
<td>0.1 ppm (1.4 mg/m³) TWA, 0.3 ppm (4 mg/m³) STEL (60-min)</td>
<td>Eye, skin, lung, and kidney irritation; severe liver toxicity</td>
</tr>
<tr>
<td></td>
<td>FG4725000</td>
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<tr>
<td>Carbon tetrachloride‡‡</td>
<td>56-23-5</td>
<td>Ca; 2 ppm (12.6 mg/m³) STEL (60-min)</td>
<td>Liver cancer</td>
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<tr>
<td>(tetrachloromethane)</td>
<td>FG4900000</td>
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<tr>
<td>Carbonyl fluoride†</td>
<td>353-50-4</td>
<td>2 ppm (5 mg/m³) TWA, 5 ppm (15 mg/m³) STEL</td>
<td>Toxic effects from the liberation of fluoride by hydrolysis</td>
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<tr>
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<td>FG6125000</td>
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<tr>
<td>Catechol† (pyrocatechol)</td>
<td>120-80-9</td>
<td>5 ppm (20 mg/m³) TWA (skin)</td>
<td>CNS depression; liver, respiratory, and renal effects</td>
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<td>UX1050000</td>
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<tr>
<td>Cellulose†</td>
<td>9004-34-6</td>
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<td>FJ5691460</td>
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<tr>
<td>Respirable fraction</td>
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<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Cesium hydroxide†</td>
<td>21351-79-1</td>
<td>2.0 mg/m³ TWA</td>
<td>Skin, eye, and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>FK9800000</td>
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<tr>
<td>Cetylmercaptan</td>
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<tr>
<td>(see 1-Hexadecanethiol)</td>
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</tr>
</tbody>
</table>

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*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
**REL revised during OSHA hearings (Appendix IV).
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlordane†‡</td>
<td>57-74-9 PB9800000</td>
<td>Ca; 0.5 mg/m³ TWA (skin)</td>
<td>Potential for cancer, CNS effects (e.g., irritability, tremors, and convulsions), skin and mucous membrane irritation, kidney and nerve damage; liver cancer in animals</td>
</tr>
<tr>
<td>Chlorinated camphene†</td>
<td>8001-35-2 XW5250000</td>
<td>Ca; lowest feasible concentration (skin) (0.01 mg/m³ LOQ)</td>
<td>Potential for cancer, skin irritation, strong CNS stimulation; cancer in animals</td>
</tr>
<tr>
<td>Chlorinated diphenyl oxide†</td>
<td>55720-99-5 KO4200000</td>
<td>0.5 mg/m³ TWA</td>
<td>Skin irritation, dermatitis; liver damage in animals</td>
</tr>
<tr>
<td>Chlorine‡</td>
<td>7782-50-5 FO2100000</td>
<td>0.5 ppm (1.45 mg/m³) ceiling (15-min)</td>
<td>Severe eye, mucous membrane, and skin irritation</td>
</tr>
<tr>
<td>Chlorine dioxide†‡</td>
<td>10049-04-4 FO3000000</td>
<td>0.1 ppm (0.3 mg/m³) TWA, 0.3 ppm (0.9 mg/m³) STEL</td>
<td>Severe respiratory and eye irritation</td>
</tr>
<tr>
<td>Chlorine trifluoride†</td>
<td>7790-91-2 FO2800000</td>
<td>0.1 ppm (0.4 mg/m³) ceiling</td>
<td>Severe eye, respiratory, and skin irritation</td>
</tr>
<tr>
<td>Chloroacetaldehyde†</td>
<td>107-20-0 AB2450000</td>
<td>1 ppm (3 mg/m³) ceiling</td>
<td>Throat, nose, and lung irritation; severe eye irritation; skin burns</td>
</tr>
<tr>
<td>α-Chloroacetophenone† (phenacyl chloride)</td>
<td>532-27-4 AM6300000</td>
<td>0.05 ppm (0.3 mg/m³) TWA</td>
<td>Eye and upper respiratory irritation, possible conjunctivitis and corneal damage</td>
</tr>
<tr>
<td>Chloroacetyl chloride†</td>
<td>79-04-9 AO6475000</td>
<td>0.05 ppm (0.2 mg/m³) TWA</td>
<td>Skin and respiratory irritation</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Remarks</td>
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<tr>
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<tr>
<td>Chlorobenzene</td>
<td>108-90-7</td>
<td>(see Appendix III)</td>
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<tr>
<td>(see Appendix III)</td>
<td>CZ0175000</td>
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<tr>
<td>o-Chlorobenzylidene malononitrile†</td>
<td>2698-41-1</td>
<td>0.05 ppm (0.4 mg/m³) ceiling (skin)</td>
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<td>OO3675000</td>
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<tr>
<td>Chlorobromomethane†</td>
<td>74-97-5</td>
<td>200 ppm (1,050 mg/m³) TWA</td>
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<td>PA5250000</td>
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<tr>
<td>2-Chloro-1,3-butadiene (see β-Chloroprene)</td>
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<tr>
<td>Chlorodifluoromethane†</td>
<td>75-45-6</td>
<td>1,000 ppm (3,500 mg/m³) TWA</td>
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<tr>
<td></td>
<td>PA6390000</td>
<td>1,250 ppm (4,375 mg/m³) STEL</td>
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<tr>
<td>Chlorodiphenyl (42% chlorine) (Aroclor 1242)</td>
<td>53469-21-9</td>
<td>Ca; 0.001 mg/m³ TWA</td>
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<tr>
<td>Class: Polychlorinated biphenyls§</td>
<td>TQ1356000</td>
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<tr>
<td>Chlorodiphenyl (54% chlorine) (Aroclor 1254)</td>
<td>11097-69-1</td>
<td>Ca; 0.001 mg/m³ TWA</td>
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<td>Class: Polychlorinated biphenyls§</td>
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<tr>
<td>1-Chloro-2,3-epoxypropane (see Epichlorohydrin)</td>
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</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
** REL revised during OSHA hearings (Appendix IV).
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloroethanes†</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>2-Chloroethanol (see Ethylene chlorohydrin)</td>
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<tr>
<td>Chloroethylene</td>
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<tr>
<td>(see Vinyl chloride)</td>
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</tr>
<tr>
<td>Chloroform‡ ‡‡</td>
<td>67-66-3 FS9100000</td>
<td>Ca; 2 ppm (9.78 mg/m³) STEL (60-min)</td>
<td>Potential for cancer, CNS effects; cancer of the liver and kidneys in animals</td>
</tr>
<tr>
<td>(trichloromethane)</td>
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<td></td>
</tr>
<tr>
<td>bis(Chloromethyl) ether</td>
<td>542-88-1 KN1575000</td>
<td>Ca; use 29 CFR 1910.1008</td>
<td>Lung cancer</td>
</tr>
<tr>
<td>Chloromethyl methyl ether</td>
<td>107-30-2 KN6650000</td>
<td>Ca; use 29 CFR 1910.1006</td>
<td>Potential for cancer; skin and lung cancer in animals</td>
</tr>
<tr>
<td>(methyl chloromethyl ether)</td>
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</tr>
<tr>
<td>1-Chloro-1-nitropropane†</td>
<td>600-25-9 TX5075000</td>
<td>2 ppm (10 mg/m³) TWA</td>
<td>Pulmonary irritation; liver, kidney, and heart damage in animals</td>
</tr>
<tr>
<td>Chloropentafluoroethane†</td>
<td>76-15-3 KH7877500</td>
<td>1,000 ppm (6,320 mg/m³) TWA</td>
<td>Cardiotoxicity; skin, CNS, and respiratory effects</td>
</tr>
<tr>
<td>Chloropicrin ‡‡</td>
<td>76-06-2 PB6300000</td>
<td>0.1 ppm (0.7 mg/m³) TWA</td>
<td>Severe eye, skin, and respiratory irritation</td>
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<tr>
<td>(nitrotrichloromethane)</td>
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<tr>
<td>β-Chloroprene</td>
<td>126-99-8 EI9625000</td>
<td>Ca; 1 ppm (3.6 mg/m³) ceiling</td>
<td>Lung and skin cancer, reproductive effects</td>
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<tr>
<td>Chemical</td>
<td>CAS Number</td>
<td>TWA Concentration</td>
<td>STEL Concentration</td>
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</tr>
<tr>
<td>o-Chlorostyrene</td>
<td>2039-87-4</td>
<td>50 ppm (285 mg/m³) TWA, 75 ppm (430 mg/m³) STEL</td>
<td>Liver and kidney changes</td>
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<tr>
<td>o-Chlorotoluene</td>
<td>95-49-8</td>
<td>50 ppm (250 mg/m³) TWA, 75 ppm (375 mg/m³) STEL</td>
<td>Moderate skin and eye irritation</td>
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<tr>
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<td>XS9000000</td>
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<tr>
<td>2-Chloro-6-trichloromethyl pyridine</td>
<td>1929-82-4</td>
<td>10 mg/m³ TWA, 20 mg/m³ STEL</td>
<td>Respirable fraction</td>
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<td>US7525000</td>
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<tr>
<td>Chlorpyrifos</td>
<td>2921-88-2</td>
<td>0.2 mg/m³ TWA, 0.6 mg/m³ STEL (skin)</td>
<td>Depression of plasma cholinesterase</td>
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<td>TF63000000</td>
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<tr>
<td>Chromic acid</td>
<td>7738-94-5</td>
<td>Ca; carcinogenic Cr(VI), 0.001 mg Cr(VI)/m³ 10-hr TWA</td>
<td>Lung cancer, skin ulcers, and lung irritation</td>
</tr>
<tr>
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<td>GB2450000</td>
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<tr>
<td>Chromium, hexavalent [Cr(VI)]</td>
<td>18540-29-9</td>
<td>Ca; carcinogenic Cr(VI), 0.001 mg/m³ 10-hr TWA</td>
<td>Lung cancer</td>
</tr>
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<td>GB6262000</td>
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<tr>
<td>Chromium(II) compounds</td>
<td>22541-79-3</td>
<td>0.5 mg/m³ TWA</td>
<td>Low-order toxicity</td>
</tr>
<tr>
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<td>GB6260000</td>
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</tr>
<tr>
<td>Chromium(III) compounds</td>
<td>16065-83-1</td>
<td>0.5 mg/m³ TWA</td>
<td>Low-order toxicity</td>
</tr>
<tr>
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<td>GB6261000</td>
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</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
** REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium metal†‡</td>
<td>7440-47-3 GB4200000</td>
<td>0.5 mg/m$^3$ TWA</td>
<td>Pulmonary effects</td>
</tr>
</tbody>
</table>
| Chromyl chloride  
*Class: Chromium, hexavalent‡*                    | 14977-61-8 GB5775000 | Ca; 0.001 mg/m$^3$ TWA [Cr(VI)]  | Respiratory cancer       |
| Chrysene                                              | 218-01-9 GC0700000   | Ca; lowest feasible concentration | Liver and skin cancer    |
| Clopidol†                                             | 2971-90-6 UU7711500  |                                   | Eye and skin irritation  |
| Total dust                                            |                       | 10 mg/m$^3$ TWA,                  |                          |
| Respirable fraction                                   |                       | 20 mg/m$^3$ STEL                  |                          |
|                                                     |                       | 5 mg/m$^3$ TWA                    |                          |
| Coal dust (<5% SiO$_2$)  
(see Appendix III)                                        | ††                    |                                   |                          |
| Coal dust (>5% SiO$_2$)  
(see Appendix III)                                        | ††                    |                                   |                          |
| Coal tar pitch volatiles‡  
*Class: Coal tar products‡*                              | 65996-93-2 GF8655000 | Ca; 0.1 mg/m$^3$ TWA (cyclohexane extractable fraction) | Lung and skin cancer |
| Cobalt metal,† dust, and fume  
*Class: Cobalt‡*                                             | 7440-48-4 GF8750000  | 0.05 mg/m$^3$ TWA                | Dermatitis, potential for pulmonary fibrosis |
<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS Number</th>
<th>TWA Concentration</th>
<th>Health Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt carbonyl</td>
<td>10210-68-1</td>
<td>0.1 mg/m³</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Cobalt hydrocarbonyl</td>
<td>16842-03-8</td>
<td>0.1 mg/m³</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Coke oven emissions</td>
<td>+</td>
<td>Ca; 0.5–0.7 mg/m³ (total particulates as screening level)</td>
<td>Lung and bladder cancer</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>0.1 mg/m³</td>
<td>Upper respiratory irritation</td>
</tr>
<tr>
<td>Fume</td>
<td></td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Dusts and mists</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cotton dust</td>
<td>+</td>
<td>Lowest feasible concentration (&lt;0.2 mg/m³ lint-free cotton dust)</td>
<td>Pulmonary disease (byssinosis)</td>
</tr>
<tr>
<td>Crag® herbicide® (Sesone)</td>
<td>136-78-7</td>
<td>10 mg/m³</td>
<td>Eye and skin irritation; liver and kidney damage; dust causes nervous system effects and convulsions in animals</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
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</tbody>
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*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cresol‡, all isomers</td>
<td>1319-77-3</td>
<td>2.3 ppm (10 mg/m³) TWA</td>
<td>Skin, liver, kidney, and pancreas effects</td>
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<tr>
<td></td>
<td>GO5950000</td>
<td></td>
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<tr>
<td></td>
<td>108-39-4</td>
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<td>606125000</td>
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<td></td>
<td>95-48-7</td>
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<td></td>
<td>606300000</td>
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<tr>
<td>m-Cresol</td>
<td>105-44-5</td>
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<td></td>
<td>606475000</td>
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</tr>
<tr>
<td>o-Cresol</td>
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</tr>
<tr>
<td>p-Cresol</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Crotonaldehyde†</td>
<td>123-73-9</td>
<td>2 ppm (6 mg/m³) TWA</td>
<td>Eye and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>GF9625000</td>
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<td></td>
</tr>
<tr>
<td>Crufomate†‡</td>
<td>299-86-5</td>
<td>5 mg/m³ TWA, 20 mg/m³ STEL</td>
<td>Neurotoxicity, cholinesterase inhibition</td>
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<tr>
<td></td>
<td>TB3850000</td>
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<tr>
<td>Cumene†</td>
<td>98-82-8</td>
<td>50 ppm (245 mg/m³) TWA (skin)</td>
<td>Eye, skin, and upper respiratory irritation</td>
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<td></td>
<td>GR8575000</td>
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<tr>
<td>Cyanamide†</td>
<td>420-04-2</td>
<td>2 mg/m³ TWA</td>
<td>Skin irritation</td>
</tr>
<tr>
<td></td>
<td>GS5950000</td>
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<td></td>
</tr>
<tr>
<td>Cyanides</td>
<td>‡‡</td>
<td>4.7 ppm (5 mg/m³) ceiling (10-min)</td>
<td>Thyroid, blood, and respiratory effects</td>
</tr>
<tr>
<td>Class: Hydrogen cyanide and cyanide salts§</td>
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</tr>
<tr>
<td>Cyanogen†</td>
<td>460-19-5</td>
<td>10 ppm (20 mg/m³) TWA</td>
<td>Respiratory and eye irritation</td>
</tr>
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<td></td>
<td>GT1925000</td>
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<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Effect</td>
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<td>---------------------------------</td>
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<tr>
<td>Cyanogen chloride†‡</td>
<td>506-77-4</td>
<td>0.3 ppm (0.6 mg/m³) ceiling</td>
<td>Severe eye and pulmonary irritation</td>
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<td></td>
<td>GT22750000</td>
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</tr>
<tr>
<td>Cyclohexane†‡</td>
<td>110-82-7</td>
<td>300 ppm (1,050 mg/m³) TWA</td>
<td>Local irritation and CNS depression</td>
</tr>
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<td></td>
<td>GU6300000</td>
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</tr>
<tr>
<td>Cyclohexanethiol</td>
<td>1569-69-3</td>
<td>0.5 ppm (2.4 mg/m³) ceiling</td>
<td>Irritation; eye, skin, blood, and nervous system effects</td>
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<tr>
<td>(cyclohexylmercaptan)</td>
<td>GV7525000</td>
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<tr>
<td>Cyclohexanol†</td>
<td>108-93-0</td>
<td>50 ppm (200 mg/m³) TWA (skin)</td>
<td>Eye, nose, throat, and skin irritation; narcotic effect at high concentrations</td>
</tr>
<tr>
<td></td>
<td>GV7875000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyclohexanone‡*‡</td>
<td>108-94-1</td>
<td>25 ppm (100 mg/m³) TWA (skin)</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones‡</td>
<td>GW1050000</td>
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</tr>
<tr>
<td>Cyclohexene†</td>
<td>110-83-8</td>
<td>300 ppm (1,015 mg/m³) TWA</td>
<td>Mild respiratory irritation, CNS depression</td>
</tr>
<tr>
<td></td>
<td>GW2500000</td>
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<tr>
<td>Cyclohexylamine†</td>
<td>108-91-8</td>
<td>10 ppm (40 mg/m³) TWA</td>
<td>Severe skin and eye irritation and sensitization</td>
</tr>
<tr>
<td></td>
<td>GX0700000</td>
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<td></td>
</tr>
<tr>
<td>Cyclohexylmercaptan</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>(see Cyclohexanethiol)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Cyclonite†</td>
<td>121-82-4</td>
<td>1.5 mg/m³ TWA,</td>
<td>Neurotoxicity</td>
</tr>
<tr>
<td></td>
<td>XY9450000</td>
<td>3 mg/m³ STEL (skin)</td>
<td></td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
** REL revised during OSHA hearings (Appendix IV).
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### Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclopentadiene⁺</td>
<td>542-92-7 GY1000000</td>
<td>75 ppm (200 mg/m³) TWA</td>
<td>Eye and nose irritation</td>
</tr>
<tr>
<td>Cyclopentane⁺</td>
<td>287-92-3 GY2390000</td>
<td>600 ppm (1,720 mg/m³) TWA</td>
<td>CNS depression, skin irritation</td>
</tr>
<tr>
<td>Cyhexatin⁺;⁺⁺</td>
<td>13121-70-5 WH8750000</td>
<td>5 mg/m³ TWA</td>
<td>Skin, eye, and respiratory irritation</td>
</tr>
<tr>
<td>2,4-D⁺ (dichlorophenoxyacetic acid)</td>
<td>94-75-7 AG6825000</td>
<td>10 mg/m³ TWA</td>
<td>Skin irritation, CNS effects</td>
</tr>
<tr>
<td>DDT (dichlorodiphenyltrichloroethane)</td>
<td>50-29-3 KJ3325000</td>
<td>Ca; 0.5 mg/m³ TWA (0.1 mg/m³ LOQ)</td>
<td>Potential for cancer; liver, lung, and lymphatic tumors in animals</td>
</tr>
<tr>
<td>Decaborane⁺</td>
<td>17702-41-9 HD1400000</td>
<td>0.05 ppm (0.3 mg/m³) TWA (skin), 0.15 ppm (0.9 mg/m³) STEL (skin)</td>
<td>Nervous system effects and narcosis; liver and kidney effects in animals</td>
</tr>
<tr>
<td>1-Decanethiol (decylmercaptan) Class: Thiols⁺⁺</td>
<td>143-10-2</td>
<td>0.5 ppm (3.6 mg/m³) ceiling</td>
<td>Eye and skin irritation; blood and nervous system effects</td>
</tr>
<tr>
<td>Decylmercaptan (see 1-Decanethiol)</td>
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<td></td>
</tr>
<tr>
<td>Demeton⁺⁺ (Systox⁺⁺)</td>
<td>8065-48-3 TF3150000</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Anticholinesterase agent</td>
</tr>
<tr>
<td>Chemical Name</td>
<td>CAS Number</td>
<td>TWA/STEL/LOQ</td>
<td>Health Effects</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-------------</td>
<td>-------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Di-2-ethylhexylphthalate (DEHP)</td>
<td>117-81-7</td>
<td>Ca; 5 mg/m³ TWA, 10 mg/m³ STEL (0.15 mg/m³ LOQ)</td>
<td>Potential for cancer; liver tumors in animals</td>
</tr>
<tr>
<td>(di-sec-octylphthalate)</td>
<td>TIO350000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,6-Di-tert-butyl-p-cresol†‡</td>
<td>128-37-0</td>
<td>10 mg/m³ TWA</td>
<td>Decreased growth rate and increased liver weight in animals</td>
</tr>
<tr>
<td></td>
<td>GO7875000</td>
<td></td>
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</tr>
<tr>
<td>Diacetone alcohol‡</td>
<td>123-42-2</td>
<td>50 ppm (240 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>(4-hydroxy-4-methy-2-pentanone)</td>
<td>SA9100000</td>
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</tr>
<tr>
<td>**Class: Ketones‡‡</td>
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</tr>
<tr>
<td>2,4-Diaminoanisole</td>
<td>615-05-4</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; tumors of the thyroid, skin, and lymphatic system in animals</td>
</tr>
<tr>
<td></td>
<td>BZ8580500</td>
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<tr>
<td>1,2-Diaminoethane **</td>
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</tr>
<tr>
<td>(see Ethylenediamine)</td>
<td></td>
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</tr>
<tr>
<td>o-Dianisidine-based dyes†‡</td>
<td></td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; tumors of the bladder, stomach, and mammary glands in animals</td>
</tr>
<tr>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Diazinon†‡</td>
<td>333-41-5</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Skin and eye irritation, cholinesterase inhibition</td>
</tr>
<tr>
<td></td>
<td>TF3325000</td>
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</tr>
<tr>
<td>Diazomethane†</td>
<td>334-88-3</td>
<td>0.2 ppm (0.4 mg/m³) TWA</td>
<td>Severe respiratory irritation and sensitization, asthma attacks, eye and mucous membrane irritation</td>
</tr>
<tr>
<td></td>
<td>PA7000000</td>
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</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diborane†</td>
<td>19287-45-7, HQ9275000</td>
<td>0.1 ppm (0.1 mg/m³) TWA</td>
<td>Pulmonary irritation; liver and kidney damage in animals</td>
</tr>
<tr>
<td>1,2-Dibromo-3-chloropropane‡ (DBCP)</td>
<td>96-12-8, TX8750000</td>
<td>Ca; use 29 CFR 1910.1044</td>
<td>Sterility; renal and liver effects; cancer of the nasal cavity, tongue, pharynx, lungs, stomach, adrenal glands, and mammary glands in animals</td>
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<tr>
<td>2-N-Dibutylaminoethanol† (DBAE)</td>
<td>102-81-8, KK3850000</td>
<td>2 ppm (14 mg/m³) TWA (skin)</td>
<td>Acetylcholinesterase inhibition in vitro; weight loss in animals</td>
</tr>
<tr>
<td>Dibutyl phosphate†</td>
<td>107-66-4, TB9605000</td>
<td>1 ppm (5 mg/m³) TWA, 2 ppm (10 mg/m³) STEL</td>
<td>Respiratory irritation, headaches</td>
</tr>
<tr>
<td>Dibutyl phthalate†</td>
<td>84-74-2, TI0875000</td>
<td>5 mg/m³ TWA</td>
<td>Heated compound is an irritant of the eyes and respiratory tract</td>
</tr>
<tr>
<td>1,3-Dichloro-5,5-dimethyl hydantoin†</td>
<td>118-52-5, MU0700000</td>
<td>0.2 mg/m³ TWA, 0.4 mg/m³ STEL</td>
<td>Eye and mucous membrane irritation</td>
</tr>
<tr>
<td>Dichloroacetylene†</td>
<td>7572-29-4, AP1080000</td>
<td>Ca; 0.1 ppm (0.4 mg/m³) ceiling</td>
<td>Potential for cancer, neurotoxicity, CNS depression; kidney tumors in animals</td>
</tr>
<tr>
<td>α-Dichlorobenzene†‡</td>
<td>95-50-1, CZ4500000</td>
<td>50 ppm (300 mg/m³) ceiling</td>
<td>Upper respiratory and eye irritation; liver and kidney toxicity in animals</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>REL or STEL</td>
<td>Health Effects (Note: 1 ppm = 1 mg/m³)</td>
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<tr>
<td>p-Dichlorobenzene*†‡</td>
<td>106-46-7</td>
<td>Ca (1.7 ppm LOQ)</td>
<td>Potential for cancer, eye and upper respiratory irritation, liver toxicity, kidney and liver cancer in animals</td>
</tr>
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<td>CZ4550000</td>
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<tr>
<td>3,3'-Dichlorobenzidine</td>
<td>91-94-1</td>
<td>Ca; use 29 CFR 1910.1007</td>
<td>Potential for cancer; bladder and liver cancer in animals</td>
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<td>DD0525000</td>
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<tr>
<td>Dichlorodifluoromethane*†</td>
<td>75-71-8</td>
<td>1,000 ppm (4,950 mg/m³) TWA</td>
<td>Narcotic effects and possible asphyxia from vapor</td>
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<tr>
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<td>PA8200000</td>
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<tr>
<td>1,1-Dichloroethane† (ethyldene chloride)</td>
<td>75-34-3</td>
<td>100 ppm (400 mg/m³) TWA</td>
<td>Narcotic effects from vapor; possible damage to the liver, kidneys, and lungs</td>
</tr>
<tr>
<td>Class: Chloroethanes‡</td>
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<td>KI0175000</td>
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<tr>
<td>1,2-Dichloroethylene†</td>
<td>540-59-0</td>
<td>200 ppm (790 mg/m³) TWA</td>
<td>Narcotic effects, mucous membrane irritation</td>
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<td>KV9360000</td>
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<tr>
<td>Dichloroethyl ether†</td>
<td>111-44-4</td>
<td>Ca; 5 ppm (30 mg/m³) TWA (skin), 10 ppm (60 mg/m³) STEL (skin)</td>
<td>Eye and respiratory irritation, pulmonary damage</td>
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<td>KN0875000</td>
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<tr>
<td>Dichloromethane</td>
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<tr>
<td>(see Methylene chloride)</td>
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<tr>
<td>Dichloromonofluoromethane† (Refrigerant 21)</td>
<td>75-43-4</td>
<td>10 ppm (40 mg/m³) TWA</td>
<td>Respiratory irritation, asphyxia at high concentrations</td>
</tr>
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<td>PA8400000</td>
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</tr>
<tr>
<td>1,1-Dichloro-1-nitroethane†</td>
<td>594-72-9</td>
<td>2 ppm (10 mg/m³) TWA</td>
<td>Vapor causes pulmonary, skin, and eye irritation in animals; also causes liver, kidney, and heart damage in animals</td>
</tr>
<tr>
<td></td>
<td>KI1050000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
<th>Hazardous agent</th>
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<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2-Dichloropropane (see Propylene dichloride)</td>
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<td></td>
<td></td>
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<tr>
<td>1,3-Dichloropropene†‡</td>
<td>542-75-6</td>
<td>Ca; 1 ppm (5 mg/m³) 8-hr TWA (skin)</td>
<td>Potential for cancer; cancer of the bladder, lung, and forestomach in animals</td>
</tr>
<tr>
<td></td>
<td>UC8310000</td>
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</tr>
<tr>
<td>2,2-Dichloropropionic acid†</td>
<td>75-99-0</td>
<td>1 ppm (6 mg/m³) TWA</td>
<td>Skin, eye, respiratory, and gastrointestinal irritation</td>
</tr>
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<td>UF0690000</td>
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</tr>
<tr>
<td>Dichlorotetrafluoroethane† (Refrigerant 114)</td>
<td>76-14-2</td>
<td>1,000 ppm (7,000 mg/m³) TWA</td>
<td>Respiratory irritation, asphyxia at high concentrations</td>
</tr>
<tr>
<td></td>
<td>KI1101000</td>
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<td></td>
</tr>
<tr>
<td>Dichlorvos†‡ (DDVP)</td>
<td>62-73-7</td>
<td>1 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td></td>
<td>TC0350000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dicrotophos†‡</td>
<td>141-66-2</td>
<td>0.25 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td></td>
<td>TC3850000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dicyclohexylmethane 4,4'-diisocyanate** [methylene bis(4-cyclohexylisocyanate)]</td>
<td>5124-30-1</td>
<td>0.01 ppm (0.11 mg/m³) ceiling</td>
<td>Respiratory effects and sensitization, pulmonary irritation</td>
</tr>
<tr>
<td></td>
<td>NQ9250000</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
<td>Dicyclopentadiene†</td>
<td>77-73-6</td>
<td>5 ppm (30 mg/m³) TWA</td>
<td>Skin and eye irritation</td>
</tr>
<tr>
<td></td>
<td>PC1050000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Effect</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------</td>
<td>---------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>Dicyclopentadienyl iron† (ferrocene)</td>
<td>102-54-5</td>
<td>10 mg/m³ TWA</td>
<td>Mutagenesis in dogs</td>
</tr>
<tr>
<td>Total dust</td>
<td>LK0700000</td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dieldrin** (Aldrin/dieldrin)</td>
<td>60-57-1</td>
<td>Ca; 0.25 mg/m³ TWA</td>
<td>Potential for cancer, tumors of the lungs, liver, thyroid,</td>
</tr>
<tr>
<td></td>
<td>IO1750000</td>
<td>(skin)</td>
<td>and adrenal glands in animals</td>
</tr>
<tr>
<td></td>
<td>††</td>
<td>Ca; lowest feasible</td>
<td>Potential for cancer, tumors of the lungs in animals</td>
</tr>
<tr>
<td>Diesel exhaust</td>
<td>HZ1760000</td>
<td>concentration</td>
<td></td>
</tr>
<tr>
<td>Diethanolamine†</td>
<td>111-42-2</td>
<td>3 ppm (15 mg/m³) TWA</td>
<td>Skin irritation, eye damage</td>
</tr>
<tr>
<td></td>
<td>KL2975000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diethyl ether (see Ethyl ether)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diethyl ketone†</td>
<td>96-22-0</td>
<td>200 ppm (705 mg/m³)</td>
<td>Skin and eye irritation</td>
</tr>
<tr>
<td></td>
<td>SA8050000</td>
<td>TWA</td>
<td></td>
</tr>
<tr>
<td>Diethyl phthalate†</td>
<td>84-66-2</td>
<td>5 mg/m³ TWA</td>
<td>Mild toxic effects; smaller than normal fetuses in animals</td>
</tr>
<tr>
<td></td>
<td>TI1050000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diethylamine†</td>
<td>109-89-7</td>
<td>10 ppm (30 mg/m³) TWA, 25 ppm (75 mg/m³) STEL</td>
<td>Eye, skin, and respiratory irritation; myocardial degeneration in animals</td>
</tr>
<tr>
<td></td>
<td>HZ8750000</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>2-Diethylaminoethanol†</td>
<td>100-37-8</td>
<td>10 ppm (50 mg/m³) TWA (skin)</td>
<td>Skin, eye, and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>KK5075000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diethylene triamine†</td>
<td>111-40-0</td>
<td>1 ppm (4 mg/m³) TWA (skin)</td>
<td>Skin and respiratory irritation and sensitization</td>
</tr>
<tr>
<td></td>
<td>IE1225000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
***CAS No. or RTECS No. not assigned.

Section B
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difluorodibromomethane†</td>
<td>75-61-6 PA7525000</td>
<td>100 ppm (860 mg/m³) TWA</td>
<td>Respiratory irritation and narcotic effects</td>
</tr>
<tr>
<td>Diglycidyl ether** (DGE)</td>
<td>2238-97-5 KN2350000</td>
<td>Ca; 0.1 ppm (0.5 mg/m³) TWA</td>
<td>Potential for cancer, skin and mucous membrane effects, potential for sensitization, possible hematopoietic and reproductive effects; skin tumors in animals</td>
</tr>
<tr>
<td>Dihydroxybenzene (see Hydroquinone)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diisobutyl ketone‡ (2,6-dimethyl-4-heptanone)</td>
<td>108-83-8 MJ5775000</td>
<td>25 ppm (150 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Diisocyanates§</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Diisopropylamine†</td>
<td>108-18-9 IM4025000</td>
<td>5 ppm (20 mg/m³) TWA (skin)</td>
<td>Respiratory and severe eye irritation</td>
</tr>
<tr>
<td>Dimethoxymethane (see Methylal)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimethyl acetamide†</td>
<td>127-19-5 AB7700000</td>
<td>10 ppm (35 mg/m³) TWA (skin)</td>
<td>Liver damage</td>
</tr>
<tr>
<td>Dimethylamine†</td>
<td>124-40-3 1P8750000</td>
<td>10 ppm (18 mg/m³) TWA</td>
<td>Gas produces respiratory, eye, and mucous membrane irritation in animals</td>
</tr>
<tr>
<td>4-Dimethylaminoazobenzene</td>
<td>60-11-7 BX7350000</td>
<td>Ca; use 29 CFR 1910.1015</td>
<td>Potential for cancer; tumors of the liver and bladder in animals</td>
</tr>
<tr>
<td>Compound</td>
<td>CAS Number</td>
<td>TWA (skin) / STEL (skin)</td>
<td>Health Effects</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dimethylaminobenzene (see Xyldine)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimethylaminoproponitrile * catalyst ESN⁸</td>
<td>1738-25-6</td>
<td>5 ppm (25 mg/m³) TWA (skin), 10 ppm (50 mg/m³) STEL (skin)</td>
<td>Urological disorders, nervous system effects</td>
</tr>
<tr>
<td>Dimethylbenzene (see Xyylene)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimethylaniline† (N,N-dimethylaniline)</td>
<td>121-69-7</td>
<td>Ca; lowest feasible concentration</td>
<td>Anoxia resulting from the formation of methemoglobin</td>
</tr>
<tr>
<td>Dimethylcarbamoyl chloride</td>
<td>79-44-7</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; nasal cancer found in animals</td>
</tr>
<tr>
<td>Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate† (naled)</td>
<td>300-76-5</td>
<td>3 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td>Dimethylformamide†</td>
<td>68-12-2</td>
<td>10 ppm (30 mg/m³) TWA (skin)</td>
<td>Vapors are toxic to the liver</td>
</tr>
<tr>
<td>2,6-Dimethyl-4-heptanone (see Diisobutyl ketone)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,1-Dimethylhydrazine * class: Hydrazines⁵</td>
<td>57-14-7</td>
<td>Ca; 0.06 ppm (0.15 mg/m³) ceiling (120-min)</td>
<td>Potential for cancer; blood, liver, and skin effects; tumors of the lungs, liver, blood vessels, and intestines in animals</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
⁸ REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>bis[2-(Dimethylaminoethyl) ether]</td>
<td>3033-62-3 KR9460000</td>
<td>Minimize exposure to NIAAX catalyst ESN</td>
<td>Urological disorders, nervous system effects</td>
</tr>
<tr>
<td><strong>Class: NIAAX catalyst ESN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimethylphthalate**</td>
<td>131-11-3 TI1575000</td>
<td>5 mg/m³ TWA</td>
<td>Heated compound causes eye and upper respiratory irritation</td>
</tr>
<tr>
<td>Dimethyl sulfate†</td>
<td>77-78-1 WS8225000</td>
<td>Ca; 0.1 ppm (0.5 mg/m³) 8-hr TWA (skin)</td>
<td>Potential for cancer, severe irritation of the eyes, mucous membranes, and skin; nasal and lung cancer in animals</td>
</tr>
<tr>
<td>Dinitrolmide† (3,5-dinitro-o-toluamide)</td>
<td>148-01-6 XS4200000</td>
<td>5 mg/m³ TWA</td>
<td>Hepatic changes</td>
</tr>
<tr>
<td>Dinitro-o cresol**</td>
<td>534-52-1 GO9625000</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>CNS and metabolic effects</td>
</tr>
<tr>
<td>Dinitrobenzene† (all isomers) meta</td>
<td>99-65-0 CZ7350000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ortho</td>
<td>528-29-0 CZ7450000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>para</td>
<td>100-25-4 CZ7525000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dinitrotoluenes§,**</td>
<td>25321-14-6 XT1300000</td>
<td>Ca; 1.5 mg/m³ TWA (skin)</td>
<td>Potential for cancer; reproductive effects; tumors of the liver, skin, and kidneys in animals</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Dioxane (diethylene oxide)</td>
<td>123-91-1</td>
<td>Ca; 1 ppm (3.6 mg/m³) ceiling (30-min)</td>
<td>Potential for cancer; liver and kidney effects; liver, lung, and nasal cavity tumors in animals</td>
</tr>
<tr>
<td>Dioxathion†‡ (Delnav)</td>
<td>78-34-2</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td>Diphenyl†‡ (biphenyl)</td>
<td>92-52-4</td>
<td>0.2 ppm (1 mg/m³) TWA</td>
<td>Eye and throat irritation, liver and CNS damage</td>
</tr>
<tr>
<td>Diphenylamine†‡</td>
<td>122-39-4</td>
<td>10 mg/m³ TWA</td>
<td>Skin, eye, and mucous membrane irritation; urinary and teratogenic effects in animals</td>
</tr>
<tr>
<td>Diphenylmethane diisocyanate</td>
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</tr>
<tr>
<td>(see Methylene bisphenyl isocyanate)</td>
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</tr>
<tr>
<td>Dipropylene glycol methyl ether†</td>
<td>34590-94-8</td>
<td>100 ppm (600 mg/m³) TWA (skin); 150 ppm (900 mg/m³) STEL (skin)</td>
<td>Narcotic effects, mild irritation of the nose and eyes</td>
</tr>
<tr>
<td>Dipropyl ketone†</td>
<td>123-19-3</td>
<td>50 ppm (235 mg/m³) TWA</td>
<td>Mild toxicity; liver effects at high concentrations in animals</td>
</tr>
<tr>
<td>Diquat†</td>
<td>85-00-7</td>
<td>0.5 mg/m³ TWA</td>
<td>CNS effects, skin and respiratory irritation from mists or dusts</td>
</tr>
<tr>
<td>Disulfiram†</td>
<td>97-77-8</td>
<td>2 mg/m³ TWA</td>
<td>Inhibition of cytochrome P450, d-amino acid oxidase, and aldehyde dehydrogenase</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
† Appendix I lists all members of the class indicated; refer to class name in Section A.
‡ Appendix I lists all members of the class indicated; refer to class name in Section A.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disulfoton†‡</td>
<td>298-04-4 TD9275000</td>
<td>0.1 mg/m^3 TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td>Diuron†</td>
<td>330-54-1 YS8925000</td>
<td>10 mg/m^3 TWA</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Divinyl benzene†</td>
<td>1321-74-0 CZ9450000</td>
<td>10 ppm (50 mg/m^3) TWA</td>
<td>Mild skin, eye, and respiratory irritation; skin burns with prolonged contact</td>
</tr>
<tr>
<td>Dodecylmercaptan (see 1-Dodecanethiol)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Dodecanethiol (dodecylmercaptan)</td>
<td>112-55-0 JR3155000</td>
<td>0.5 ppm (4.1 mg/m^3) ceiling (15-min)</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td>Emery (see Appendix III)</td>
<td>12415-34-8 ††</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endosulfan†‡</td>
<td>115-29-7 RB9275000</td>
<td>0.1 mg/m^3 TWA (skin)</td>
<td>Convulsions; high toxicity in female animals</td>
</tr>
<tr>
<td>Endrin†‡</td>
<td>72-20-8 IO575000</td>
<td>0.1 mg/m^3 TWA (skin)</td>
<td>Convulsions</td>
</tr>
<tr>
<td>Enfluranc</td>
<td>13838-16-9 KN6800000</td>
<td>2 ppm (15.1 mg/m^3) ceiling (60-min)</td>
<td>Reproductive effects and decreased audio-visual performance</td>
</tr>
</tbody>
</table>

*Health effects*
<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS No.</th>
<th>LOQ or TWA (skin)</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epichlorohydrin‡ (1-chloro-2,3-epoxypropane)</td>
<td>106-89-8</td>
<td>Ca, lowest feasible concentration (2.5 mg/m³ LOQ)</td>
<td>Respiratory cancer; mutagenesis; reproductive, skin, kidney, liver, and respiratory effects</td>
</tr>
<tr>
<td>EPN†‡</td>
<td>2104-64-5</td>
<td>0.5 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td>1,2-Epoxypropane (see Propylene oxide)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2,3-Epoxy-1-propanol (see Glycidol)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Ethanethiol (ethyl mercaptan)</td>
<td>75-08-1</td>
<td>0.5 ppm (1.3 mg/m³) ceiling</td>
<td>Skin and eye irritation, blood and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Thiols§</em></td>
<td>KI9625000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethanolamine†‡</td>
<td>141-43-5</td>
<td>3 ppm (8 mg/m³) TWA, 6 ppm (15 mg/m³) STEL</td>
<td>Skin, eye, and respiratory irritation; narcotic effects</td>
</tr>
<tr>
<td>Ethion†‡</td>
<td>563-12-2</td>
<td>0.4 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition; toxic effects on nervous, respiratory, and digestive systems</td>
</tr>
<tr>
<td>2-Ethoxyethanol (see Ethylene glycol monoethyl ether)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Ethoxyethyl acetate (see Ethylene glycol monoethyl ether acetate)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl acetate†‡</td>
<td>141-78-6</td>
<td>400 ppm (1,400 mg/m³) TWA</td>
<td>Eye and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>AH542500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl acrylate†</td>
<td>140-88-5</td>
<td>Ca (4.0 ppm LOQ)</td>
<td>Potential for cancer; tumors of the forestomach in animals</td>
</tr>
<tr>
<td></td>
<td>AT0700000</td>
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</tr>
<tr>
<td>Ethyl alcohol† (ethanol)</td>
<td>64-17-5</td>
<td>1,000 ppm (1,900 mg/m³) TWA</td>
<td>Eye, respiratory, and skin irritation; teratogenic and reproductive effects</td>
</tr>
<tr>
<td></td>
<td>KQ6300000</td>
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</tr>
<tr>
<td>Ethylamine†</td>
<td>75-04-7</td>
<td>10 ppm (18 mg/m³) TWA</td>
<td>Primary irritation of mucous membranes, eyes, and skin</td>
</tr>
<tr>
<td></td>
<td>KH2100000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl amyl ketone† (5-methyl-3-heptanone)</td>
<td>541-85-5</td>
<td>25 ppm (130 mg/m³) TWA</td>
<td>Primary irritation of skin and eyes, CNS depression</td>
</tr>
<tr>
<td></td>
<td>MJ7350000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl benzene†</td>
<td>100-41-4</td>
<td>100 ppm (435 mg/m³) TWA,</td>
<td>Eye, skin, and upper respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>DA0700000</td>
<td>125 ppm (545 mg/m³) STEL</td>
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</tr>
<tr>
<td>Ethyl bromide (see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl butyl ketone† (3-heptanone)</td>
<td>106-35-4</td>
<td>50 ppm (230 mg/m³) TWA</td>
<td>Skin and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>MJ5250000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethyl chloride (see Monochloroethane)</td>
<td>74-96-4</td>
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</tr>
<tr>
<td></td>
<td>KH6475000</td>
<td></td>
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</tr>
<tr>
<td>Ethyl ether (see Appendix III)</td>
<td></td>
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</tr>
<tr>
<td>Ethyl formate††</td>
<td>109-94-4</td>
<td>100 ppm (300 mg/m³) TWA</td>
<td>Eye and nose irritation; narcosis in animals at high concentrations</td>
</tr>
<tr>
<td></td>
<td>LQ8400000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Name</td>
<td>CAS Registry Number</td>
<td>TWA Concentration</td>
<td>Notes</td>
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<tr>
<td>Ethyl mercaptan (see Ethanethiol)</td>
<td>78-10-4</td>
<td>10 ppm (85 mg/m³)</td>
<td>TWA, Eye and nose irritation; lung, liver, and kidney damage in animals</td>
</tr>
<tr>
<td>Ethyl silicate†</td>
<td>VV9450000</td>
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</tr>
<tr>
<td>Ethylene chlorohydrin† (2-chloroethanol)</td>
<td>107-07-3</td>
<td>1 ppm (3 mg/m³)</td>
<td>ceiling (skin), Eye, nose, and respiratory irritation; liver, kidney, and brain toxicity</td>
</tr>
<tr>
<td>Ethylenediamine†‡ (1,2-diaminoethane)</td>
<td>107-15-3</td>
<td>10 ppm (25 mg/m³)</td>
<td>TWA, Sensitization and primary irritation to the skin, mucous membranes, and respiratory tract</td>
</tr>
<tr>
<td>Ethylene dibromide‡</td>
<td>106-93-4</td>
<td>Ca; 0.045 ppm TWA, 0.13 ppm</td>
<td>ceiling (15-min), Potential for cancer; mutagenesis; damage to skin, eyes, heart, liver, spleen, CNS, and reproductive and respiratory systems</td>
</tr>
<tr>
<td>Ethylene dichloride***</td>
<td>107-06-2</td>
<td>Ca; 1 ppm (4 mg/m³)</td>
<td>TWA, 2 ppm (8 mg/m³) STEL, Potential for cancer; nervous system, respiratory, cardiovascular, and liver effects</td>
</tr>
<tr>
<td>Ethylene glycol‡</td>
<td>107-21-1</td>
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<tr>
<td>(see Appendix III)</td>
<td>KW2975000</td>
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<tr>
<td>Ethylene glycol dinitrate‡</td>
<td>628-96-6</td>
<td>0.1 mg/m³ STEL (skin), Circulatory system effects</td>
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<tr>
<td>KWS600000</td>
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<tr>
<td>Ethylene glycol monobutyl ether (EGBE) (2-butoxyethanol)</td>
<td>111-76-2</td>
<td>5 ppm (24 mg/m³)</td>
<td>TWA (skin), Adverse effects on blood and hematopoietic system, tissue irritation, CNS depression</td>
</tr>
<tr>
<td>Class: Glycol ethers$‡</td>
<td>KJS875000</td>
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</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol monobutyl ether acetate (EGBEA) (2-butoxyethyl acetate)</td>
<td>112-07-2 KJ8925000</td>
<td>5 ppm (33 mg/m³) TWA (skin)</td>
<td>Adverse effects on blood and hematopoietic system, tissue irritation, CNS depression</td>
</tr>
<tr>
<td>Ethylene glycol monoethyl ether (EGEE) (2-ethoxyethanol)</td>
<td>110-80-5 KK8050000</td>
<td>0.5 ppm (1.8 mg/m³) TWA (skin)</td>
<td>Reproductive and developmental effects; blood, CNS, and hematopoietic system effects</td>
</tr>
<tr>
<td>Ethylene glycol monoethyl ether acetate (EGEEA) (2-ethoxyethyl acetate)</td>
<td>111-15-9 KK8225000</td>
<td>0.5 ppm (2.7 mg/m³) TWA (skin)</td>
<td>Reproductive and developmental effects; blood, CNS, and hematopoietic system effects</td>
</tr>
<tr>
<td>Ethylene glycol monomethyl ether (EGME) (2-methoxyethanol)</td>
<td>109-86-4 KL5775000</td>
<td>0.1 ppm (0.3 mg/m³) TWA (skin)</td>
<td>Reproductive and developmental effects; blood, CNS, and hematopoietic system effects</td>
</tr>
<tr>
<td>Ethylene glycol monomethyl ether acetate (EGMEA) (2-methoxyethyl acetate)</td>
<td>110-49-6 KL5950000</td>
<td>0.1 ppm (0.5 mg/m³) TWA (skin)</td>
<td>Reproductive and developmental effects; blood, CNS, and hematopoietic system effects</td>
</tr>
<tr>
<td>Ethylene oxide‡</td>
<td>75-21-8 KX2450000</td>
<td>Ca; 0.1 ppm (0.18 mg/m³) 8-hr TWA, 5 ppm (9 mg/m³) ceiling (10-min)</td>
<td>Peritoneal cancer, leukemia, mutagenesis, reproductive effects</td>
</tr>
<tr>
<td>Chemical</td>
<td>CAS Number(s)</td>
<td>Additional Information</td>
<td>Description</td>
</tr>
<tr>
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<tr>
<td>Ethyleneimine</td>
<td>151-56-4</td>
<td>Ca; use 29 CFR 1910.1012</td>
<td>Potential for cancer; liver and lung tumors in animals</td>
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<td></td>
<td>KX5075000</td>
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<tr>
<td>Ethylene thiourea</td>
<td>96-45-7</td>
<td>Ca; use in encapsulated form in industry; lowest feasible concentration</td>
<td>Potential for cancer and teratogenesis; liver, thyroid, and lymphatic system tumors in animals</td>
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<td></td>
<td>N91625000</td>
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<td>Ethylidene chloride</td>
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<tr>
<td>(see 1,1-Dichloroethane)</td>
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<tr>
<td>Ethylidene norbornene†</td>
<td>16219-75-3</td>
<td>5 ppm (25 mg/m³) ceiling</td>
<td>Eye and skin irritation; kidney, renal, urogenital, and bone marrow effects in animals</td>
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<tr>
<td>(ENB)</td>
<td>RB9450000</td>
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<tr>
<td>N-Ethylmorpholine†</td>
<td>100-74-3</td>
<td>5 ppm (23 mg/m³) TWA (skin)</td>
<td>Visual disturbances, mucous membrane irritation</td>
</tr>
<tr>
<td></td>
<td>QE4025000</td>
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<tr>
<td>Fenamiphos†</td>
<td>22224-92-6</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
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<td></td>
<td>TB3675000</td>
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</tr>
<tr>
<td>Fensulfothion‡‡ (Dasanit)</td>
<td>115-90-2</td>
<td>0.1 mg/m³ TWA</td>
<td>Cholinesterase inhibition, skin irritation</td>
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<tr>
<td></td>
<td>TF3850000</td>
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<tr>
<td>Fenthion‡ (see Appendix III)</td>
<td>55-38-9</td>
<td>0.1 mg/m³ TWA</td>
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<tr>
<td></td>
<td>TF9625000</td>
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<td></td>
</tr>
<tr>
<td>Ferbam‡‡</td>
<td>14484-64-1</td>
<td>10 mg/m³ TWA</td>
<td>Eye and respiratory irritation from dust</td>
</tr>
<tr>
<td></td>
<td>NO8750000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
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§ Appendix I lists all members of the class indicated; refer to class name in Section A.
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<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrovanadium dust†</td>
<td>12604-58-9</td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL</td>
<td>Eye, skin, and lung effects</td>
</tr>
<tr>
<td>Class: Vanadium§</td>
<td>LK2900000</td>
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</tr>
<tr>
<td>Fibrous glass</td>
<td>††</td>
<td>3 million fibers/m³ TWA (fibers ≤3.5 μm in diameter and ≥10 μm long); 5 mg/m³ TWA (total fibrous glass)</td>
<td>Eye, skin, and respiratory effects</td>
</tr>
<tr>
<td>Class: Synthetic vitreous fibers§</td>
<td>LK3651000</td>
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<td></td>
</tr>
<tr>
<td>Fluorides, inorganic‡</td>
<td>††</td>
<td>2.5 mg/m³ TWA</td>
<td>Kidney and bone effects</td>
</tr>
<tr>
<td>Fluorine†</td>
<td>7782-41-4</td>
<td>0.1 ppm (0.2 mg/m³) TWA</td>
<td>Severe irritation of the eyes, mucous membranes, and skin; lung damage</td>
</tr>
<tr>
<td>LM6475000</td>
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<tr>
<td>Fluorotrichloromethane†</td>
<td>75-69-4</td>
<td>1,000 ppm (5,600 mg/m³) ceiling</td>
<td>Narcotic effects; asphyxia at high concentrations</td>
</tr>
<tr>
<td>(trichlorofluoromethane)</td>
<td>PB6125000</td>
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<tr>
<td>Fluoxene</td>
<td>406-90-6</td>
<td>2 ppm (10.3 mg/m³) ceiling (60-min)</td>
<td>Reproductive effects and decreased audiovisual performance</td>
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<tr>
<td>Class: Waste anesthetic gases and vapors§</td>
<td>KO4250000</td>
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<tr>
<td>Fonofos†‡</td>
<td>944-22-9</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition</td>
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<td>TA5950000</td>
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<tr>
<td>Formaldehyde†</td>
<td>50-00-0</td>
<td>Ca: 0.016 ppm 8-hr TWA, 0.1 ppm ceiling (15-min)</td>
<td>Nasal cancer</td>
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<td>LP8925000</td>
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<tr>
<td>Formamide†</td>
<td>75-12-7</td>
<td>10 ppm (15 mg/m³) TWA (skin)</td>
<td>Skin, eye, and mucous membrane irritation; reproductive effects in animals</td>
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<tr>
<td>LQ0525000</td>
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<tr>
<td>Chemical</td>
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</tr>
<tr>
<td>----------------------------------</td>
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<tr>
<td>Formic acid&lt;sup&gt;*&lt;/sup&gt;</td>
<td>64-18-6</td>
<td>5 ppm (9 mg/m³) TWA</td>
<td>Severe irritation of the eyes, mucous membranes, upper respiratory tract, and skin</td>
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<tr>
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<td>LQ49000000</td>
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<tr>
<td>Furfural (see Appendix III)</td>
<td>98-01-1</td>
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<td>Respiratory effects</td>
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<td>LT70000000</td>
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<tr>
<td>Furfuryl alcohol&lt;sup&gt;**&lt;/sup&gt;</td>
<td>98-00-0</td>
<td>10 ppm (40 mg/m³) TWA (skin), 15 ppm (60 mg/m³) STEL (skin)</td>
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<td>LU91000000</td>
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</tr>
<tr>
<td>Gallium arsenide</td>
<td>1303-00-0</td>
<td>Ca; 0.002 mg As/m³ ceiling (15-min)</td>
<td>Lung and lymphatic cancer resulting from dissociation of gallium arsenide to arsenic</td>
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<td>LW8800000</td>
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<tr>
<td>Gasoline&lt;sup&gt;+&lt;/sup&gt;</td>
<td>8006-61-9</td>
<td>Ca (15 ppm LOQ)</td>
<td>Potential for cancer; skin and eye irritation; kidney and liver cancer in animals</td>
</tr>
<tr>
<td></td>
<td>LX3300000</td>
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<tr>
<td>Germanium tetrahydride&lt;sup&gt;†&lt;/sup&gt;</td>
<td>7782-65-2</td>
<td>0.2 ppm (0.6 mg/m³) TWA</td>
<td>Toxic effects; flammable gas may cause burns</td>
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<td></td>
<td>LY4900000</td>
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<tr>
<td>Glutaraldehyde&lt;sup&gt;‡&lt;/sup&gt;</td>
<td>111-30-8</td>
<td>0.2 ppm (0.8 mg/m³) ceiling</td>
<td>Mutagenesis; possible teratogenesis; eye, nose, and throat irritation</td>
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<td></td>
<td>MA2450000</td>
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<tr>
<td>Glycerin (see Appendix III)</td>
<td>56-81-5</td>
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<td>MA8005000</td>
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<tr>
<td>Glycidol&lt;sup&gt;†&lt;/sup&gt;</td>
<td>556-52-5</td>
<td>25 ppm (75 mg/m³) TWA</td>
<td>Eye, upper respiratory, and skin irritation; CNS depression</td>
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<tr>
<td>(2,3-epoxy-1-propanol)</td>
<td>UB4375000</td>
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</tbody>
</table>

<sup>*</sup>Consult primary sources in Section A for definitive information.

<sup>**</sup>REL adopted during OSHA hearings (Appendix II).

<sup>†</sup>Also listed as a pesticide in Appendix V.

<sup>‡</sup>Appendix I lists all members of the class indicated; refer to class name in Section A.

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</tr>
</thead>
<tbody>
<tr>
<td>Glycidyl ethers$^{§}$</td>
<td>‡‡</td>
<td>See individual chemical</td>
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<tr>
<td>Glycol ethers$^{§}$</td>
<td>‡‡</td>
<td>See individual chemical</td>
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<tr>
<td>Glycolonitrile</td>
<td>107-16-4</td>
<td>2.0 ppm (5.0 mg/m$^3$) ceiling (15-min)</td>
<td>Hepatic, renal, respiratory, cardiovascular,</td>
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<tr>
<td>Class: Nitrile$^{§}$</td>
<td>AM0350000</td>
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<td>gastrointestinal, and nervous system effects</td>
</tr>
<tr>
<td>Grain dust$^+$</td>
<td>‡‡</td>
<td>4 mg/m$^3$ TWA</td>
<td>Chronic bronchitis, asthma, and chronic</td>
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<tr>
<td>Graphite,$^+$ natural</td>
<td>7782-42-5</td>
<td>2.5 mg/m$^3$ TWA</td>
<td>obstruction pulmonary disease</td>
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<td>respirable dust</td>
<td>MD9659600</td>
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<tr>
<td>Graphite, synthetic</td>
<td>‡‡</td>
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<td>Graphite pneumoconiosis</td>
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<td>(see Appendix III)</td>
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<tr>
<td>Guthion$^*$</td>
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<td>(see Azinphos-methyl)</td>
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<td>Gypsum$^+$</td>
<td>13397-24-5</td>
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<tr>
<td>Total dust</td>
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<td>10 mg/m$^3$ TWA</td>
<td>Eye, skin, and physical irritation</td>
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<td>Respirable fraction</td>
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<tr>
<td>Hafnium$^+$</td>
<td>7440-58-6</td>
<td>0.5 mg/m$^3$ TWA</td>
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<td></td>
<td>MG4600000</td>
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<td>Liver damage and eye and skin irritation in</td>
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<td></td>
<td></td>
<td></td>
<td>animals</td>
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<tr>
<td>Substance</td>
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<td>Concentration Details</td>
<td>Health Effects</td>
</tr>
<tr>
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<tr>
<td>Halothane</td>
<td>151-67-7 KH6550000</td>
<td>2 ppm (16.2 mg/m³) ceiling (60-min)</td>
<td>Reproductive effects and decreased audiovisual performance</td>
</tr>
<tr>
<td>Heptachlor†‡</td>
<td>76-44-8 PC07000000</td>
<td>Ca; 0.5 mg/m³ TWA (skin)</td>
<td>Potential for cancer; liver tumors in animals</td>
</tr>
<tr>
<td>Heptane</td>
<td>142-82-5 MI7700000</td>
<td>85 ppm (350 mg/m³) TWA, 440 ppm (1,800 mg/m³) ceiling (15-min)</td>
<td>Skin and nervous system effects</td>
</tr>
<tr>
<td>1-Heptanethiol (n-heptylmercaptan)</td>
<td>1639-09-4 MJ1400000</td>
<td>0.5 ppm (2.7 mg/m³) ceiling (15-min)</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td>n-Heptylmercaptan</td>
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<tr>
<td>(see 1-Heptanethiol)</td>
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<tr>
<td>Hexachlorobutadiene†</td>
<td>87-68-3 EJ07000000</td>
<td>Ca; 0.02 ppm (0.24 mg/m³) TWA (skin)</td>
<td>Potential for cancer; kidney tumors in animals</td>
</tr>
<tr>
<td>Hexachlorocyclopentadiene†‡</td>
<td>77-47-4 GY12250000</td>
<td>0.01 ppm (0.1 mg/m³) TWA</td>
<td>Mucous membrane and skin irritation</td>
</tr>
<tr>
<td>Hexachloroethane***</td>
<td>67-72-1 KI40250000</td>
<td>Ca; 1 ppm (10 mg/m³) 8-hr TWA</td>
<td>Potential for cancer; liver tumors in animals</td>
</tr>
<tr>
<td>Hexachloronaphthalene†</td>
<td>1335-87-1 QJ3500000</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>Toxic effects on liver and skin</td>
</tr>
</tbody>
</table>

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</tr>
</thead>
<tbody>
<tr>
<td>1-Hexadecanethiol (cetylmercaptan)</td>
<td>2917-26-2 ††</td>
<td>0.5 ppm (5.3 mg/m³) ceiling (15-min)</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Thiols§</em></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hexafluoroacetone†</td>
<td>684-16-2</td>
<td>0.1 ppm (0.7 mg/m³) TWA (skin)</td>
<td>Severe lung irritation; eye, nose, throat, and skin irritation. In animals, damage to the liver, kidneys, thymus, spleen, lungs, lymph nodes, and testes; fetotoxic, embryotoxic, and teratogenic effects</td>
</tr>
<tr>
<td></td>
<td>UC2450000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexamethylphosphoric triamide (HMPA)</td>
<td>680-31-9</td>
<td>Ca; lowest feasible concentration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TD0875000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexamethylene diisocyanate (HDI)</td>
<td>822-06-0</td>
<td>0.035 mg/m³ TWA, 0.14 mg/m³ ceiling (10-min)</td>
<td>Respiratory effects, sensitization, and pulmonary irritation</td>
</tr>
<tr>
<td><em>Class: Diisocyanates§</em></td>
<td>MO1740000</td>
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</tr>
<tr>
<td>Hexane **</td>
<td>110-54-3</td>
<td>50 ppm (180 mg/m³) TWA</td>
<td>Skin and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Alkanes§</em></td>
<td>MN9275000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hexane isomers</td>
<td>††</td>
<td>100 ppm (350 mg/m³) TWA, 510 ppm (1,800 mg/m³) ceiling</td>
<td>Skin and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Alkanes§</em></td>
<td>MO3860000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l-Hexanethiol (n-hexylmercaptan)</td>
<td>111-31-9</td>
<td>0.5 ppm (2.7 mg/m³) ceiling</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Thiols§</em></td>
<td>MO4550000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2-Hexanone
(see Methyl butyl ketone)

(see Methyl isobutyl ketone)

sec-Hexyl acetate†
108-84-9
SA7525000
50 ppm (300 mg/m³) TWA
Mild eye and upper respiratory irritation

Hexylene glycol†
107-41-5
SA0810000
25 ppm (125 mg/m³) ceiling
CNS depression; eye, skin, throat, and respiratory irritation; liver and kidney damage in animals

n-Hexylmercaptan
(see 1-Hexanethiol)

Hydrazines§
302-01-2
MU7175000
Ca; 0.03 ppm (0.04 mg/m³) ceiling (120-min)
Potential for cancer; blood, liver, and skin effects; tumors of the lung, liver, blood vessels, and intestines in animals

Hydrogen bromide†
10035-10-6
MW3850000
3 ppm (10 mg/m³) ceiling
Eye, mucous membrane, and skin irritation

Hydrogen chloride†,‡
7647-01-0
MW4025000
5 ppm (7 mg/m³) ceiling
Eye, mucous membrane, and skin irritation

Hydrogen cyanide**
Class: Hydrogen cyanide and cyanide salts§
74-90-8
MW6825000
4.7 ppm (5 mg/m³) STEL (skin)
Thyroid, blood, and respiratory effects

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen fluoride**</td>
<td>7664-39-3 MW7875000</td>
<td>3 ppm (2.5 mg/m³) TWA, 6 ppm (5.0 mg/m³) STEL</td>
<td>Skin, eye, and airway irritation; bone effects</td>
</tr>
<tr>
<td>Hydrogen peroxide†</td>
<td>7722-84-1 MX0900000</td>
<td>1.0 ppm (1.4 mg/m³) TWA</td>
<td>Eye, mucous membrane, and skin irritation</td>
</tr>
<tr>
<td>Hydrogen selenide†</td>
<td>7783-07-5 MX1050000</td>
<td>0.05 ppm (0.2 mg/m³) TWA</td>
<td>Eye, nose, and throat irritation; pulmonary irritation in animals</td>
</tr>
<tr>
<td>Hydrogen sulfide</td>
<td>7783-06-4 MX1225000</td>
<td>10 ppm (15 mg/m³) ceiling (10-min)</td>
<td>Irritation and severe acute effects on nervous and respiratory systems</td>
</tr>
<tr>
<td>Hydrogenated terphenyls†</td>
<td>61788-32-7 WZ6535000</td>
<td>0.5 ppm (5 mg/m³) TWA</td>
<td>Eye, skin, and lung damage; systemic toxicity to the liver, kidneys, and blood-forming organs</td>
</tr>
<tr>
<td>Hydroquinone</td>
<td>123-31-9 MX3500000</td>
<td>2 mg/m³ ceiling (15-min)</td>
<td>Eye and skin effects</td>
</tr>
<tr>
<td>(dihydroxybenzene)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Hydroxypropyl acrylate†</td>
<td>999-61-1 AT1925000</td>
<td>0.5 ppm (3 mg/m³) TWA (skin)</td>
<td>Skin and eye irritation</td>
</tr>
<tr>
<td>Indene†</td>
<td>95-13-6 NK8225000</td>
<td>10 ppm (45 mg/m³) TWA</td>
<td>Mucous membrane and lung irritation; in animals, liver and renal necrosis, spleen injury</td>
</tr>
<tr>
<td>Indium and compounds†</td>
<td>7440-74-6 NL1050000</td>
<td>0.1 mg/m³ TWA</td>
<td>Highly toxic effects; eye and respiratory irritation</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>TLV</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Iodine†‡</td>
<td>7553-56-2</td>
<td>0.1 ppm (1 mg/m³) ceiling</td>
<td>Severe eye, respiratory, and skin irritation</td>
</tr>
<tr>
<td></td>
<td>NN1575000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iodoform†</td>
<td>75-47-8</td>
<td>0.6 ppm (10 mg/m³) TWA</td>
<td>CNS depression; eye, heart, liver, and kidney damage</td>
</tr>
<tr>
<td></td>
<td>PB70000000</td>
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<td></td>
</tr>
<tr>
<td>Iron oxide,† dust and fume (as Fe, total particulate)</td>
<td>1309-37-1</td>
<td>5 mg/m³ TWA</td>
<td>Benign pneumoconiosis termed siderosis</td>
</tr>
<tr>
<td></td>
<td>NO7400000</td>
<td></td>
<td></td>
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<tr>
<td>Iron pentacarbonyl† (as Fe)</td>
<td>13463-40-6</td>
<td>0.1 ppm (0.8 mg/m³) TWA, 0.2 ppm (1.6 mg/m³) STEL</td>
<td>Lung effects, degenerative changes in CNS</td>
</tr>
<tr>
<td></td>
<td>NO4900000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron salts†, soluble</td>
<td>††</td>
<td>1.0 mg/m³ TWA</td>
<td>Skin and mucous membrane irritation</td>
</tr>
<tr>
<td>Isoamyl acetate†</td>
<td>123-92-2</td>
<td>100 ppm (525 mg/m³) TWA</td>
<td>Conjunctival and upper respiratory irritation, narcosis</td>
</tr>
<tr>
<td></td>
<td>NS9800000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isoamyl alcohol†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>123-51-3</td>
<td>100 ppm (360 mg/m³) TWA, 125 ppm (450 mg/m³) STEL</td>
<td>Mild irritation of the eyes, respiratory tract, and skin</td>
</tr>
<tr>
<td></td>
<td>EL5425000</td>
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<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>6032-29-7</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>SA4900000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isobutyl acetate†</td>
<td>110-19-0</td>
<td>150 ppm (700 mg/m³) TWA</td>
<td>Eye and nose irritation, narcosis</td>
</tr>
<tr>
<td></td>
<td>AI4025000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isobutyl alcohol†</td>
<td>78-83-1</td>
<td>50 ppm (150 mg/m³) TWA</td>
<td>Narcotic effects; mild irritation of the skin, eyes, and throat</td>
</tr>
<tr>
<td></td>
<td>NP9625000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
**REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobutyronitrile</td>
<td>78-82-0 TZ4900000</td>
<td>8 ppm (22 mg/m³) TWA</td>
<td>Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects</td>
</tr>
<tr>
<td>Class: Nitriles§</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Isooctyl alcohol†</td>
<td>26952-21-6 NS7700000</td>
<td>50 ppm (270 mg/m³) TWA (skin)</td>
<td>Conjunctival irritation in animals</td>
</tr>
<tr>
<td>Isophorone‡</td>
<td>78-59-1 GW7700000</td>
<td>4 ppm (23 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isophorone diisocyanate**</td>
<td>4098-71-9 NQ9370000</td>
<td>0.005 ppm (0.045 mg/m³) TWA (skin), 0.02 ppm (0.18 mg/m³) STEL (skin)</td>
<td>Respiratory effects, sensitization, pulmonary irritation</td>
</tr>
<tr>
<td>Class: Diisocyanates§</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2-Isopropanol (see Appendix III)</td>
<td>109-59-1 KL5075000</td>
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<td></td>
</tr>
<tr>
<td>Isopropyl acetate (see Appendix III)</td>
<td>108-21-4 AI4930000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isopropyl alcohol**</td>
<td>67-63-0 NT8050000</td>
<td>400 ppm (980 mg/m³) TWA, 500 ppm (1,225 mg/m³) STEL</td>
<td>Mucous membrane irritation, possible carcinogenic effects</td>
</tr>
<tr>
<td>Isopropyl ether†</td>
<td>108-20-3 TZ5425000</td>
<td>500 ppm (2,100 mg/m³) TWA</td>
<td>Mild irritation of the eyes and mucous membranes, narcosis in animals</td>
</tr>
<tr>
<td>Isopropyl glycidyl ether (IGE) Class: Glycidyl ethers§</td>
<td>4016-14-2 TZ3500000</td>
<td>50 ppm (240 mg/m³) ceiling</td>
<td>Skin and mucous membrane effects, sensitization potential, possible hematopoietic and reproductive effects</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS No.</td>
<td>TWA Concentrations</td>
<td>Effects</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------</td>
<td>--------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Isopropylamine</td>
<td>75-31-0</td>
<td>NT8400000</td>
<td>Skin and eye irritation in animals</td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-Isopropylaniline†</td>
<td>768-52-5</td>
<td>BY4200000</td>
<td>2 ppm (10 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Kaolin†</td>
<td>1332-58-7</td>
<td>++</td>
<td>10 mg/m³ TWA</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td>5 mg/m³ TWA</td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kepone</td>
<td>143-50-0</td>
<td>PC8575000</td>
<td>Ca; 0.001 mg/m³ TWA</td>
</tr>
<tr>
<td>Kerosene</td>
<td>8008-20-6</td>
<td>OA5500000</td>
<td>100 mg/m³ TWA</td>
</tr>
<tr>
<td>Class: Refined petroleum solvents§</td>
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</tr>
<tr>
<td>Ketene†</td>
<td>463-51-4</td>
<td>OA7700000</td>
<td>0.5 ppm (0.9 mg/m³) TWA, 1.5 ppm (3 mg/m³) STEL</td>
</tr>
<tr>
<td>Ketones§</td>
<td>++</td>
<td></td>
<td>See individual chemical</td>
</tr>
<tr>
<td>Lead, inorganic§ (as Pb)</td>
<td>7439-92-1</td>
<td>OF7525000</td>
<td>&lt;0.1 mg Pb/m³ TWA; Pb concentration in air to be maintained so that Pb concentration in worker's blood remains ≤ 0.060 mg/100 g of whole blood</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kidney, blood, and nervous system effects</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
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<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone†</td>
<td>1317-65-3 EV9580000</td>
<td>10 mg/m³ TWA</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Lindane†</td>
<td>58-89-9 GV4900000</td>
<td>0.5 mg/m³ 8-hr TWA (skin)</td>
<td>Convulsions; liver and kidney damage in animals</td>
</tr>
<tr>
<td>Liquified petroleum gas†</td>
<td>68476-85-7 SE7545000</td>
<td>1,000 ppm (1,800 mg/m³) TWA</td>
<td>Asphyxia, CNS depression</td>
</tr>
<tr>
<td>Lithium hydride†</td>
<td>7580-67-8 OJ6300000</td>
<td>0.025 mg/m³ TWA</td>
<td>Severe irritation of the eyes, respiratory tract, and skin</td>
</tr>
<tr>
<td>Magnesite†</td>
<td>546-93-0 OM2470000</td>
<td></td>
<td>Skin, mucous membrane, and other physical irritation</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Magnesium oxide fume</td>
<td>(see Appendix III)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malathion†</td>
<td>121-75-5 WM8400000</td>
<td>10 mg/m³ TWA (skin)</td>
<td>Nervous system effects</td>
</tr>
<tr>
<td>Maleic anhydride†</td>
<td>106-31-6 ON3675000</td>
<td>0.25 ppm (1.0 mg/m³) TWA</td>
<td>Severe eye irritation, skin and respiratory irritation, and sensitization</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Description</td>
<td>Effects</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Malonaldehyde</td>
<td>542-78-9</td>
<td>Class: Aldehydes§</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>Malononitrile</td>
<td>109-77-3</td>
<td>Class: Nitriles§</td>
<td>3 ppm (8 mg/m³) TWA</td>
</tr>
<tr>
<td>Manganese compounds and fumes† (as Mn)</td>
<td>7439-96-5</td>
<td></td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL</td>
</tr>
<tr>
<td>Manganese cyclopentadienyl tricarbonyl† (as Mn)</td>
<td>12079-65-1</td>
<td></td>
<td>0.1 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Manganese tetroxide (see Appendix III)</td>
<td>1317-35-7</td>
<td></td>
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</tr>
<tr>
<td>Marble†</td>
<td>1317-65-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marble Total dust</td>
<td>EV9580000</td>
<td>Respirable fraction</td>
<td>10 mg/m³ TWA, 5 mg/m³ TWA</td>
</tr>
<tr>
<td>Mercury,∗** aryl and inorganic (as Hg)</td>
<td>††</td>
<td></td>
<td>0.1 mg/m³ ceiling (skin)</td>
</tr>
<tr>
<td>Mercury (organo) alkyl compounds†‡ (as Hg)</td>
<td>††</td>
<td></td>
<td>0.01 mg/m³ TWA, 0.03 mg/m³ STEL (skin)</td>
</tr>
<tr>
<td>Mercury** vapor (as Hg)</td>
<td>7439-97-6</td>
<td></td>
<td>0.05 mg/m³ TWA (skin)</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesityl oxide</td>
<td>141-79-7 SB4200000</td>
<td>10 ppm (40 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones§</td>
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</tr>
<tr>
<td>Methacrylic acid†</td>
<td>79-41-4 OZ2975000</td>
<td>20 ppm (70 mg/m³) TWA (skin)</td>
<td>Severe eye and skin irritation</td>
</tr>
<tr>
<td>Methanethiol (methyl mercaptan)</td>
<td>74-93-1 PB4375000</td>
<td>0.5 ppm (1 mg/m³) ceiling (15-min)</td>
<td>Irritation; eye, skin, blood, and nervous system effects</td>
</tr>
<tr>
<td>Class: Thiols§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methomyl†† (Lannate)</td>
<td>16752-77-5 AK2975000</td>
<td>2.5 mg/m³ TWA</td>
<td>Reversible cholinesterase inhibition; eye irritation; kidney, liver, blood, spleen, and bone marrow effects</td>
</tr>
<tr>
<td>Methoxychlor†‡</td>
<td>72-43-5 KJ3675000</td>
<td>Ca (0.07 mg/m³ LOQ)</td>
<td>Potential for cancer; liver and ovarian cancers in animals</td>
</tr>
<tr>
<td>2-Methoxyethanol (see Ethylene glycol monomethyl ether)</td>
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<td></td>
</tr>
<tr>
<td>2-Methoxyethyl acetate (see Ethylene glycol monomethyl ether acetate)</td>
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<tr>
<td>Methoxyflurane</td>
<td>76-38-0 KN7820000</td>
<td>2 ppm (13.5 mg/m³) ceiling</td>
<td>Reproductive effects and decreased audiovisual performance</td>
</tr>
<tr>
<td>Class: Waste anesthetic gases and vapors§</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Compound</td>
<td>CAS Number</td>
<td>TWA/STEL Concentration</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>4-Methoxyphenol†</td>
<td>150-76-5</td>
<td>5 mg/m³ TWA</td>
<td>Eye and skin irritation, corneal damage, CNS depression</td>
</tr>
<tr>
<td></td>
<td>SL7700000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl acetate†</td>
<td>79-20-9</td>
<td>200 ppm (610 mg/m³) TWA, 250 ppm (760 mg/m³) STEL</td>
<td>Mild irritation to upper respiratory tract and eyes at higher concentrations</td>
</tr>
<tr>
<td></td>
<td>AI9100000</td>
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</tr>
<tr>
<td>Methyl acetylene† (propyne)</td>
<td>74-99-7</td>
<td>1,000 ppm (1,650 mg/m³) TWA</td>
<td>CNS effects</td>
</tr>
<tr>
<td></td>
<td>UK4920000</td>
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</tr>
<tr>
<td>Methyl acetylene-propadiene mixture† (MAPP)</td>
<td>59355-75-8</td>
<td>1,000 ppm (1,800 mg/m³) TWA, 1,250 ppm (2,250 mg/m³) STEL</td>
<td>Anesthetic effects at high concentrations</td>
</tr>
<tr>
<td></td>
<td>UK4920000</td>
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<td></td>
</tr>
<tr>
<td>Methyl acrylate†</td>
<td>96-33-3</td>
<td>10 ppm (35 mg/m³) TWA (skin)</td>
<td>Conjunctival and upper respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>AT2800000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl alcohol**</td>
<td>67-56-1</td>
<td>200 ppm (260 mg/m³) TWA (skin), 250 ppm (325 mg/m³) STEL (skin)</td>
<td>Blindness, metabolic acidosis</td>
</tr>
<tr>
<td></td>
<td>PC1400000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methylamine†</td>
<td>74-89-5</td>
<td>10 ppm (12 mg/m³) TWA</td>
<td>Severe eye and respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>PF6300000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl amyl alcohol (see Methyl isobutyl carbinol)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl amyl ketone</td>
<td>110-43-0</td>
<td>100 ppm (465 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones†</td>
<td>MJ5075000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl bromide§</td>
<td>74-83-9 PA49000000</td>
<td>Ca; lowest feasible concentration (4.7 ppm LOQ)</td>
<td>Potential for cancer; tumors of the kidney, forestomach, and lung in animals</td>
</tr>
<tr>
<td>Class: Monoalumethanes§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl butyl ketone (2-hexanone)</td>
<td>591-78-6 MP1400000</td>
<td>1 ppm (4 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl chloride§</td>
<td>74-87-3 PA6300000</td>
<td>Ca; lowest feasible concentration (1.6 ppm LOQ)</td>
<td>Potential for cancer, possible teratogenic effects; tumors of the kidney, forestomach, and lung in animals</td>
</tr>
<tr>
<td>Class: Monoalumethanes§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl chloroform</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see 1,1,1-Trichloroethane)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl chloromethyl ether</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Chloromethyl methyl ether)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl 2-cyanoacrylate†</td>
<td>137-05-3 AS7000000</td>
<td>2 ppm (8 mg/m³) TWA, 4 ppm (16 mg/m³) STEL</td>
<td>Nasal and eye irritation</td>
</tr>
<tr>
<td>Methyl demeton†</td>
<td>8022-00-2 TG1760000</td>
<td>0.5 mg/m³ TWA (skin)</td>
<td>Cholinesterase inhibition, alteration of intraocular pressure</td>
</tr>
<tr>
<td>Methyl ethyl ketone** (MEK)</td>
<td>78-93-3 EL6475000</td>
<td>200 ppm (590 mg/m³) TWA, 300 ppm (885 mg/m³) STEL</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>(2-butanone)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Class: Ketones§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Exposure Limit</td>
<td>Description</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>----------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Methyl ethyl ketone peroxide (MEK)</td>
<td>1338-23-4 EL9450000</td>
<td>0.2 ppm (1.5 mg/m³) ceiling</td>
<td>Eye and skin irritation; lung, liver, and kidney damage</td>
</tr>
<tr>
<td>Methyl formate</td>
<td>107-31-3 LQ8925000</td>
<td>100 ppm (250 mg/m³) TWA, 150 ppm (375 mg/m³) STEL</td>
<td>Eye and respiratory irritation; narcosis in animals</td>
</tr>
<tr>
<td>Methylhydrazine (monomethylhydrazine)</td>
<td>60-34-4 MV5600000</td>
<td>Ca; 0.04 ppm (0.08 mg/m³) ceiling (120-min)</td>
<td>Potential for cancer; blood, liver, and skin effects; tumors of the lung, liver, blood vessels, and intestines in animals</td>
</tr>
<tr>
<td>Methyl iodide</td>
<td>74-88-4 PA9450000</td>
<td>Ca; 2 ppm (10 mg/m³) TWA (skin) (1.7 ppm LOQ)</td>
<td>Potential for cancer; tumors of the kidney, forestomach, and lung in animals</td>
</tr>
<tr>
<td>Methyl isoamyl ketone</td>
<td>110-12-3 MP3850000</td>
<td>50 ppm (240 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Methyl isobutyl carbinol (methyl amyl alcohol)</td>
<td>108-11-2 SA7350000</td>
<td>25 ppm (100 mg/m³) TWA (skin), 40 ppm (165 mg/m³) STEL (skin)</td>
<td>Narcosis; eye irritation</td>
</tr>
<tr>
<td>Methyl isobutyl ketone (hexone)</td>
<td>108-10-1 SA9275000</td>
<td>50 ppm (205 mg/m³) TWA, 75 ppm (300 mg/m³) STEL</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Methyl isocyanate</td>
<td>624-83-9 NQ9450000</td>
<td>0.02 ppm (0.05 mg/m³) TWA (skin)</td>
<td>Lacrimation and irritation of the eyes, mucous membranes, and skin</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
** REL revised during OSHA hearings (Appendix IV).
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

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<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl isopropyl ketone†</td>
<td>56-89-4 EL9100000</td>
<td>200 ppm (705 mg/m³) TWA</td>
<td>Mild skin and eye irritation</td>
</tr>
<tr>
<td>Methyl mercaptan (see Methanethiol)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Methyl methacrylate†</td>
<td>80-62-6 OZ5075000</td>
<td>100 ppm (410 mg/m³) TWA</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Methyl parathion‡**</td>
<td>298-00-0 TG0175000</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>CNS effects</td>
</tr>
<tr>
<td>Methyl propyl ketone (2-pentanone)</td>
<td>107-87-9 SA7875000</td>
<td>150 ppm (530 mg/m³) TWA</td>
<td>Irritation; liver, kidney, and nervous system effects</td>
</tr>
<tr>
<td>Class: Ketones§</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Methyl silicate†</td>
<td>681-84-5 VV9800000</td>
<td>1 ppm (6 mg/m³) TWA</td>
<td>Severe eye irritation</td>
</tr>
<tr>
<td>Methylacrylonitrile†</td>
<td>126-98-7 UD1400000</td>
<td>1 ppm (3 mg/m³) TWA (skin)</td>
<td>CNS effects in animals</td>
</tr>
<tr>
<td>Methylal† (dimethoxymethane)</td>
<td>109-87-5 PA8750000</td>
<td>1,000 ppm (3,100 mg/m³) TWA</td>
<td>Mild respiratory irritation and anesthetic effects</td>
</tr>
<tr>
<td>α-Methyl styrene†</td>
<td>98-83-9 WLS0753000</td>
<td>50 ppm (240 mg/m³) TWA, 100 ppm (485 mg/m³) STEL</td>
<td>Slight irritation of the eyes, upper respiratory tract, and skin; CNS depression</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Effect Description</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Methylcyclohexane†</td>
<td>108-87-2</td>
<td>400 ppm (1,600 mg/m³) TWA</td>
<td>Mild narcotic effects</td>
</tr>
<tr>
<td></td>
<td>GV6125000</td>
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</tr>
<tr>
<td>Methylcyclohexanol†</td>
<td>25639-42-3</td>
<td>50 ppm (235 mg/m³) TWA</td>
<td>Mild irritation of the eyes and mucous membranes in animals</td>
</tr>
<tr>
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<td>GW0175000</td>
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</tr>
<tr>
<td>α-Methylcyclohexanone†</td>
<td>583-60-8</td>
<td>50 ppm (230 mg/m³) TWA</td>
<td>Eye and mucous membrane irritation in animals, narcosis at high concentrations</td>
</tr>
<tr>
<td></td>
<td>GV1750000</td>
<td>(skin), 75 ppm</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>(345 mg/m³) STEL (skin)</td>
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</tr>
<tr>
<td>Methylcyclopentadienyl manganese tricarbonyl†</td>
<td>12108-13-3</td>
<td>0.2 mg/m³ TWA (skin)</td>
<td>CNS effects, systemic damage</td>
</tr>
<tr>
<td></td>
<td>OP1450000</td>
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</tr>
<tr>
<td>4,4'-Methylene bis (2-chloroaniline)** (MOCA)</td>
<td>101-14-4</td>
<td>Ca; 0.003 mg/m³ TWA (skin)</td>
<td>Potential for cancer; liver and lung tumors in animals</td>
</tr>
<tr>
<td></td>
<td>CY1050000</td>
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<td></td>
</tr>
<tr>
<td>Methylene bis(4-cyclohexylisocyanate) (see Dicyclohexylmethane 4,4-diisocyanate)</td>
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</tr>
<tr>
<td>Methylene bisphenyl isocyanate (MDI) (diphenylmethane diisocyanate) Class: Disocyanates§</td>
<td></td>
<td>0.005 ppm (0.050 mg/m³), TWA, 0.020 ppm (0.200 mg/m³) ceiling (10-min)</td>
<td>Respiratory effects, sensitization, pulmonary irritation</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Methylene chloride‡ (dichloromethane)</td>
<td>75-09-2</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; tumors of the lung, liver, salivary, and mammary glands in animals</td>
</tr>
<tr>
<td></td>
<td>PA8050000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
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**REL revised during OSHA hearings (Appendix IV).
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4'-Methyleneedianiline (MDA)</td>
<td>101-77-9, BY5425000</td>
<td>Ca; lowest feasible concentration (0.03 mg/m³ LOQ)</td>
<td>Bladder cancer, skin and liver effects</td>
</tr>
<tr>
<td>Metribuzin¹</td>
<td>21087-64-9, XZ2990000</td>
<td>5 mg/m³ TWA</td>
<td>CNS depression; thyroid and liver enzyme effects in animals</td>
</tr>
<tr>
<td>Mica (see Silicates)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mineral wool</td>
<td>&quot;&quot;</td>
<td>3 million fibers/m³ (fibers ≤ 3.5 μm in diameter and ≥ 10 μm long), 5 mg/m³ TWA (total mineral wool dust)</td>
<td>Eye, skin, and respiratory effects</td>
</tr>
<tr>
<td>Molybdenum, soluble</td>
<td>7439-98-7, QA4680000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum, insoluble</td>
<td>7439-98-7, QA4680000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monochloroethane (ethyl chloride)</td>
<td>75-00-3, KH7525000</td>
<td>Handle with caution in the workplace</td>
<td>CNS effects, possible liver and kidney effects</td>
</tr>
<tr>
<td>Class: Chloroethylene³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monocrotophos² (Azodrin*)</td>
<td>6923-22-4, TC4375000</td>
<td>0.25 mg/m³ TWA</td>
<td>Reversible cholinesterase inhibition; behavioral symptoms and pulmonary effects in animals; mutagenic and possible teratogenic effects in animals</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS No.</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Monohalomethanes$</td>
<td>++</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Monomethyl aniline$</td>
<td>100-61-8BY4550000</td>
<td>0.5 ppm (2.0 mg/m$^3$) TWA (skin)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Anoxia resulting from the formation of methemoglobin</td>
<td></td>
</tr>
<tr>
<td>Morpholine$</td>
<td>110-91-8QD6475000</td>
<td>20 ppm (70 mg/m$^3$) TWA (skin), 30 ppm (105 mg/m$^3$) STEL (skin)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Irritation to the skin, eyes, mucous membranes, and respiratory tract</td>
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<tr>
<td>Naphtha$</td>
<td>8030-30-6DE3030000</td>
<td>100 ppm (400 mg/m$^3$) TWA</td>
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<tr>
<td>(coal tar)</td>
<td></td>
<td>Narcosis; liver and kidney damage in animals</td>
<td></td>
</tr>
<tr>
<td>Naphthalene$</td>
<td>91-20-3QJ0525000</td>
<td>10 ppm (50 mg/m$^3$) TWA, 15 ppm (75 mg/m$^3$) STEL</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Hemolysis and eye irritation that causes cataracts</td>
<td></td>
</tr>
<tr>
<td>Naphthalene diisocyanate</td>
<td>25551-28-4NQ9600000</td>
<td>0.04 mg/m$^3$ TWA, 0.17 mg/m$^3$ ceiling (10-min)</td>
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<tr>
<td>(NDI)</td>
<td></td>
<td>Respiratory effects and sensitization, pulmonary irritation</td>
<td></td>
</tr>
<tr>
<td>Class: Diisocyanates$</td>
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<tr>
<td>α-Naphthylamine</td>
<td>134-32-7QM1400000</td>
<td>Ca; use 29 CFR 1910.1004</td>
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<tr>
<td></td>
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<td>Bladder cancer</td>
<td></td>
</tr>
<tr>
<td>β-Naphthylamine$</td>
<td>91-59-8QM2100000</td>
<td>Ca; use 29 CFR 1910.1009</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Bladder cancer</td>
<td></td>
</tr>
<tr>
<td>NIAx$ catalyst ESN$</td>
<td>62765-93-9QR3900000</td>
<td>Lowest feasible concentration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Urological disorders, nervous system effects</td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
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++CAS No. or RTECS No. not assigned.
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<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel carbonyl</td>
<td>13463-39-3 QR6300000</td>
<td>Ca; 0.001 ppm (0.007 mg/m³) TWA</td>
<td>Lung and nasal cancer</td>
</tr>
<tr>
<td>Nickel, metal, soluble,</td>
<td>7440-02-0 QR5950000</td>
<td>Ca; 0.015 mg/m³ TWA</td>
<td>Lung and nasal cancer, skin effects</td>
</tr>
<tr>
<td>insoluble, and inorganic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Class: Nickel, inorganic</em></td>
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</tr>
<tr>
<td>Nickel sulfide roasting (as Ni)</td>
<td>‡‡</td>
<td>Ca; 0.015 mg/m³ TWA</td>
<td>Lung and nasal cancer, skin effects</td>
</tr>
<tr>
<td><em>Class: Nickel, inorganic</em></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nicotine‡‡</td>
<td>54-11-5 QS5250000</td>
<td>0.5 mg/m³ TWA (skin)</td>
<td>Transient stimulation, depression, or paralysis of the CNS, peripheral autonomic ganglia, and nerve endings in skeletal muscle; teratogenic effects in animals</td>
</tr>
<tr>
<td>Nitric acid‡‡</td>
<td>7697-37-2 QU5775000</td>
<td>2 ppm (5 mg/m³) TWA, 4 ppm (10 mg/m³) STEL</td>
<td>Dental erosion, nasal and lung irritation</td>
</tr>
<tr>
<td>Nitric oxide</td>
<td>10102-43-9 QX0525000</td>
<td>25 ppm (30 mg/m³) TWA</td>
<td>Effects on blood and respiratory system</td>
</tr>
<tr>
<td>*Class: Oxides of nitrogen§</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Nitriles‡‡</td>
<td>‡‡</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>p-Nitroaniline†</td>
<td>100-01-6 BY7000000</td>
<td>3 mg/m³ TWA (skin)</td>
<td>Anoxia resulting from the formation of methemoglobin; jaundice and anemia</td>
</tr>
<tr>
<td>Nitrobenzene†</td>
<td>98-95-3 DA6475000</td>
<td>1 ppm (5 mg/m³) TWA (skin)</td>
<td>Anoxia resulting from the formation of methemoglobin; anemia</td>
</tr>
<tr>
<td>Chemical</td>
<td>CAS No.</td>
<td>OSHA PEL or LOQ</td>
<td>Health Effects</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------</td>
<td>-------------------------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>4-Nitrobiphenyl</td>
<td>92-93-3</td>
<td>Ca; usc 29 CFR 1910.1003</td>
<td>Potential for cancer; bladder tumors in animals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DV5600000</td>
<td></td>
</tr>
<tr>
<td>p-Nitrochlorobenzene†</td>
<td>100-00-5</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; vascular and liver tumors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(skin) (0.25 mg/m³ LOQ)</td>
<td>in animals; anoxia</td>
</tr>
<tr>
<td>Nitroethane†</td>
<td>79-24-3</td>
<td>100 ppm (310 mg/m³) TWA</td>
<td>Mild skin irritation; narcosis, pulmonary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>irritation, and liver damage in animals</td>
</tr>
<tr>
<td>Nitrogen oxide**</td>
<td>10102-44-0</td>
<td>1 ppm (1.8 mg/m³) STEL</td>
<td>Respiratory and blood effects</td>
</tr>
<tr>
<td>Class: Oxides of nitrogen‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen trifluoride†</td>
<td>7783-54-2</td>
<td>10 ppm (29 mg/m³) TWA</td>
<td>Anoxia resulting from the formation of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>methemoglobin in animals</td>
</tr>
<tr>
<td>Nitroglycerin**</td>
<td>55-63-0</td>
<td>0.1 mg/m³ STEL (skin)</td>
<td>Circulatory effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>QX2100000</td>
<td></td>
</tr>
<tr>
<td>Nitromethane</td>
<td>75-52-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td>PA9800000</td>
<td></td>
</tr>
<tr>
<td>2-Nitronaphthalene</td>
<td>581-89-5</td>
<td>Ca; lowest feasible concentration</td>
<td></td>
</tr>
<tr>
<td>Class: β-Naphthylamine§</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>QJ9760000</td>
<td></td>
</tr>
<tr>
<td>1-Nitropropane†</td>
<td>108-03-2</td>
<td>25 ppm (90 mg/m³) TWA</td>
<td>Eye irritation and mild respiratory irritation;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>liver and kidney damage in animals</td>
</tr>
<tr>
<td>2-Nitropropane‡</td>
<td>79-46-9</td>
<td>Ca; lowest feasible concentration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.4 ppm LOQ)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TZ5250000</td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
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<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-Nitrosodimethylamine</td>
<td>62-75-9 IQ0525000</td>
<td>Ca; use 29 CFR 1910.1016</td>
<td>Potential for cancer; tumors of the liver, kidney, lung, and nasal cavity in animals</td>
</tr>
<tr>
<td>m-Nitrotoluene†</td>
<td>99-08-1 XT2975000</td>
<td>2 ppm (11 mg/m³) TWA (skin)</td>
<td>Hypoxia/anoxia resulting from formation of methemoglobin</td>
</tr>
<tr>
<td>o-Nitrotoluene†</td>
<td>88-72-2 XT3150000</td>
<td>2 ppm (11 mg/m³) TWA (skin)</td>
<td>Anoxia resulting from formation of methemoglobin</td>
</tr>
<tr>
<td>p-Nitrotoluene†</td>
<td>99-99-0 XT3325000</td>
<td>2 ppm (11 mg/m³) TWA (skin)</td>
<td>Anoxia resulting from formation of methemoglobin</td>
</tr>
<tr>
<td>Nitrotrichloromethane (see Chloropicrin)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrous oxide</td>
<td>10024-97-2 QX1350000</td>
<td>25 ppm (30 mg/m³) TWA for the duration of the exposure</td>
<td>Reproductive system effects and decreases in audiovisual performance</td>
</tr>
<tr>
<td><em>Class: Waste anesthetic gases and vapors§</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonane†</td>
<td>111-84-2 RA6115000</td>
<td>200 ppm (1050 mg/m³) TWA</td>
<td>Narcosis</td>
</tr>
<tr>
<td>1-Nonanethiol (n-nonylmercaptan)</td>
<td>1455-21-6 ‡‡‡</td>
<td>0.5 ppm (3.3 mg/m³) ceiling (15-min)</td>
<td>Irritation; eye, skin, blood, and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Thiols§</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octachloronaphthalene†</td>
<td>2234-13-1 QK0250000</td>
<td>0.1 mg/m³ TWA, 0.3 mg/m³ STEL (skin)</td>
<td>Liver and skin effects</td>
</tr>
<tr>
<td></td>
<td>CAS No.</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>---------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1-Octadecanethiol (octadecylmercaptan)</td>
<td>2885-00-9</td>
<td>0.5 ppm (5.9 mg/m³) ceiling (15-min) Irritation; eye, skin, blood, and nervous system effects</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Class: Thiols §</td>
<td></td>
</tr>
<tr>
<td>Octane</td>
<td>111-65-9</td>
<td>75 ppm (350 mg/m³) TWA, 385 ppm (1,800 mg/m³) ceiling (15-min) Skin and nervous system effects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RG8400000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Octanethiol (n-octylmercaptan)</td>
<td>111-88-6</td>
<td>0.5 ppm (3.0 mg/m³) ceiling (15-min) Irritation; eye, skin, blood, and nervous system effects</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Class: Thiols §</td>
<td></td>
</tr>
<tr>
<td>n-Octylmercaptan</td>
<td></td>
<td>(see 1-Octanethiol)</td>
<td></td>
</tr>
<tr>
<td>Oil mist,† mineral</td>
<td>8012-95-1</td>
<td>5 mg/m³ TWA, 10 mg/m³ STEL Respiratory effects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PY8030000</td>
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<td></td>
</tr>
<tr>
<td>Organic solvents§</td>
<td>‡‡</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Organotin compounds§</td>
<td>‡‡</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Osmium tetroxide† (as Os)</td>
<td>20816-12-0</td>
<td>0.0002 ppm (0.002 mg/m³) TWA, 0.0006 ppm (0.006 mg/m³) STEL Severe irritation of the eyes and respiratory tract</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RN11400000</td>
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<td></td>
</tr>
<tr>
<td>Oxalic acid†‡‡</td>
<td>144-62-7</td>
<td>1 mg/m³ TWA, 2 mg/m³ STEL Eye, mucus membrane, and skin irritation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RO2450000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxides of nitrogen⁵</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Oxygen difluoride†</td>
<td>7783-41-7</td>
<td>0.05 ppm (0.1 mg/m³) ceiling</td>
<td>Severe respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>RS2100000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10028-15-6</td>
<td>0.1 ppm (0.2 mg/m³) ceiling</td>
<td>Upper and lower respiratory tract irritation</td>
</tr>
<tr>
<td></td>
<td>RS8225000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraffin wax fume†</td>
<td>8002-74-2</td>
<td>2 mg/m³ TWA</td>
<td>Discomfort and nausea</td>
</tr>
<tr>
<td></td>
<td>RV0350000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paraquat†</td>
<td>4685-14-7</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Eye, mucous membrane, and skin irritation</td>
</tr>
<tr>
<td>Respirable dust</td>
<td>DW1960000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parathion‡</td>
<td>56-38-2</td>
<td>0.05 mg/m³ TWA (skin)</td>
<td>Nervous system effects</td>
</tr>
<tr>
<td></td>
<td>TF4550000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulates not otherwise regulated (see Appendix III)</td>
<td>††</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pentaborane†</td>
<td>19624-22-7</td>
<td>0.005 ppm (0.01 mg/m³) TWA,</td>
<td>Toxicity, nervous system effects, narcosis and hyperexcitation</td>
</tr>
<tr>
<td></td>
<td>RY8925000</td>
<td>0.015 ppm (0.03 mg/m³) STEL</td>
<td></td>
</tr>
<tr>
<td>Pentachloroethane Class: Chloroethanes</td>
<td>76-01-7</td>
<td>Handle with caution in the workplace</td>
<td>CNS effects, possible liver and kidney effects</td>
</tr>
<tr>
<td></td>
<td>K16300000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pentachloronaphthalene† 1321-64-8
QK0300000 0.5 mg/m³ TWA (skin)
Liver and skin toxicity

Pentachlorophenol‡,* 87-86-5
SM6300000 0.5 mg/m³ TWA (skin)
Eye and upper respiratory irritation, increased
metabolic rate and hyperpyrexia

Pentaerythritol† 115-77-5
RZ2490000
Total dust
10 mg/m³ TWA
Respirable fraction
5 mg/m³ TWA
Physical irritation

Pentane‡ 109-66-0
Class: Alkane§
RZ9450000
120 ppm (350 mg/m³) TWA,
610 ppm (1,800 mg/m³) ceiling
(15-min)
Skin and nervous system effects

1-Pentanethiol‡ (pentylmercaptan)
Class: Thiols§ 110-66-7
SA3150000
0.5 ppm (2.1 mg/m³) ceiling
(15-min)
Eye and skin irritation, blood and nervous
system effects

2-Pentanone
(see Methyl propyl ketone)

Pentylmercaptan
(see 1-Pentanethiol)

Perchloroethylene
(see Tetrachloroethylene)

*Consult primary sources in Section A for definitive information.
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Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perchloromethyl mercaptan†</td>
<td>594-42-3</td>
<td>0.1 ppm (0.8 mg/m³) TWA</td>
<td>Severe pulmonary irritation and lacrimation, liver and kidney damage</td>
</tr>
<tr>
<td></td>
<td>PB0370000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perchloryl fluoride†</td>
<td>7616-94-6</td>
<td>3 ppm (14 mg/m³) TWA,</td>
<td>Mucous membrane irritation; methemoglobinemia and pulmonary edema in animals</td>
</tr>
<tr>
<td></td>
<td>SD1925000</td>
<td>6 ppm (28 mg/m³) STEL</td>
<td></td>
</tr>
<tr>
<td>Perlite†</td>
<td>93763-70-3</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>SD5254000</td>
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<td></td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>10 mg/m³ TWA</td>
<td>Eye, skin, and other forms of physical irritation</td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Pesticides‡</td>
<td>‡‡</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>See individual chemicals</td>
</tr>
<tr>
<td>Petroleum distillates (naphtha)</td>
<td>8002-05-9</td>
<td>350 mg/m³ TWA,</td>
<td></td>
</tr>
<tr>
<td><em>Class: Refined petroleum products§</em></td>
<td>SE7449000</td>
<td>1,800 mg/m³ ceiling (15-min)</td>
<td>Eye, nose, and throat irritation; dermatitis; nervous system effects</td>
</tr>
<tr>
<td>Phenol‡</td>
<td>108-95-2</td>
<td>5 ppm (19 mg/m³) TWA (skin),</td>
<td>Skin, eye, CNS, liver, and kidney effects</td>
</tr>
<tr>
<td></td>
<td>SJ3325000</td>
<td>15.6 ppm (60 mg/m³) ceiling (15-min) (skin)</td>
<td></td>
</tr>
<tr>
<td>Phenothiazine†</td>
<td>92-84-2</td>
<td>5 mg/m³ TWA (skin)</td>
<td>Skin sensitization</td>
</tr>
<tr>
<td></td>
<td>SN5075000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-Phenyl-β-naphthylamine</td>
<td>135-88-6</td>
<td>Ca; lowest feasible concentration</td>
<td></td>
</tr>
<tr>
<td>*Class: β-Naphthylamine§</td>
<td>QM4550000</td>
<td></td>
<td>Bladder cancer</td>
</tr>
</tbody>
</table>

*Health effects as reported in NIOSH Pocket Guide.
<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS Number</th>
<th>TWA Concentration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenyl ether, vapor</td>
<td>101-84-8</td>
<td>1 ppm (7 mg/m³) TWA</td>
<td>Mild toxicity; eye and nose irritation in animals</td>
</tr>
<tr>
<td>Phenyl ether-biphenyl mixture, vapor</td>
<td>††</td>
<td>1 ppm (7 mg/m³) TWA</td>
<td>Eye, skin, and upper respiratory irritation</td>
</tr>
<tr>
<td>Phenyl glycidyl ether</td>
<td>122-60-1</td>
<td>Ca: 1 ppm (6 mg/m³) ceiling (15-min)</td>
<td>Skin and mucous membrane effects, potential for sensitization, possible hematopoietic and reproductive effects; epidermoid nasal carcinomas and squamous metaplasia of the nasal epithelium in rats</td>
</tr>
<tr>
<td>Phenyl mercaptan</td>
<td>106-50-3</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Skin and respiratory sensitization, bronchial asthma</td>
</tr>
<tr>
<td>Phenylethylene (see Styrene)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenylhydrazine</td>
<td>100-63-0</td>
<td>Ca: 0.14 ppm (0.6 mg/m³) ceiling (120-min) (skin)</td>
<td>Potential for cancer; blood, liver, and skin effects; tumors of the lung, liver, blood vessels, and intestines in animals</td>
</tr>
<tr>
<td>Phenylphosphine</td>
<td>638-21-1</td>
<td>0.05 ppm (0.25 mg/m³) ceiling</td>
<td>CNS effects, irritation</td>
</tr>
</tbody>
</table>

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<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phorate(^{±,‡})</td>
<td>298-02-2 TD9450000</td>
<td>0.05 mg/m(^3) TWA, 0.2 mg/m(^3) STEL (skin)</td>
<td>Organo-phosphorus cholinesterase inhibition</td>
</tr>
<tr>
<td>Phosdrin(^†) (Mevinphos(^{±‡}))</td>
<td>7786-34-7 GQ5250000</td>
<td>0.01 ppm (0.1 mg/m(^3)) TWA, 0.03 ppm (0.3 mg/m(^3)) STEL (skin)</td>
<td>Cholinesterase inhibition</td>
</tr>
<tr>
<td>Phosgene (carbonyl chloride)</td>
<td>75-44-5 SY5600000</td>
<td>0.1 ppm (0.4 mg/m(^3)) TWA, 0.2 ppm (0.8 mg/m(^3)) ceiling (15-min)</td>
<td>Respiratory irritation and effects</td>
</tr>
<tr>
<td>Phosphine(^†)</td>
<td>7803-51-2 SY7525000</td>
<td>0.3 ppm (0.4 mg/m(^3)) TWA, 1.0 ppm (1.0 mg/m(^3)) STEL</td>
<td>Severe pulmonary irritation and acute systemic poisoning</td>
</tr>
<tr>
<td>Phosphoric acid(^{±,‡})</td>
<td>7664-38-2 TB6300000</td>
<td>1 mg/m(^3) TWA, 3 mg/m(^3) STEL</td>
<td>Mild irritation of the eyes, upper respiratory tract, and skin</td>
</tr>
<tr>
<td>Phosphorus(^{±,‡}) (yellow)</td>
<td>7723-14-0 TH3500000</td>
<td>0.1 mg/m(^3) TWA</td>
<td>Respiratory and eye irritation, skin burns</td>
</tr>
<tr>
<td>Phosphorus oxychloride(^†)</td>
<td>10025-87-3 TH4897000</td>
<td>0.1 ppm (0.6 mg/m(^3)) TWA, 0.5 ppm (3.0 mg/m(^3)) STEL</td>
<td>Eye and respiratory irritation, gastric effects, narcotic effects, pulmonary edema, nephritis</td>
</tr>
<tr>
<td>Phosphorus pentachloride(^†)</td>
<td>10026-13-8 TB6125000</td>
<td>1 mg/m(^3) TWA</td>
<td>Severe irritation of the eyes, mucous membranes, and respiratory tract; bronchitis</td>
</tr>
<tr>
<td>Phosphorus pentasulfide(^†)</td>
<td>1314-80-3 TH3675000</td>
<td>1 mg/m(^3) TWA, 3 mg/m(^3) STEL</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>Substance</td>
<td>REL†</td>
<td>TWA</td>
<td>STEL</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------</td>
<td>---------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Phosphorus trichloride†</td>
<td>7719-12-2 7719-12-2</td>
<td>0.2 ppm (1.5 mg/m³) TWA, 0.5 ppm (3.0 mg/m³) STEL</td>
<td>Severe irritation of the eyes, mucous membranes, and skin; respiratory effects ranging from bronchial spasm to severe pulmonary edema.</td>
</tr>
<tr>
<td>Phthalic anhydride†</td>
<td>85-44-9 85-44-9</td>
<td>1 ppm (6 mg/m³) TWA</td>
<td>Skin and respiratory irritation and sensitization, eye irritation causing conjunctivitis.</td>
</tr>
<tr>
<td>m-Phthalodinitrile†</td>
<td>626-17-5 626-17-5</td>
<td>5 mg/m³ TWA</td>
<td>Skin irritation.</td>
</tr>
<tr>
<td>Picloram† (see Appendix III)</td>
<td>1918-02-1 1918-02-1</td>
<td></td>
<td>Sensitization dermatitis.</td>
</tr>
<tr>
<td>Picric acid† (2,4,6-trinitrophenyl)</td>
<td>88-89-1 88-89-1</td>
<td>0.1 mg/m³ TWA (skin), 0.3 mg/m³ STEL (skin)</td>
<td>Vitamin K antagonist and inhibition of prothrombin.</td>
</tr>
<tr>
<td>Pindone† (2-pivalyl-1,3-indandione)</td>
<td>83-26-1 83-26-1</td>
<td>0.1 mg/m³ TWA</td>
<td>Eye and skin irritation and sensitization.</td>
</tr>
<tr>
<td>Piperazine dihydrochloride†‡</td>
<td>142-64-3 142-64-3</td>
<td>5.0 mg/m³ TWA</td>
<td>Skin, eye, and other forms of physical irritation.</td>
</tr>
<tr>
<td>Plaster of Paris†</td>
<td>26499-65-0 26499-65-0</td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
</tbody>
</table>

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<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platinum† (as Pt)</td>
<td>7440-06-4 TP2160000</td>
<td>1 mg/m³ TWA 0.002 mg/m³ TWA</td>
<td>Asthma, skin sensitization, eye irritation</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soluble salts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polychlorinated biphenyls§ (PCBs)</td>
<td>††</td>
<td>See individual chemical</td>
<td>Potential for cancer; skin, liver, and reproductive effects; tumors of the liver and pituitary gland and leukemias in animals</td>
</tr>
<tr>
<td>Portland cement†</td>
<td>65997-15-1 VV8770000</td>
<td>10 mg/m³ TWA 5 mg/m³ TWA</td>
<td>Eye irritation, dermatitis</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium hydroxide†‡</td>
<td>1310-58-3 TT2100000</td>
<td>2 mg/m³ ceiling</td>
<td>Severe irritation of the eyes, mucous membranes, and skin</td>
</tr>
<tr>
<td>Propane†</td>
<td>74-98-6 TX2275000</td>
<td>1,000 ppm (1,800 mg/m³) TWA</td>
<td>Asphyxiation</td>
</tr>
<tr>
<td>Propane sultone†</td>
<td>1120-71-4 RP5425000</td>
<td>Ca; lowest feasible concentration</td>
<td>Skin tumors, leukemia, and gliomas in rats and mice</td>
</tr>
<tr>
<td>1-Propanethiol (n-propyl mercaptan)</td>
<td>107-03-9 TZ7300000</td>
<td>0.5 ppm (1.6 mg/m³) ceiling (15-min)</td>
<td>Eye and skin irritation, blood and nervous system effects</td>
</tr>
<tr>
<td>Class: Thiols§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>CAS No.</td>
<td>Concentration Details</td>
<td>Hazard Notes</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Propargyl alcohol</td>
<td>107-19-7</td>
<td>1 ppm (2 mg/m^3) TWA (skin)</td>
<td>Skin and mucous membrane irritation, CNS depression, liver and kidney damage</td>
</tr>
<tr>
<td></td>
<td>UK5075000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>β-Propiolactone</td>
<td>57-57-8</td>
<td>Ca; use CFR 29 1910.1013</td>
<td>Potential for cancer; tumors of the liver, skin, and stomach in animals</td>
</tr>
<tr>
<td></td>
<td>RQ7350000</td>
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<td></td>
</tr>
<tr>
<td>Propionic acid</td>
<td>79-09-4</td>
<td>10 ppm (30 mg/m^3) TWA, 15 ppm (45 mg/m^3) STEL</td>
<td>Mild irritation of the skin, eyes, and mucosal surfaces</td>
</tr>
<tr>
<td></td>
<td>UE5950000</td>
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</tr>
<tr>
<td>Propionitrile</td>
<td>107-12-0</td>
<td>6 ppm (14 mg/m^3) TWA</td>
<td>Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects</td>
</tr>
<tr>
<td><em>Class: Nitriles</em></td>
<td>UF9625000</td>
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</tr>
<tr>
<td>Propoxur (Baygon)</td>
<td>114-26-1</td>
<td>0.5 mg/m^3 TWA</td>
<td>Cholinesterase inhibition</td>
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<td></td>
<td>FC3150000</td>
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<td></td>
</tr>
<tr>
<td>n-Propyl acetate</td>
<td>109-60-4</td>
<td>200 ppm (840 mg/m^3) TWA, 250 ppm (1,050 mg/m^3) STEL</td>
<td>Conjunctival and upper respiratory irritation; narcosis in animals</td>
</tr>
<tr>
<td></td>
<td>AJ3675000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n-Propyl alcohol</td>
<td>71-23-8</td>
<td>200 ppm (500 mg/m^3) TWA (skin), 250 ppm (625 mg/m^3) STEL (skin)</td>
<td>Mild narcosis, upper respiratory irritation</td>
</tr>
<tr>
<td></td>
<td>UH8225000</td>
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</tr>
<tr>
<td>n-Propyl nitrate</td>
<td>627-13-4</td>
<td>25 ppm (105 mg/m^3) TWA, 40 ppm (170 mg/m^3) STEL</td>
<td>Anoxia resulting from the formation of methemoglobin</td>
</tr>
<tr>
<td></td>
<td>UK0350000</td>
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</tr>
<tr>
<td>Propylene dichloride</td>
<td>78-87-5</td>
<td>Ca; lowest feasible concentration (0.03 ppm LOQ)</td>
<td>Potential for cancer; narcosis; eye irritation; mammary gland tumors and liver tumors in animals</td>
</tr>
<tr>
<td>(1,2-dichloropropane)</td>
<td>TX9625000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
§Appendix I lists all members of the class indicated; refer to class name in Section A.
††CAS No. or RTECS No. not assigned.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene glycol dinitrate†</td>
<td>6423-43-4 TY6300000</td>
<td>0.05 ppm (0.3 mg/m³) TWA (skin)</td>
<td>Hepatotoxic, hematologic, and CNS effects</td>
</tr>
<tr>
<td>Propylene glycol monomethyl ether†</td>
<td>107-98-2 UB7700000</td>
<td>100 ppm (360 mg/m³) TWA, 150 ppm (540 mg/m³) STEL</td>
<td>Eye, nose, and throat irritation; CNS depression</td>
</tr>
<tr>
<td>Propylene imine†</td>
<td>75-55-8 CM8050000</td>
<td>Ca; 2 ppm (5 mg/m³) TWA (skin)</td>
<td>Potential for cancer; brain and mammary tumors in animals</td>
</tr>
<tr>
<td>Propylene oxide‡</td>
<td>75-56-9 TZ2975000</td>
<td>Ca; lowest feasible concentration (8.4 ppm LOQ)</td>
<td>Potential for cancer; nasal tumors in animals</td>
</tr>
<tr>
<td>n-Propylmercaptan (see 1-Propanethiol)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propyne (see Methyl acetylene)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrethrum†</td>
<td>8003-34-7 UR4200000</td>
<td>5 mg/m³ TWA</td>
<td>Dermatitis and sensitization; intoxication in animals</td>
</tr>
<tr>
<td>Pyridine‡‡</td>
<td>110-86-1 UR8400000</td>
<td>5 ppm (15 mg/m³) TWA</td>
<td>Mild irritation to eyes and mucous membranes, narcosis; kidney and liver damage in animals</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>TWA or STEL</td>
<td>Effects</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>-------------</td>
<td>---------</td>
</tr>
<tr>
<td>Quinone</td>
<td>106-51-4 DK2625000</td>
<td>0.1 ppm (0.4 mg/m³) TWA</td>
<td>Eye irritation, conjunctivitis, corneal edema, ulceration, scarring</td>
</tr>
<tr>
<td>Refined petroleum solvents</td>
<td>✪</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Resorcinol</td>
<td>108-46-3 VG9625000</td>
<td>10 ppm (45 mg/m³) TWA, 20 ppm (90 mg/m³) STEL</td>
<td>Irritation, methemoglobinemia</td>
</tr>
<tr>
<td>Rhodium (as Rh), metal fume and insoluble compounds</td>
<td>7440-16-6 VI9069000</td>
<td>0.1 mg/m³ TWA</td>
<td>Possible respiratory sensitization</td>
</tr>
<tr>
<td>Rhodium (as Rh), soluble compounds</td>
<td>7440-16-6 VI9069000</td>
<td>0.001 mg/m³ TWA</td>
<td>Mild eye irritation in animals</td>
</tr>
<tr>
<td>Ronnel</td>
<td>299-84-3 TG0525000</td>
<td>10 mg/m³ TWA</td>
<td>Weak cholinesterase inhibition</td>
</tr>
<tr>
<td>Rosin core solder, pyrolysis products (as formaldehyde)</td>
<td>✪</td>
<td>0.1 mg/m³ TWA; Ca in the presence of formaldehyde, acetaldehyde, or malonaldehyde</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Rotenone</td>
<td>83-79-4 DJ2800000</td>
<td>5 mg/m³ TWA</td>
<td>Nervous system effects and convulsions in animals</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
* REL adopted during OSHA hearings (Appendix II).
* Also listed as a pesticide in Appendix V.
* Appendix I lists all members of the class indicated; refer to class name in Section A.
* CAS No. or RTECS No. not assigned.
### Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selenium compounds† (as Se)</td>
<td>7782-49-2 VS7700000</td>
<td>0.2 mg/m³ TWA</td>
<td>Eye, upper respiratory, and skin irritation;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>damage to the liver, kidney, spleen, and heart in animals†</td>
</tr>
<tr>
<td>Selenium hexafluoride† (as Se)</td>
<td>7783-79-1 VS9450000</td>
<td>0.05 ppm (0.4 mg/m³) TWA</td>
<td>Severe respiratory irritation in animals</td>
</tr>
<tr>
<td>Silica, amorphous†, diatomaceous earth containing less than 1% crystalline silica</td>
<td>61790-53-2 HL8600000</td>
<td>6 mg/m³ TWA</td>
<td>Pulmonary fibrosis</td>
</tr>
<tr>
<td>Silica, amorphous †, precipitated, and gel</td>
<td>7699-41-4 VV8850000</td>
<td>6 mg/m³ TWA</td>
<td>Pulmonary fibrosis</td>
</tr>
<tr>
<td>Silica, crystalline cristobalite</td>
<td>14464-46-1 VV7325000</td>
<td>Ca; 0.05 mg/m³ TWA</td>
<td>Chronic lung disease (silicosis)</td>
</tr>
<tr>
<td>Silica, crystalline quartz</td>
<td>14808-60-7 VV7330000</td>
<td>Ca; 0.05 mg/m³ TWA</td>
<td>Chronic lung disease (silicosis)</td>
</tr>
<tr>
<td>Silica, crystalline tridymite</td>
<td>15468-32-3 VV7335000</td>
<td>Ca; 0.05 mg/m³ TWA</td>
<td>Chronic lung disease (silicosis)</td>
</tr>
<tr>
<td>Silica, crystalline tripoli</td>
<td>1317-95-9 VV7336000</td>
<td>Ca; 0.05 mg/m³ TWA</td>
<td>Chronic lung disease (silicosis)</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS No.</td>
<td>Units</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>---------</td>
<td>-------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Silica, fused</td>
<td>60676-86-0</td>
<td>Ca; 0.05 mg/m³ TWA</td>
<td>Chronic lung disease (silicosis)</td>
</tr>
<tr>
<td></td>
<td>VV7328000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicates†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(&lt;1% crystalline silica):</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mica, respirable dust</td>
<td>12001-26-2</td>
<td>3 mg/m³ TWA</td>
<td>Fibrotic pneumoconiosis</td>
</tr>
<tr>
<td></td>
<td>VV8760000</td>
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<td></td>
</tr>
<tr>
<td>Soapstone, total dust</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Soapstone, respirable dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talc (containing asbestos)</td>
<td>14807-96-6</td>
<td>Ca; 100,000 fibers/m³ (fibers &gt;5 μm long; in a 400-liter sample)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WW2710000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talc (containing no asbestos) (see Talc)</td>
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<td></td>
</tr>
<tr>
<td>Silicon†</td>
<td>7440-21-3</td>
<td></td>
<td>Eye, skin, and mucous membrane irritation; respiratory effects</td>
</tr>
<tr>
<td></td>
<td>VW0400000</td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
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</tr>
<tr>
<td>Silicon carbide†</td>
<td>409-21-2</td>
<td></td>
<td>Physical irritation</td>
</tr>
<tr>
<td></td>
<td>VW0450000</td>
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</tr>
<tr>
<td>Total dust</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silicon tetrahydride†</td>
<td>7803-62-5</td>
<td>5 ppm (7 mg/m³ TWA)</td>
<td>Moderate irritation of the eyes, skin, and mucous membranes</td>
</tr>
<tr>
<td></td>
<td>VW1400000</td>
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<td></td>
</tr>
<tr>
<td>Silver†‡ metal and soluble compounds</td>
<td>7440-22-4</td>
<td>0.01 mg/m³ TWA</td>
<td>Argyria; local or generalized impregnation of the mucous membranes, skin, and eyes with silver</td>
</tr>
<tr>
<td></td>
<td>VW3675000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
†‡CAS No. or RTECS No. not assigned.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soapstone (see Silicates)</td>
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</tr>
<tr>
<td>Sodium azide†</td>
<td>26628-22-8 VV80500000</td>
<td>0.1 ppm ceiling (skin) as HN₃,</td>
<td>Hypotension, cardiovascular effects, irritation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.3 mg/m³ ceiling (skin) as NaN₃</td>
<td></td>
</tr>
<tr>
<td>Sodium bisulfite‡+‡</td>
<td>7631-90-5 VZ20000000</td>
<td>5 mg/m³ TWA</td>
<td>Eye, skin, and mucous membrane irritation</td>
</tr>
<tr>
<td>Sodium fluoroacetate‡+‡</td>
<td>62-74-8 AH91000000</td>
<td>0.05 mg/m³ TWA (skin), 0.15 mg/m³ STEL (skin)</td>
<td>Convulsions and ventricular fibrillation, kidney damage</td>
</tr>
<tr>
<td>Sodium hydroxide‡</td>
<td>1310-73-2 WB4900000</td>
<td>2 mg/m³ ceiling (15-min)</td>
<td>Respiratory irritation</td>
</tr>
<tr>
<td>Sodium metabisulfite†</td>
<td>7681-57-4 UX8225000</td>
<td>5 mg/m³ TWA</td>
<td>Skin, eye, lung, nose, and throat irritation</td>
</tr>
<tr>
<td>Starch†</td>
<td>9005-25-8 GM5090000</td>
<td></td>
<td>Eye, skin, and other physical irritation</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>10 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m³ TWA</td>
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</tr>
<tr>
<td>Stibine†</td>
<td>7803-52-3 WJ07000000</td>
<td>0.1 ppm (0.5 mg/m³) TWA</td>
<td>Toxic hemolysis, liver, and kidney damage; lung irritation</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Effects</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------</td>
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<td>----------------------------------------------</td>
</tr>
<tr>
<td>Stoddard solvent‡</td>
<td>8052-41-3</td>
<td>350 mg/m³ TWA, 1,800 mg/m³ ceiling (15-min)</td>
<td>Eye, nose, and throat irritation; dermatitis, nervous system effects</td>
</tr>
<tr>
<td>Class: Refined petroleum solvents§</td>
<td>WJ8925000</td>
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<tr>
<td>Strychnine‡‡</td>
<td>57-24-9</td>
<td>0.15 mg/m³ TWA</td>
<td>Convulsions</td>
</tr>
<tr>
<td>(vinyl benzene; phenylethylene)</td>
<td>WL2275000</td>
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<td></td>
</tr>
<tr>
<td>Styrene **</td>
<td>100-42-5</td>
<td>50 ppm (215 mg/m³) TWA, 100 ppm (425 mg/m³) STEL</td>
<td>Nervous system effects, eye and respiratory irritation, reproductive effects</td>
</tr>
<tr>
<td>Subtilisins†</td>
<td>9014-01-1</td>
<td>0.00006 mg/m³ STEL (60-min)</td>
<td>Respiratory sensitization, skin irritation, respiratory effects</td>
</tr>
<tr>
<td>(proteolytic enzymes)</td>
<td>CO9450000, CO9550000</td>
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<td></td>
</tr>
<tr>
<td>Succinonitrile §</td>
<td>110-61-2</td>
<td>6 ppm (20 mg/m³) TWA</td>
<td>Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects</td>
</tr>
<tr>
<td>Class: Nitriles §</td>
<td>WN3850000</td>
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<tr>
<td>Sucrose†</td>
<td>57-50-1</td>
<td>10 mg/m³ TWA</td>
<td>Physical irritation</td>
</tr>
<tr>
<td>Total dust</td>
<td>WN6500000</td>
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</tr>
<tr>
<td>Respirable dust</td>
<td></td>
<td>5 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Sulfitol (see TEDP)</td>
<td></td>
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</tr>
<tr>
<td>Sulfur dioxide‡‡</td>
<td>7446-09-5</td>
<td>2 ppm (5 mg/m³) TWA, 5 ppm (10 mg/m³) STEL</td>
<td>Respiratory effects</td>
</tr>
<tr>
<td>Sulfur hexafluoride†</td>
<td>2551-62-4</td>
<td>1,000 ppm (6,000 mg/m³) TWA</td>
<td>Mild effect on the nervous system</td>
</tr>
<tr>
<td>WS4500000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
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§Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid‡</td>
<td>7664-93-9 WS5600000</td>
<td>1 mg/m³ TWA</td>
<td>Pulmonary irritation</td>
</tr>
<tr>
<td>Sulfuric acid, fuming</td>
<td>8014-95-7 WS5605000</td>
<td>1 mg/m³ TWA</td>
<td>Pulmonary irritation</td>
</tr>
<tr>
<td>Sulfur monochloride†</td>
<td>10025-67-9 WS4300000</td>
<td>1 ppm (6 mg/m³) ceiling</td>
<td>Severe irritation of the eyes, mucous membranes, and skin; respiratory irritation</td>
</tr>
<tr>
<td>Sulfur pentafluoride‡</td>
<td>5714-22-7 WS4480000</td>
<td>0.01 ppm (0.1 mg/m³) ceiling</td>
<td>Severe pulmonary irritation in animals</td>
</tr>
<tr>
<td>Sulfur tetrafluoride‡</td>
<td>7783-60-0 WT4800000</td>
<td>0.1 mg/m³ (0.4 mg/m³) ceiling</td>
<td>Severe pulmonary irritation in animals</td>
</tr>
<tr>
<td>Sulfonyl fluoride†‡‡</td>
<td>2699-79-8 WT5075000</td>
<td>5 ppm (20 mg/m³) TWA, 10 ppm (40 mg/m³) STEL</td>
<td>Respiratory irritation, CNS depression</td>
</tr>
<tr>
<td>Sulprofos†</td>
<td>35400-43-2 TE4165000</td>
<td>1 mg/m³ TWA</td>
<td>Mild organophosphate cholinesterase inhibition</td>
</tr>
<tr>
<td>Systox* (see Demeton)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4,5-T†‡</td>
<td>93-76-5 AJ8400000</td>
<td>10 mg/m³ TWA</td>
<td>Mild toxic effects; stiffness to ataxia in animals</td>
</tr>
<tr>
<td>Talc (containing asbestos) (see Asbestos)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>REL Code</td>
<td>TWA Value</td>
<td>STEL Value (if applicable)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------</td>
<td>-----------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Tale†  (containing no asbestos)</td>
<td>14807-96-6 WW2700000</td>
<td>2 mg/m³ TWA</td>
<td>5 mg/m³ TWA, 10 mg/m³ STEL</td>
</tr>
<tr>
<td>Tantalum†, metal and oxide dust</td>
<td>7440-25-7 WW5505000</td>
<td>5 mg/m³ TWA</td>
<td>10 mg/m³ STEL</td>
</tr>
<tr>
<td>TEDP±‡ (sulfotep)</td>
<td>3689-24-5 XN4375000</td>
<td>0.2 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Tellurium† and compounds</td>
<td>13494-80-9 WY2625000</td>
<td>0.1 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Tellurium hexafluoride†</td>
<td>7783-80-4 WY2800000</td>
<td>0.02 ppm (0.2 mg/m³) TWA</td>
<td></td>
</tr>
<tr>
<td>Temephos±‡</td>
<td>3383-96-8 TF6890000</td>
<td>10 mg/m³ TWA</td>
<td>5 mg/m³ TWA</td>
</tr>
<tr>
<td>Total dust (Respirable fraction)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEPP±‡ (tetrathyl pyrophosphate)</td>
<td>107-49-3 UX6825000</td>
<td>0.05 mg/m³ TWA (skin)</td>
<td></td>
</tr>
<tr>
<td>Terphenyls†</td>
<td>26140-60-3 WZ6450000</td>
<td>0.5 ppm (5 mg/m³) ceiling</td>
<td></td>
</tr>
<tr>
<td>1,1,1,2-Tetrachloro-2,2-difluoroethane†</td>
<td>76-11-9 K11425000</td>
<td>500 ppm (4,170 mg/m³) TWA</td>
<td></td>
</tr>
<tr>
<td>1,1,2,2-Tetrachloro-1,2-difluoroethane‡</td>
<td>76-12-0 K11420000</td>
<td>500 ppm (4,170 mg/m³) TWA</td>
<td></td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) (dioxin)</td>
<td>1746-01-6 HP350000</td>
<td>Ca; lowest feasible concentration</td>
<td>Potential for cancer; chloracne; tumors at many sites in animals</td>
</tr>
<tr>
<td>1,1,1,2-Tetrachloroethane Class: Chloroethanes†</td>
<td>630-20-6 KI845000</td>
<td>Handle with caution in the workplace</td>
<td>CNS effects, possible liver and kidney effects</td>
</tr>
<tr>
<td>1,1,2,2-Tetrachloroethane**</td>
<td>79-34-5 KI8575000</td>
<td>Ca; 1 ppm (7 mg/m³) TWA (0.7 ppm LOQ) (skin)</td>
<td>Potential for cancer, liver, gastrointestinal, and nervous system effects; tumors of the liver in animals</td>
</tr>
<tr>
<td>Tetrachloroethylene‡ ( perchloroethylene)</td>
<td>127-18-4 KX3850000</td>
<td>Ca; lowest feasible concentration (0.4 ppm LOQ)</td>
<td>Potential for cancer; tumors of the liver in animals</td>
</tr>
<tr>
<td>Tetrachloromethane (see Carbon tetrachloride)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetrachloronaphthalene‡</td>
<td>1335-88-2 QK3700000</td>
<td>2 mg/m³ TWA (skin)</td>
<td>Liver and skin toxicity</td>
</tr>
<tr>
<td>Tetraethyl lead† (as Pb)</td>
<td>78-00-2 TP4550000</td>
<td>0.075 mg/m³ TWA (skin)</td>
<td>Nervous system effects, mental aberrations, psychosis, mania, convulsions</td>
</tr>
<tr>
<td>Tetrahydrofuran‡</td>
<td>109-99-9 LU5950000</td>
<td>200 ppm (590 mg/m³) TWA, 250 ppm (735 mg/m³) STEL</td>
<td>Anesthetic effects, mild upper respiratory tract irritation</td>
</tr>
<tr>
<td>Tetramethyl lead‡</td>
<td>75-74-1 TP4725000</td>
<td>0.075 mg/m³ TWA (skin)</td>
<td>Irritability; CNS effects in animals</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Number</td>
<td>TLV or Ceiling</td>
<td>Notes</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>Tetramethyl succinonitrile</td>
<td>3333-52-6 WN4025000</td>
<td>0.5 ppm (3 mg/m³) TWA (skin)</td>
<td>Hepatic, renal, respiratory, cardiovascular, gastrointestinal, and nervous system effects</td>
</tr>
<tr>
<td>Tetranitromethane</td>
<td>509-14-8 PB4025000</td>
<td>1 ppm (8 mg/m³) TWA</td>
<td>Severe irritation of the eyes and respiratory tract</td>
</tr>
<tr>
<td>Tetrasodium pyrophosphate</td>
<td>7722-88-5 UX7350000</td>
<td>5 mg/m³ TWA</td>
<td>Eye and respiratory irritation</td>
</tr>
<tr>
<td>Tetryl (2,4,6-trinitrophenylmethylnitramine)</td>
<td>479-45-8 BY6300000</td>
<td>1.5 mg/m³ TWA (skin)</td>
<td>Severe sensitization dermatitis, upper respiratory tract irritation</td>
</tr>
<tr>
<td>Thallium, soluble compounds</td>
<td>7440-28-0 XG3425000</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Extreme toxic effects, effects on nervous system and body hair, kidney damage</td>
</tr>
<tr>
<td>4,4'-Thiobis-(6-tertbutyl-m-cresol)</td>
<td>96-69-5 GP3150000</td>
<td>10 mg/m³ TWA 5 mg/m³ TWA</td>
<td>Eye, skin, and other physical irritation</td>
</tr>
<tr>
<td>Thioglycolic acid</td>
<td>68-11-1 AI5950000</td>
<td>1 ppm (4 mg/m³) TWA (skin)</td>
<td>Eye and skin irritation, systemic effects</td>
</tr>
<tr>
<td>Thiols</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Thionyl chloride</td>
<td>7719-09-7 XM5150000</td>
<td>1 ppm (5 mg/m³) ceiling</td>
<td>Eye, skin, and mucous membrane irritation</td>
</tr>
</tbody>
</table>

* Consult primary sources in Section A for definitive information.
† REL adopted during OSHA hearings (Appendix II).
‡ Also listed as a pesticide in Appendix V.
§ Appendix I lists all members of the class indicated; refer to class name in Section A.
** REL revised during OSHA hearings (Appendix IV).
††CAS No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

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<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiram†‡</td>
<td>137-26-8</td>
<td>5 mg/m³ TWA</td>
<td>Respiratory, eye, and skin irritation; sensitization dermatitis; teratogenic effects in animals</td>
</tr>
<tr>
<td></td>
<td>JO1400000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin†, inorganic compounds</td>
<td>7440-31-5 XP7320000</td>
<td>2 mg/m³ TWA</td>
<td>Eye and skin irritation</td>
</tr>
<tr>
<td>(as Sn)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin”, organic compounds</td>
<td>‡</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Eye, skin, liver, nervous system, and heart effects</td>
</tr>
<tr>
<td>Class: Organotin compounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>‡</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tin oxide†</td>
<td>1332-29-2 XQ3980000</td>
<td>2 mg/m³ TWA</td>
<td>Reduced pulmonary capacity, stannosis</td>
</tr>
<tr>
<td>(as Sn)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Titanium dioxide†</td>
<td>13463-67-7 XR2275000</td>
<td>Ca; lowest feasible concentration (0.2 mg/m³ LOQ)</td>
<td>Potential for cancer; lung tumors in animals</td>
</tr>
<tr>
<td>o-Tolidine-based dyes</td>
<td>‡</td>
<td>Ca; lowest feasible concentration</td>
<td>Bladder cancer</td>
</tr>
<tr>
<td>o-Tolidine</td>
<td>119-93-7 DD1225000</td>
<td>Ca; 0.02 mg/m³ ceiling (60-min)</td>
<td>Potential for cancer; tumors of the liver, urinary bladder, and mammary glands in animals</td>
</tr>
<tr>
<td>Toxolene**</td>
<td>108-88-3 XS5250000</td>
<td>100 ppm (375 mg/m³) TWA, 150 ppm (560 mg/m³) STEL</td>
<td>CNS depression</td>
</tr>
<tr>
<td>Substance</td>
<td>CAS Registry No.</td>
<td>EEC N°</td>
<td>Classification and Effects</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------</td>
<td>--------</td>
<td>----------------------------------------------------------------</td>
</tr>
<tr>
<td>Toluene diisocyanate (TDI)</td>
<td>26471-62-5</td>
<td>NQ9490000</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>Toluenediamine (TDA)</td>
<td>95-80-7</td>
<td>XS9625000</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>m-Toluidine</td>
<td>108-44-1</td>
<td>XU2800000</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
<td>(skin)</td>
</tr>
<tr>
<td>o-Toluidine</td>
<td>95-53-4</td>
<td>XU2975000</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>p-Toluidine†</td>
<td>106-49-0</td>
<td>XU3150000</td>
<td>Ca; lowest feasible concentration</td>
</tr>
<tr>
<td>Toxaphene‡</td>
<td></td>
<td></td>
<td>(0.15 ppm LOQ) (skin)</td>
</tr>
<tr>
<td>(see Chlorinated camphene)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tremolite</td>
<td>77536-68-6</td>
<td>CI6560000</td>
<td>Ca; 0.1 fibers/cc</td>
</tr>
<tr>
<td>Class: Asbestos$</td>
<td></td>
<td></td>
<td>(see 29 CFR 1910.1101)</td>
</tr>
<tr>
<td>Tributyl phosphate‡</td>
<td>126-73-8</td>
<td>TC7700000</td>
<td>0.2 ppm (2.5 mg/m³) TWA</td>
</tr>
<tr>
<td>Trichloroacetic acid†‡</td>
<td>76-03-9</td>
<td>AJ7875000</td>
<td>1 ppm (7 mg/m³) TWA</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Listed as a pesticide in Appendix V.
$Appendix I lists all members of the class indicated; refer to class name in Section A.
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Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

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<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,4-Trichlorobenzene†‡</td>
<td>120-82-1 DC2100000</td>
<td>5 ppm (40 mg/m³) ceiling</td>
<td>Eye, throat, and dermal irritation</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane‡</td>
<td>71-55-6 KJ2975000</td>
<td>350 ppm (1,910 mg/m³) ceiling (15-min)</td>
<td>CNS, liver, and cardiovascular effects</td>
</tr>
<tr>
<td>*Class: Chloroethanes§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,1,2-Trichloroethane‡**§</td>
<td>79-00-5 KJ3150000</td>
<td>Ca; 10 ppm (45 mg/m³) TWA (skin)</td>
<td>Potential for cancer, CNS effects; liver tumors in animals</td>
</tr>
<tr>
<td>*Class: Chloroethanes§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichloroethylene‡§</td>
<td>79-01-6 KX4550000</td>
<td>Ca; 25 ppm TWA; 2 ppm ceiling (1-hr) as a Waste anesthetic gas</td>
<td>Potential for cancer, CNS effects; liver tumors in animals</td>
</tr>
<tr>
<td>Trichloromethane (see Chloroform)</td>
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<td></td>
</tr>
<tr>
<td>Trichloronaphthalene†</td>
<td>1321-65-9 QK4025000</td>
<td>5 mg/m³ TWA (skin)</td>
<td>Toxic effects on the liver and skin</td>
</tr>
<tr>
<td>1,2,3-Trichloropropene†</td>
<td>96-18-4 TZ9275000</td>
<td>Ca; 10 ppm (60 mg/m³) TWA (skin)</td>
<td>Eye and mucous membrane irritation; potential for cancer, liver and kidney effects, narcosis in animals</td>
</tr>
<tr>
<td>1,1,2-Trichloro-1,2,2-trifluoroethane†</td>
<td>76-13-1 KJ4000000</td>
<td>1,000 ppm (7,600 mg/m³) TWA, 1,250 ppm (9,500 mg/m³) STEL</td>
<td>CNS depression, cardiac sensitization, mild mucous membrane irritation</td>
</tr>
<tr>
<td>Triethylamine</td>
<td>121-44-8 YE0175000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(see Appendix III)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical Name</td>
<td>CAS Number</td>
<td>Concentration</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Trifluorobromomethane</td>
<td>75-63-8</td>
<td>1,000 ppm (6,100 mg/m³) TWA</td>
<td>Narcotic effects; CNS effects in animals</td>
</tr>
<tr>
<td></td>
<td>PA5425000</td>
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</tr>
<tr>
<td>Trimellitic anhydride</td>
<td>552-30-7</td>
<td>0.005 ppm (0.04 mg/m³) TWA; handle in the workplace as an extremely toxic substance</td>
<td>Pulmonary edema; immunologic sensitization; pulmonary, eye, nose, and skin irritation</td>
</tr>
<tr>
<td></td>
<td>DC2050000</td>
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<td></td>
</tr>
<tr>
<td>Trimethylamine</td>
<td>75-50-3</td>
<td>10 ppm (24 mg/m³) TWA, 15 ppm (36 mg/m³) STEL</td>
<td>Eye, respiratory, and skin irritation</td>
</tr>
<tr>
<td></td>
<td>PA0350000</td>
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<td></td>
</tr>
<tr>
<td>Trimethyl benzene</td>
<td>25551-13-7</td>
<td>25 ppm (125 mg/m³) TWA</td>
<td>Skin irritation, CNS depression, respiratory failure</td>
</tr>
<tr>
<td></td>
<td>DC3220000</td>
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</tr>
<tr>
<td>Trimethyl phosphite</td>
<td>121-45-9</td>
<td>2 ppm (10 mg/m³) TWA</td>
<td>Eye, skin, and upper respiratory irritation; teratogenic and reproductive effects in animals</td>
</tr>
<tr>
<td></td>
<td>TH1400000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2,4,6-Trinitrophenyl (see Picric acid)</td>
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</tr>
<tr>
<td>2,4,6-Trinitrophenylmethyl nitramine (see Tetryl)</td>
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<tr>
<td>2,4,6-Trinitrotoluene (TNT)</td>
<td>118-96-7</td>
<td>0.5 mg/m³ TWA (skin)</td>
<td>Kidney and liver damage, aplastic anemia, cyanosis, dermatitis</td>
</tr>
<tr>
<td></td>
<td>XU0175000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triorthocresyl phosphate</td>
<td>78-30-8</td>
<td>0.1 mg/m³ TWA (skin)</td>
<td>Peripheral neuropathy, flaccid paralysis of the distal muscles of the upper and lower extremities, spastic paralysis</td>
</tr>
<tr>
<td></td>
<td>TD0350000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triphenyl amine†</td>
<td>603-34-9 YK2680000</td>
<td>5 mg/m³ TWA</td>
<td>Skin irritation</td>
</tr>
<tr>
<td>Triphenyl phosphate†</td>
<td>115-86-6 TC8400000</td>
<td>3 mg/m³ TWA</td>
<td>Neurotoxicity in animals</td>
</tr>
<tr>
<td>Tungsten and cemented tungsten carbide:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tungsten containing &gt;2% cobalt</td>
<td>12070-12-1 Y07250000</td>
<td>0.05 (Co) mg/m³ TWA</td>
<td>Lung and skin effects</td>
</tr>
<tr>
<td>Tungsten containing &gt;0.3% nickel</td>
<td></td>
<td>0.015 (Ni) mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td>Tungsten** Insoluble compounds§</td>
<td>7440-33-7 Y07175000</td>
<td>5 mg/m³ TWA, 10 mg/m³ STEL</td>
<td>Lung and skin effects</td>
</tr>
<tr>
<td>Tungsten** Soluble compounds</td>
<td></td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL</td>
<td></td>
</tr>
<tr>
<td>Turpentine†</td>
<td>8006-64-2 YO8400000</td>
<td>100 ppm (560 mg/m³) TWA</td>
<td>Mucous membrane irritation, convulsions, albuminuria, hematuria</td>
</tr>
<tr>
<td>1-Undecanethiol Class: Thiols§</td>
<td>5332-52-5 **</td>
<td>0.5 ppm (3.9 mg/m³) ceiling (15-min)</td>
<td>Eye, skin, and blood irritation, nervous system effects</td>
</tr>
</tbody>
</table>
| Substance                                           | CAS No./NR        | Concentration/Exposure Limit | Effects                                      
|-----------------------------------------------------|-------------------|------------------------------|----------------------------------------------
| Uranium†                                            | 7440-61-1, YR3490000 | Ca: 0.05 mg/m³ TWA, Ca: 0.2 mg/m³ TWA, 0.6 mg/m³ STEL | Potential for hepatocellular cancers as a result of its alpha-emitting properties and radioactive decay products (e.g., radon, etc.) |
| Soluble compounds                                   |                   |                              |                                              |
| Insoluble compounds                                 |                   |                              |                                              |
| n-Valeraldehyde†                                     | 110-62-3, YV3600000 | 50 ppm (175 mg/m³) TWA       | Severe eye and skin irritation               |
| Class: Aldehydes†                                    |                   |                              |                                              |
| Vanadium⁸ (as V), Respirable dust and fume           | 1314-62-1, YW2450000 | 0.05 mg/m³ ceiling (15-min)  | Eye, skin, and lung effects                  |
| Vegetable oil mist⁷                                  | 68956-68-3, YX1850000 |                              | Physical irritation                           |
| Total dust                                          |                   | 10 mg/m³ TWA                 |                                              |
| Respirable fraction                                 |                   | 5 mg/m³ TWA                  |                                              |
| Vinyl acetate                                       | 108-05-4, AK0875000 | 4 ppm (15 mg/m³) ceiling (15-min) | Eye, nose, and throat irritation             |
| Vinyl benzene (see Styrene)                         |                   |                              |                                              |
| Vinyl bromide                                       | 593-60-2, KU8400000 | Ca; lowest feasible concentration (0.2 ppm LOQ) | Potential for cancer; liver and kidney tumors in animals |
| Class: Vinyl halides⁴                               |                   |                              |                                              |
| Vinyl chloride                                      | 75-01-4, KU9625000 | Ca; lowest feasible concentration | Liver cancer                                  |
| Vinylecyanide                                       |                   |                              |                                              |
| (see Acrylonitrile)                                 |                   |                              |                                              |

*†Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
**CAS No. or RTECS No. not assigned.
<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl cyclohexene dioxide†</td>
<td>106-87-6</td>
<td>Ca; 10 ppm (60 mg/m³) TWA (skin)</td>
<td>Potential for cancer; skin tumors in animals</td>
</tr>
<tr>
<td></td>
<td>RN8640000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinyl fluoride Class: Vinyl halides§</td>
<td>75-02-5</td>
<td>1 ppm TWA, 5 ppm ceiling (15-min); use 29 CFR 1910.1017</td>
<td>CNS effects; mutagenic effects in bacterial systems</td>
</tr>
<tr>
<td></td>
<td>YZ7351000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinyl halides§</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Vinyl toluene†</td>
<td>25013-15-4</td>
<td>100 ppm (480 mg/m³) TWA</td>
<td>Eye, upper respiratory, and skin irritation</td>
</tr>
<tr>
<td></td>
<td>WL5075000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinylidene chloride (1,1-dichloroethylene) Class: Vinyl halides§</td>
<td>75-35-4</td>
<td>Ca; lowest feasible concentration (0.4 ppm LOQ)</td>
<td>Potential for cancer; liver and kidney tumors in animals</td>
</tr>
<tr>
<td></td>
<td>KV9275000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vinylidene fluoride Class: Vinyl halides§</td>
<td>75-38-7</td>
<td>1 ppm TWA, 5 ppm ceiling (15-min); use 29 CFR 1910.1017</td>
<td>CNS effects; mutagenic effects in bacterial systems</td>
</tr>
<tr>
<td></td>
<td>KW0560000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VM&amp;P naphtha Class: Refined petroleum solvents§</td>
<td>8032-32-4</td>
<td>350 mg/m³ TWA, 1,800 mg/m³ ceiling (15-min)</td>
<td>Eye, nose, and throat irritation; dermatitis; nervous system effects</td>
</tr>
<tr>
<td></td>
<td>O16180000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warfarin†‡</td>
<td>81-81-2</td>
<td>0.1 mg/m³ TWA</td>
<td>Hypoprothrombinemia and vascular injury resulting in internal hemorrhage</td>
</tr>
<tr>
<td></td>
<td>GN4550000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste anesthetic gases and vapors§</td>
<td>††</td>
<td>See individual chemical</td>
<td></td>
</tr>
<tr>
<td>Substance</td>
<td>REL</td>
<td>Concentration</td>
<td>Effects</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>-------</td>
<td>-------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Welding, fumes and total</td>
<td>‡</td>
<td>Ca; lowest feasible</td>
<td>Cancer, respiratory disease</td>
</tr>
<tr>
<td>particulates</td>
<td></td>
<td>concentration</td>
<td></td>
</tr>
<tr>
<td>Wood dust, all soft and</td>
<td>‡</td>
<td>Ca; 1 mg/m³ TWA</td>
<td>Pulmonary dysfunction, respiratory effects</td>
</tr>
<tr>
<td>hard woods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xylene, isomers</td>
<td>1330-20-7</td>
<td>100 ppm (435 mg/m³) TWA,</td>
<td>CNS depression, respiratory and eye irritation</td>
</tr>
<tr>
<td></td>
<td>ZE2100000</td>
<td>150 ppm (655 mg/m³) STEL</td>
<td></td>
</tr>
<tr>
<td>m-Xylene</td>
<td>108-38-3</td>
<td>0.1 mg/m³ ceiling (skin)</td>
<td>Skin irritation, systemic effects</td>
</tr>
<tr>
<td></td>
<td>ZE2275000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o-Xylene</td>
<td>95-47-6</td>
<td>2 ppm (10 mg/m³) TWA (skin)</td>
<td>Anoxia resulting from formation of</td>
</tr>
<tr>
<td></td>
<td>ZE2450000</td>
<td></td>
<td>methemoglobin in humans; lung, liver and</td>
</tr>
<tr>
<td>p-Xylene</td>
<td>106-42-3</td>
<td>1 mg/m³ TWA</td>
<td>kidney damage in animals</td>
</tr>
<tr>
<td></td>
<td>ZE2625000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m-Xylene a, a'-diamine</td>
<td>1477-55-0</td>
<td></td>
<td>Skin irritation, systemic effects</td>
</tr>
<tr>
<td></td>
<td>PF8970000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xyolidine</td>
<td>1300-73-8</td>
<td>1 mg/m³ TWA</td>
<td>Pulmonary irritation in animals</td>
</tr>
<tr>
<td></td>
<td>ZE8575000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yttrium</td>
<td>7440-65-5</td>
<td>1 mg/m³ TWA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ZG2980000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc chloride fume</td>
<td>7646-85-7</td>
<td>1 mg/m³ TWA, 2 mg/m³ STEL</td>
<td>Eye, mucous membrane, and skin irritation;</td>
</tr>
<tr>
<td></td>
<td>ZH1400000</td>
<td></td>
<td>pulmonary edema</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
†Appendix I lists all members of the class indicated; refer to class name in Section A.
‡‡REL revised during OSHA hearings (Appendix IV).
ámara No. or RTECS No. not assigned.
Table 1 (Continued).—NIOSH recommended safety and health standards for hazardous agents in the workplace

<table>
<thead>
<tr>
<th>Hazardous agent</th>
<th>CAS No. and RTECS No.</th>
<th>NIOSH REL</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc chromate</td>
<td>13530-65-9 GB32900000 GB3300000</td>
<td>Ca; 0.001 mg/m$^3$ TWA 10 mg/m$^3$ STEL</td>
<td>Lung cancer, skin ulcers, lung irritation</td>
</tr>
<tr>
<td><strong>Class:</strong> Chromium †</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc oxide, fume**</td>
<td>1314-13-2 ZH48100000</td>
<td>5 mg/m$^3$ TWA, 10 mg/m$^3$ STEL</td>
<td>Metal fume fever</td>
</tr>
<tr>
<td>Zinc oxide,†‡ total dust</td>
<td>1314-13-2 ZH48100000</td>
<td>5 mg/m$^3$ TWA, 15 mg/m$^3$ TWA ceiling (15-min)</td>
<td>Metal fume fever</td>
</tr>
<tr>
<td>Zinc stearate†</td>
<td>557-05-1 ZH52000000</td>
<td></td>
<td>Pulmonary effects</td>
</tr>
<tr>
<td>Total dust</td>
<td></td>
<td>10 mg/m$^3$ TWA</td>
<td></td>
</tr>
<tr>
<td>Respirable fraction</td>
<td></td>
<td>5 mg/m$^3$ TWA</td>
<td></td>
</tr>
<tr>
<td>Zirconium compounds‡ (except zirconium tetrachloride)</td>
<td>7440-67-7 ZH70700000</td>
<td>5 mg/m$^3$ TWA, 10 mg/m$^3$ STEL</td>
<td>Granulomas of the skin</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†REL adopted during OSHA hearings (Appendix II).
‡Also listed as a pesticide in Appendix V.
†‡Appendix I lists all members of the class indicated; refer to class name in Section A.
**REL revised during OSHA hearings (Appendix IV).
### Table 2.—NIOSH recommended safety and health standards for physical hazards in the workplace

<table>
<thead>
<tr>
<th>Physical hazard</th>
<th>NIOSH recommendation</th>
<th>Health effects*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical energy and electrocutions</td>
<td>Numerous work practice and control recommendations for reducing the risk of electrocutions and related injuries</td>
<td>Injury and death</td>
</tr>
<tr>
<td>Hand-arm vibration</td>
<td>Redesign tools and jobs; use protective clothing and equipment; implement worker training programs, administrative controls, and medical monitoring</td>
<td>Raynaud's phenomenon of occupational origin, or vibration white finger disease</td>
</tr>
<tr>
<td>Hot environments</td>
<td>Sliding scale limits based on environmental and metabolic heat loads</td>
<td>Heat-induced illnesses</td>
</tr>
<tr>
<td>Noise</td>
<td>85 dBA† TWA; 115 dBA ceiling</td>
<td>Hearing damage</td>
</tr>
<tr>
<td>Radon progeny in underground mines (See Radiation in Section A)</td>
<td>Ca: 1.0 WLM/year with average workshift concentration ≤1/12 of 1.0 WL (or 0.083 WL)</td>
<td>Lung cancer</td>
</tr>
<tr>
<td>Radiofrequency (RF) sealers and heaters</td>
<td>Various recommendations for safe work practices and technologic improvements to reduce adverse health effects from unwarranted exposure to RF energy</td>
<td>Adverse thermal and nonthermal effects on tissue cells</td>
</tr>
<tr>
<td>Ultraviolet radiation</td>
<td>For spectral region of 315-400 nm: for periods &gt;1,000 sec, 1.0 mW/cm²; for periods ≤1,000 sec, 1,000 mW·sec/cm² (1.0 J/cm²). For spectral region of 200-315 nm: consult criteria document</td>
<td>Skin and eye effects</td>
</tr>
</tbody>
</table>

*Consult primary sources in Section A for definitive information.
†Abbreviations: dBA = decibels measured on the A scale; RF = radiofrequency; TWA = time-weighted average; WL = working level; WLM = working level month.
Table 3.—NIOSH recommended safety and health standards for industries, processes, and work environments

<table>
<thead>
<tr>
<th>Industry, process, or work environment</th>
<th>NIOSH recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal rendering</td>
<td>RELs for specific hazards are applicable to reduce the risk of mechanical injuries, burns, heat stress, infections from biologic agents, and chemical hazards</td>
</tr>
<tr>
<td>Chromite ore processing and chromate pigment manufacturing*</td>
<td>RELs for specific hazards are applicable to reduce the risk of cancer</td>
</tr>
<tr>
<td>Coal gasification</td>
<td>RELs for specific hazards are applicable to reduce the risk of occupational disease and physical injuries; recommendations are given for engineering controls, work practices, personal protective equipment, and medical surveillance</td>
</tr>
<tr>
<td>Coal liquefaction</td>
<td>RELs for specific hazards are applicable to reduce the risk of occupational disease and physical injuries; recommendations are given for engineering controls, work practices, personal protective equipment, and medical surveillance</td>
</tr>
<tr>
<td>Confined spaces, working in</td>
<td>Various recommendations, including a permit system to prevent worker injury and death</td>
</tr>
<tr>
<td>Electronic component manufacturing</td>
<td>Develop a more comprehensive data base on the chemical and physical agents and ergonomic stresses encountered in the manufacture of electronic components</td>
</tr>
<tr>
<td>Elevated workstations, emergency egress</td>
<td>Various recommendations concerning means and availability of egress</td>
</tr>
<tr>
<td>Excavations, from working in</td>
<td>Many recommendations concerning safety standards for excavations to prevent worker injury and death</td>
</tr>
<tr>
<td>Fluorocarbon polymers, decomposition products of</td>
<td>Various recommendations emphasizing good work practices, engineering controls, and medical management to reduce the risk of lung effects and polymer fume fever</td>
</tr>
<tr>
<td>Foundry work</td>
<td>Various recommendations emphasizing good work practices, engineering controls, and medical monitoring to reduce the risk of cancer, respiratory disease, heat-induced illness, noise-induced hearing loss, vibration-induced disorders, eye injuries, and traumatic and ergonomic injuries</td>
</tr>
</tbody>
</table>

*REL adopted during OSHA hearings (Appendix II).
<table>
<thead>
<tr>
<th>Industry, process, or work environment</th>
<th>NIOSH recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous materials, working with</td>
<td>Complete system for identifying occupationally hazardous materials</td>
</tr>
<tr>
<td>Hazardous energy control during maintenance and servicing (Lockout/Tagout)</td>
<td>Lockout/Tagout guidelines for work practices, and recommendations for controlling hazardous energy during maintenance and servicing activities</td>
</tr>
<tr>
<td>Logging from felling to first haul</td>
<td>Extensive work practice and personal protection recommendations</td>
</tr>
<tr>
<td>Mechanical power presses, working with</td>
<td>Various recommendations for preventing injuries and amputations resulting from mechanical power presses, specifically those operated by foot or dual palm-button controls</td>
</tr>
<tr>
<td>Oil and gas well drilling (land-based)</td>
<td>Comprehensive recommendations for safe work practices and technological improvements</td>
</tr>
<tr>
<td>Paint and allied coatings manufacture</td>
<td>Various recommendations for the handling of raw materials and finished products; dispersion of pigment or resin particles; filling; laboratory functions; and thinning, tinting, and shading</td>
</tr>
<tr>
<td>Precast concrete, production of</td>
<td>Various recommendations for safe work practices and worker safety</td>
</tr>
<tr>
<td>Tobacco smoke</td>
<td>Reduce exposures to the lowest feasible concentration by eliminating tobacco use from the workplace or restricting smoking to designated separate, enclosed areas with separate ventilation.</td>
</tr>
<tr>
<td>Welding, brazing, and thermal cutting</td>
<td>Existing RELs for specific chemical and physical agents are applicable to reduce the risk of cancer, respiratory disease, heat-induced illness, noise-induced hearing loss, eye injuries, traumatic and ergonomic injuries; consider these RELs upper boundaries of exposure; implement recommendations emphasizing good work practices, engineering controls, and medical monitoring</td>
</tr>
</tbody>
</table>
APPENDIX I
CLASSES OF CHEMICALS

Several RELs apply to entire classes of chemicals. Appendix I lists these classes (e.g., alkanes, ketones, etc.) and the individual members of each that are listed by RTECS. Table 1 of Section B refers the reader to Appendix I whenever a class name is mentioned. Readers may use the class name to locate source documents in Section A.

ALDEHYDES

Acetaldehyde
Acrolein
Butyraldehyde
Crotonaldehyde
Glutaraldehyde
Glyoxal
Malonaldehyde
Paraformaldehyde
Propionaldehyde
Propionaldehyde
Valeraldehyde

ALKANES

Heptane
Hexane, all isomers
Octane
Pentane

ANTIMONY

Elemental antimony and antimony compounds (not including stibine, SbH₃) include but are not limited to the following compounds:

Acetic acid, antimony salt
Acetic acid, bis(nitritotri-, antimony complex
Acetic acid, (isopropyleneinitril)tetra-, antimony sodium salt, dihydrate
Acetic acid, (2-stibonophenyl)thio-
Acetic acid, (2-stibonophenyl)thio-, calcium salt
Acetic acid, (2-stibonophenyl)thio-, diethanolamine salt

Acetic acid, ((2-stibonophenyl)thio)-, sodium salt
Aniline, oxo(tartrato)antimonate(1-)
m-Anisidine antimonyl tartrate
o-Anisidine antimonyl tartrate
p-Anisidine antimonyl tartrate
Antimonate(5-), bis(4,5-dihydroxy-m-benzene-disulfonato(4-)), pentasodium, heptahydrate
Antimonate(2-), bis(μ-(2,3-dihyroxybutane-dicato(4)-O(sup 1), O(sup 2), O(sup 3), O(sup 4))di-, stereoisomer, dihydrogen, compound with piperazine (1:1)
Antimonate, sodium salt
Antimonic acid, tungsten salt
Antimony, bis(trichloro-, compound with 1 mol of octamethyl pyrophosphoramide
Antimony (III) chloride
Antimony (V) chloride
Antimony, dichlorotriphenyl-
Antimony (III) fluoride (1:3)
Antimony lactate
Antimony oxide
Antimony (V) pentfluoride
Antimony pentasulfide
Antimony pentoxide
Antimony potassium dimethyl cysteino tartrate
Antimony potassium tartrate
D-Antimony potassium tartrate
DL-Antimony potassium tartrate
L-Antimony potassium tartrate
meso-Antimony potassium tartrate
Antimony sodium dimethylcysteino tartrate
Antimony (III) sodium gluconate
Antimony sodium tartrate
Antimony (V) sodium tartrate
Antimony (III) sulfate (2:3)
Antimony tartrate
Antimony trisulfide
Benzenamine, 4-stibino-, monosodium salt
Benzenestibonic acid, p-acetamido-, sodium salt
Benzenestibonic acid, p-amino-, compound with urea (3:1)
1,3,2-Benzodioxastibole, 2-hydroxy-
1,3,2-Dithiastibole-4,5-dicarboxylic acid, 2,2'-(1,2-dicarboxyl-1,2-ethanediyl)bisis(thio), hexasodium salt
Emetine antimony iodide
D-Gluconic acid, 2,4;2',4'-O-(oxydistibylidyne)bis-, Sb,Sb'-dioxide, trisodium salt, nonahydrate
Neostam
m-Phenetidine antimony tartrate
o-Phenetidine antimony tartrate
p-Phenetidine antimony tartrate
Phenol, m-amino-, oxo(tartrato) antimonate(1-)
Phenol, o-amino-, oxo(tartrato) antimonate(1-)
Phenol, p-amino-, oxo(tartrato) antimonate(1-)
Phosphonic acid, (α-hydroxy-p-methoxybenzyl)-, diethyl ester, ester with bis(2-chloro propyl) antimonate (III)
1,3-Propanediol, 2-(hydroxymethyl)-2-propyl-, cyclic ester with antimony acid
5-Quinolinesulfonic acid, 8,8'-(hydroxytribenylene)-bis(oxy))bis(7-formyl-, disodium salt
Sodium antimonyl adonitol
Sodium antimonyl D-arabitol
Sodium antimonyl biscatechol
Sodium antimonyl tert-butyl catechol
Sodium antimonyl catechol thiosaliclylate
Sodium antimonyl citrate
Sodium antimonyl erythritol
Sodium antimonyl D-fucitol
Sodium antimonyl gluco-guloheptitol
Sodium antimonyl glycerol
Sodium antimonyl D-mannitol
Sodium antimonyl 2,5-methylene D-mannitol
Sodium antimonyl 2,4-methylene D-sorbitol
Sodium antimonyl xylitol
Sodium mannitol antimonate
Sodium stibinivanadate
Stibine oxide, triphenyl-
Stibine sulfide, triphenyl-
Stibine, trimethyl-
Stibine, triphenyl-
Stibine, tri-2-pyridyl-
Stibine, tris((1,2-dicarboxyethyl)thio)-, hexalithium salt
Stibine, tris(dodecylthio)-
Stibonium, tetramethyl-, iodide
Succinic acid, mercapto-, thioantimonate (III), dilithium salt, nonahydrate
2,4,10,12-Tetraoxa-6,16,17,18-tetraaza-3,11-distibatricyclo(11.3.1.1(sup 5,9))octadeca-
1(17),5,7,9(18),13,15-hexaene, 3,11-dihydrory
2,4,10,12-Tetraoxa-6,16,17,18-tetraaza-3,11-
distibatricyclo(11.3.1.1(sup 5,9))octadeca-
1(17),5,7,9(18),13,15-hexaene-8,14-dimethanol, 3,11-dihydrory
m-Toluidine antimony tartrate
o-Toluidine antimony tartrate
p-Toluidine antimony tartrate
Urea antimonyl tartrate

ARSENIC, INORGANIC

Elemental arsenic and all of its inorganic compounds include but are not limited to the following compounds:

Ammonium vanado-arsenate
Aniline, arsenate
Arsenic acid, sodium salt
Arsenic acid
Arsenic acid, (03-As-H)
Arsenic acid, calcium salt (2:3)
Arsenic acid, diammonium salt
Arsenic acid, disodium salt
Arsenic acid, disodium salt, heptahydrate
Arsenic acid, hemihydrate
Arsenic acid, lead salt
Arsenic acid, lead (2+) salt(s1:1)
Arsenic acid, magnesium salt
Arsenic acid, monopotassium salt
Arsenic acid, sodium salt
Arsenic (V) acid, trisodium salt, heptahydrate
(1:3:7)
Arsenic (II) bromide
Arsenic chloride
Arsenic iodide
Arsenic pentoxide
Arsenic sulfide
Arsenic triiodide mixed with mercuric iodide
Arsenic trioxide
Arsenic trioxide mixed with selenium dioxide (1:1)
Arsenious acid, calcium salt
Arsenious acid, copper (II) salt (1:1)
Arsenious acid, monosodium salt
Arsenious acid, potassium salt
Arsenious acid, sodium salt
Arsenious acid, zinc salt
Arsenopyrite
Arsenous trifluoride
Arsenic acid, disodium salt, heptahydrate
Bordeauxarsenite
Caesium arsenate
Iron (II) arsenate (3:2)
Iron (III) arsenate (1:1)
Iron (III) α-arsenite, pentahydrate
Lead (II) arsenite
Mercury (II) α-arsenate
Potassium hexafluoroarsenate
Sodium hexafluoroarsenate
Strontium arsenite
Zinc arsenate

ASBESTOS

Asbestos is defined as chrysotile, crocidolite, amosite (cummingtonite-grunsite), anthophyllite, tremolite, and actinolite. The nonasbestiform habits of the serpentine minerals antigorite and lizardite, and the amphibole minerals contained in the series cummingtonite-grunrite, tremolite-ferroactinolite, and glaucophane-riebeckite shall also be included provided they meet the criteria for a fiber as ascertained on a microscopic level. A fiber is defined as a particle with an aspect ratio of 3:1 or larger and a length greater than 5 μm.

Actinolite
Amosite (cummingtonite-grunsite)
Anthophyllite
Chrysotile
Crocidolite
Tremolite

BERYLLIUM

Elemental beryllium and beryllium compounds include but are not limited to the following compounds:

Acetic acid, beryllium salt
Bertrandite
Beryl
Beryllium aluminum alloy
Beryllium, bis(carbonato(2-))dihydroxytri-
Beryllium carbonate (1:1)
Beryllium chloride
Beryllium chloride, tetrahydrate

Beryllium fluoride
Beryllium, hexakis(μ-acetato)-μ(sup 4)-oxotetra-
Beryllium hydrogen phosphate (1:1)
Beryllium hydroxide
Beryllium manganese zinc silicate
Beryllium, compound with niobium (12:1)
Beryllium nitrate
Beryllium oxide
Beryllium oxyfluoride
Beryllium sulfate (1:1)
Beryllium sulfate, tetrahydrate (1:1:4)
Beryllium, compound with titanium (12:1)
Beryllium, compound with vanadium (12:1)
Copper alloy, Cu,Be
Copper alloy, Cu,Be,Co
Lactic acid, beryllium salt
Nickel alloy, Ni,Be
Silicic acid, beryllium salt
Silicic acid, beryllium zine salt
Sodium beryllium malate
Sodium beryllium tartrate

CADMIUM

Cadmium and its compounds include but are not limited to the following compounds:

Acetic acid, (ethylenedinitrilato)teta-, cadmium (II) complex
Aerosol of thermovacuum cadmium
Cadmium (II) acetate
Cadmium, bis(diethylthiicarbamato)-
Cadmium, bis(1-hydroxy-2-(1h)-pyridinethionato)-
Cadmium chloride
Cadmium chloride, dihydrate
Cadmium chloride, monohydrate
Cadmium compounds
Cadmium fluoborate
Cadmium fluoride
Cadmium fluorosilicate
Cadmium lactate
Cadmium nitrate
Cadmium (II) nitrate, tetrahydrate (1:2:4)
Cadmium oxide
Cadmium oxide fume
Cadmium phosphate
Cadmium selenide sulfide
Cadmium sulfate (1:1)
Cadmium sulfate, hydrate
Cadmium sulfate (1:1), hydrate (3:8)
Cadmium sulfate tetrahydrate
Cadmium sulfide
Cadmium sulfide mixed with zinc sulfide (1:1)
Cadmium sulfide mixed with zinc sulfide (5:95)
Cadmium sulfide mixed with zinc sulfide (8:92)
Cadmium telluride
Cadmium thionine
Carbonic acid, cadmium salt
Imidazole, 2,4,5-tribromo, cadmium salt (2:1)
Kromad
Lauric acid, barium cadmium salt
Octadecanoic acid, cadmium salt
Octanoic acid, cadmium salt (2:1)
Phosphorous acid, bis(2-ethylhexyl) ester, cadmium salt
Stearic acid, barium cadmium salt (4:1:1)
Succinic acid, cadmium salt (1:1)

CHROMIUM, HEXAVALENT

Hexavalent chromium includes chromium in all materials in the +6 state.

COAL TAR PRODUCTS

Coal tar
Coal tar pitch
Creosote

CHLOROETHANES

1,1-Dichloroethane
1,2-Dichloroethane
Hexachloroethane
Monochloroethane
Pentachloroethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane

COBALT

Cobalt and all cobalt-containing compounds include but are not limited to the following compounds:

Cemented tungsten carbide:
  Tungsten carbide, mixed with cobalt (85\%:15\%)
  Tungsten carbide, mixed with cobalt (92\%:8\%)
  Tungsten carbide, mixed with cobalt and titanium (78\%:14\%:8\%)

DIISOCYANATES

Dicyclohexylmethane 4,4'-diisocyanate (hydrogenated MDI)
Hexamethylene diisocyanate (HDI)
Isophorone diisocyanate (IPDI)
Methylene bisphenyl isocyanate (MDI)
Naphthalene diisocyanate (NDI)
Toluene diisocyanate (TDI), all isomers

DINITROTOLUENES

Dinitrotoluene, all isomers
2,4-Dinitrotoluene
2,6-Dinitrotoluene

FLUORIDES, INORGANIC

Inorganic fluorides are defined as compounds of fluoride that (1) are inorganic solids at normal workroom temperatures (20°C), (2) are without radioactive elements, and (3) have components that do not have more restrictive exposure limits than fluoride. The standard also applies to any gaseous fluorides emitted simultaneously with particulate fluorides as defined above.

GLYCIDYL ETHERS

Allyl glycidyl ether (AGE)
Butyl glycidyl ether (BGE)
Di(2,3-epoxypropyl) ether (DGE)
Isopropyl glycidyl ether (IGE)
Phenyl glycidyl ether (PGE)

GLYCOL ETHERS

Ethylene glycol monobutyl ether
Ethylene glycol monobutyl ether acetate
Ethylene glycol monomethyl ether
Ethylene glycol monomethyl ether acetate

HYDRAZINES

1,1-Dimethylhydrazine
1,2-Dimethylhydrazine
Hydrazine
Methylhydrazine
Phenylhydrazine
Salts of the previous chemicals (e.g., sulfates, hydrochlorides, and hydrobromides) formed by the addition of acids.

HYDROGEN CYANIDE AND CYANIDE SALTS

Calcium cyanide
Hydrogen cyanide
Potassium cyanide
Sodium cyanide

KETONES

Acetone
Cyclohexanone
Diacetone alcohol
Diisobutyl ketone
Isophorone
Mesityl oxide
Methyl amyl ketone
Methyl butyl ketone
Methyl ethyl ketone
Methyl isomyl ketone
Methyl isobutyl ketone
Methyl propyl ketone

LEAD, INORGANIC

Inorganic lead includes lead oxides, metallic lead, and lead salts (including organic salts such as lead soaps but excluding lead arsenate).

MERCURY COMPOUNDS

Mercury compounds include elemental mercury, all inorganic mercury compounds, and organic mercury compounds other than ethyl and methyl mercury compounds.

Acetic acid, (3-(3-(Acetoxymercuri)-2-ethoxypropyl)carbamoyl)-2-Naphthoxy)-
Acetic acid, (ethylenedinitrilotetra-), mercury (II) complex
Ammonium, (bis(2-hydroxy-3,5,6-trichlorophenyl) methoxy)dimethyl(2-hydroxyethyl)\(^+\), phenylmercurate
Ammonium, (bis(2-hydroxy-3,5,6-trichlorophenyl) methoxy)tris(2-hydroxyethyl)\(^-\), phenylmercurate
Ammonium, mercuribis(diethyl(2,2-dimethyl-4-dithiocarboxyamino)butyl), dichloride
Ammonium, tris(2-hydroxyethyl)(phenylmercurio), lactate
Aniline, 2-(acetoxymercuri)-4-nitro-
Aniline, 2(hydroxymercuri)-4-nitro-
Barbituric acid, 5-(2-hydroxy-3-hydroxymercury) propyl-5-phenyl
2H-1-benzopyran-3-carboxylic acid, 8-(3-(hydroxymercury)-2-methoxypropyl)-2-oxo, sodium salt, compound with theophylline (1:1)
3H-2,1-benzoxazemercurole, 7-nitro-3-oxo
Boric acid, phenylmercury deriv.
Boric acid, phenylmercury silver deriv.
Caffeine, 8-(3-(hydroxymercury)-2-methoxypropoxy)-
Calo-clor
Chromium, hexacarbonyldi-\(\pi\)-cyclopentadienyl-\(\mu\)-mercuriodi-
Cobalt(2\(^+\)), bis(1,2-ethanediamine-N,N\(^\prime\))-(T-4)-tetrakis(thiocyanato)s) mercuryate(2-\(^-)\) (1:1), homopolymer
Copper(2\(^+\)), bis(ethylenediamine), tetrakis
(tiocyanato)nmercurate(2-\(^-)\), polymers
Fluorescein, 2',7'-dibromo-4'-(hydroxymercuroio), disodium salt
Iron(2\(^+\)), bis(1,2-ethanediamine-N,N\(^\prime\))-(T-4)-tetrakis(thiocyanato-N)nmercurate (2-\(^-)\) (1:1), homopolymer
Malonic acid, (2-hydroxy-3-hydroxymercury) propyl(phenyl)\(^-\), sodium salt
Mercurate(1\(^-\)), acetatophenyl-, ammonium salt
Mercurate(4\(^-\)), bis(N,N-bis(carboxymethyl) glycinate)(3\(^-)\)-N,O,O\(^\prime\), tetrahydrogen
Mercurate(1\(^-\)), butyl(mercaptoacetato(2-\()-O,S\(^-\)), sodium
Mercurate(1\(^-\)), (3-(4-(carboxylatomethoxy) phenyl)-2-hydroxypropyl)hydroxy-, sodium
Mercurate(2\(^-\)), ((cyclohexylenedinitril) tetractetato)-
Mercurate(1\(^-\)), ethyl(mercaptoacetato(2-\()-O,S\(^-\), potassium
Mercurate(1\(^-\)), (mercaptoacetato(2-\()-O,S\(^-\)),methyl, sodium
Mercurate(2\(^-\)), tetraiodo-, dipotassium
Mercury
Mercury, (3-acetamido-2-methoxypropyl)chloro-
Mercury, acetato(5-(2-amino-2-carboxyethyl)-2-hydroxyphenyl)-
Mercury, acetato(2-amino-5-carboxyphenyl)-
Mercury, acetato(4-amino-2-carboxyphenyl)-
Mercury, acetato(4-amino-3-carboxyphenyl)
Mercury, acetato(5-amino-2-hydroxyphenyl)
Mercury, acetato(o-aminophenyl)-
Mercury, (acetato)(p-aminophenyl)-
Mercury, acetato(2-aminophenyl)-
Mercury, acetato(3-benzamido-2-methoxypropyl)-
Mercury, (acetato)bis(heptyloxy)phosphinyl-
Mercury, (acetato)bis(hexyloxy)phosphinyl-
Mercury, acetato(3-bromo-2-carboxyphenyl)-
Mercury, acetato(3-bromo-6-carboxyphenyl)-
Mercury, acetato(3-bromo-4-hydroxyphenyl)-
Mercury, acetato(3-bromo-6-hydroxyphenyl)-
Mercury, acetato(3-carboxy-4-((carboxymethyl)
    amino)phenyl)-
Mercury, acetato(2-carboxy-3-chlorophenyl)-
Mercury, acetato(3-carboxy-4-((cyanomethyl)
    amino)phenyl)-
Mercury, acetato(2-carboxy-3-cyanophenyl)-
Mercury, acetato(2-carboxy-4,6-dinitro-3-
    hydroxyphenyl)-
Mercury, acetato(3-carboxy-4-((ethylamino)phenyl)-
Mercury, acetato(p-(carboxyformamido)phenyl)-
Mercury, acetato(3-carboxy-6-hydroxyphenyl)-
Mercury, acetato(2-carboxy-3-iodophenyl)-
Mercury, acetato(2-carboxy-3-mercaptophenyl)-
Mercury, acetato(3-carboxy-4-((methylamino)
    phenyl)-
Mercury, acetato(2-carboxy-3-nitrophenyl)-
Mercury, acetato(2-carboxy-5-nitrophenyl)-
Mercury, acetato(2-carboxy-6-nitrophenyl)-
Mercury, (acetato)(diethoxyphosphinyl)-
Mercury, acetato(p-(diethylamino)phenyl)-
Mercury, acetato(5-(dimethylamino)-2-
    hydroxyphenyl)-
Mercury, acetato(p-(dimethylamino)phenyl)-
Mercury, acetato(2-(dimethylamino)-5-
    sulphonyl)-
Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-
    1,2,3,6-tetrahydro-7H-purin-7-y1)acetamido)-2-
    ethoxypropyl)-
Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-
    1,2,3,6-tetrahydro-7H-purin-7-y1)acetamido)-2-
    methoxypropyl)-
Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-
    1,2,3,6-tetrahydro-7H-purin-7-y1)acetamido)-2-
    propoxypropyl)-
Mercury, (acetato)ethyl-
Mercury, acetato(3-formyl-4-hydroxyphenyl)-
Mercury, acetato(2-hydroxy-5iodophenyl)-
Mercury, acetato(4-hydroxy-3-methoxyphenyl)-
Mercury, acetato(2-hydroxy-5-methylphenyl)-
Mercury, acetato(4-hydroxy-3-methoxyphenyl)-
Mercury, acetato(2-hydroxy-5-nitrophenyl)-
Mercury, acetato(2-hydroxy-5-nitrosophenyl)-
Mercury, acetato(2-hydroxy-5-sulphonyl)-
Mercury, (acetato)(2-hydroxyethyl)-
Mercury, acetato(2-methoxy-3-(1-naphthamido)
    propyl)-
Mercury, acetato(2-methoxy-3-(2,4,6-trioxo-
    (1H,3H,5H)-pyrimidin-3-yl)propyl)-
Mercury, acetato(2-methoxy-3-(2,4,6-trioxo-
    (1H,3H,5H)-pyrimidin-5-yl)propyl)-
Mercury, (acetato)methyl-
Mercury, (acetato)(o-nitrophenyl)-
Mercury, (acetato)(phenyl)-
Mercury, acetato(3-sulphonyl)-
Mercury, (acetato)(1,2,3,6-tetrahydro-1,3-dimethyl-
    2,6-dioxopurin-8-yl)-
Mercury, acetato(3-(1,2,3,6-tetrahydro-1,3-
    dimethyl-2,6-dioxopurin-7-yl)-2-methoxypropyl)-
Mercury, (acetato)(2,3,5,6-tetramethylphenyl)-
Mercury, acetato(2-acetamido-5-nitrophenyl)-
Mercury acetylide
Mercury amide chloride
Mercury, (3-aminophenyl)-chloromercapto-
Mercury, bis(4-amino-3-carboxyphenyl)-
Mercury, (1,2-benzenediolato-O)phenyl-
Mercury, bis(3-bromo-4-hydroxyphenyl)-
Mercury, bis(5-bromo-2-hydroxyphenyl)-
Mercury, bis(5-chloro-3-hydroxyphenyl)-
Mercury(II), bis(L-cysteinato)-
Mercury, bis(O,O-dibutylphosphorodithioato-s)-
Mercury, bis(diethylidithiocarbamato)-
Mercury(2-), bis(4(dihydroxyphenyl)-1-
    piperazineacetato(2-)), disodium
Mercury, bis(formylmethyl)-
Mercury, bis(4-hydroxy-3-nitrophenyl)-
Mercury, bis(o-hydroxyphenyl)-
Mercury, bis(3-hydroxy-1-propynyl)-
Mercury(II), bis(3-mercapto-3-valinato)-
Mercury(2-), bis(dl-3-mercaptovalinato)dichloro-
Mercury(II), bis(dl-methionato)-
Mercury, bis(4-morpholinecarbodithioato)-
Mercury, bis(trifluoromethylsulfoxide)-
Mercury, bis(1,3,7-trimethyl-8-xanthyl)-
Mercury(I) bromide (1:1)
Mercury(II) bromide (1:2)
Mercury, bromo(3,6-di-hydroxy-3-oxospiro
    (isobenzofuran-1(3H),9’-xanthen-4’yl))- , sodium
salt
Mercury, bromohexyl
Mercury, bromo(2-hydroxyethyl)-
Mercury, bromo(2-hydroxyphenyl)-
Mercury, bromo(methoxybenzyl)
Mercury, (butyrate)phenyl-
Mercury, (3-(α-carboxy-o-anisamido)-2-(2-hydroxyethoxy)propyl)hydroxy-, monosodium salt
Mercury, (3-(α-carboxy-m-anisamido)-2-hydroxypropyl)hydroxy-
Mercury, (3-(α-carboxy-o-anisamido)-2-hydroxypropyl)hydroxy-
Mercury, (3-(α-carboxy-p-anisamido)-2-hydroxypropyl)hydroxy-
Mercury, (3-(α-carboxy-o-anisamido)-2-methoxypropyl)hydroxy-, monosodium salt
Mercury, (3-(α-carboxy-o-anisamido)-2-methoxypropyl)hydroxy-, sodium salt, compound with theophylline (1:1)
Mercury, (2-carboxy-5-chlorophenyl)chloro-
Mercury, (3-carboxy-4-hydroxyphenyl)hydroxy-
Mercury, (3-carboxy-4-hydroxy-6-sulfophenyl)hydroxy-
Mercury, (3-(o-carboxymethoxy)benzamido)-2-methoxypropyl(1,2-dicarboxyethylthio)trisodium salt
Mercury, (3-(o-carboxymethoxy)benzamido)-2-methoxypropyl)hydroxy-, monosodium salt, compound with theophylline
Mercury, (4-carboxynaphthyl)-3-chlorophenyl
(5,5-dicarbomethoxy-2,4,6-(1H,3H,5H)-pyrimidinetrionato-O(sup 2))-monosodium salt
Mercury, (carboxymethylthio)-2-(12,3,6-tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)-2-methoxypropyl-
Mercury, (p-carboxyphenyl)chloro-
Mercury, (o-carboxyphenoxy)hydroxy-
Mercury, (o-carboxyphenyl)hydroxy-
Mercury, (o-carboxyphenyl)hydroxy-, sodium salt
Mercury, (p-carboxyphenyl)hydroxy-, sodium salt
Mercury, (o-carboxyphenyl)thio)ethyl-, sodium salt
Mercury, (o-carboxyphenyl)thiogluco-
Mercury, (3-(3-carboxypropionyl)ureido)-2-methoxypropyl-
Mercury, (3-(3-carboxy-2,2,3-trimethylcyclopentanecarboxamido)-2-methoxypropyl) (hydrogen mercaptoacetato) -
Mercury, (3-(3-carboxy-2,2,3-trimethylcyclopentanecarboxamido)-2-methoxypropyl)hydroxy-, mixture with theophylline
Mercury, (3-(3-carboxy-2,2,3-trimethylcyclopentane 2,4,6(1H,3H,5H)-pyrimidinetrionato-O(sup 2))- disodium salt
Mercury(I) chloride
Mercury(II) chloride
Mercury, chloro(3-benzamido-2-methoxypropyl)-
Mercury, chloro(2-(3-bromopropionamido)cyclohexyl)-(E)-
Mercury, chloro(2-chlorovinyl)-
Mercury, chloro(2-dibutoxyphosphinyl)-
Mercury, chloro(3-isopropoxyphosphinyl)-
Mercury, chloro(4-(dimethylamino)-2-sulfophenyl)-
Mercury, chloro(3-(2,2-dimethylpropionamido)-2-methoxypropyl-
Mercury, chloro(3-(2,4-dioxo-1-imidazolidinyl)-2-methoxypropyl-
Mercury, chloro(3-(2,4-dioxo-3-imidazolidinyl)-2-methoxypropyl)-
Mercury, chloro(3-(2,4-dioxo-5-imidazolidinyl)-2-methoxypropyl)-
Mercury, chloro(3-(2,4-dioxo-1-methyl-3-imidazolidinyl)-2-methoxypropyl)-
Mercury, chloro((3-(2,4-dioxo-3-methyl-1-imidazolidinyl)-2-methoxypropyl)-
Mercury, chloro((3-(2,4-dioxo-3-methyl-5-imidazolidinyl)-2-methoxypropyl)-
Mercury, chloroethy-
Mercury, chloro(2-furyl)-
Mercury, chloro(2-hexanamidocyclohexyl)-(E)-
Mercury, chloro(2-hydroxy-3,5-dinitrophenyl)-
Mercury, chloro(4-(2-hydroxy-1-naphthalencyl)azo)phenyl)-
Mercury, chloro(4-o-hydroxyphenyl)-
Mercury, (3-chloro-4-hydroxyphenyl)hydroxy-
Mercury, (3-chloro-6-hydroxyphenyl)hydroxy-
Mercury, (1-hydroxy-4-sulfo-2-naphthyl)-
Mercury, chloro(3-methoxybicyclo(2,2.1)hept-2-yl)-
Mercury, chloro(trans-2-methoxybicyclooctyl)-
Mercury, chloro(2-methoxyethyl)-
Mercury, chloro(2-methoxy-3-(1-naphthamido)propyl)-
Mercury, chloro(2-(3-methoxypropionamido)cyclohexyl)-
Mercury, chloro(2-methoxy-3-propionamidopropyl)-
Mercury, chloro(2-methoxy-3-ureidopropyl)-
Mercury, chloro(2-methoxy-3-valeramidopropyl)-
Mercury, chloromethyl-
Mercury, chloropentyl-
Mercury, chloro(n-phenylformamido)-
Mercury, chloropropanyl-
Mercury, chloro-3-pyridyl-
Mercury (II) cyanide
Mercury, (3-cyanoguanidino)methyl-
Mercury, cyanohydroxy-
Mercury, cyanomethyl-
Mercury, diaminolino-
Appendix I

Mercury, dibenzyl-
Mercury, (2,4-dibromo-6-(((p-bromophenyl)carbamoyl)phenoxyl)phenyl-
Mercury, dibutyl-
Mercury, di-sec-butyl-
Mercury, (1,1,2-dicarboxyethyl)thio)(3-(1,2,3,6-tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)-2-methoxypropyl-
Mercury, (2,5-dichloro-3,6-dihydroxy-p-benzoquinatolo)-
Mercury, diheptyl-
Mercury, (dihydrogen 7,12-bis(1-hydroxyethyl)-3,8,13,17-tetramethyl-2,18-porphinedipropionate (2))- sodium salt-
Mercury, (dihydrogen phosphato)methyl-
Mercury, (dihydroxyphenyl)phenyl-
Mercury, ((dihydroxypropyl)thio)methyl-
Mercury, diisopentyl-
Mercury, diisopropyl-
Mercury, diphenyl-
Mercury, dipropyl-
Mercury, di-3-pyridyl-
Mercury, (dodecylthio)phenyl-
Mercury, ethyl(n-ethyl-p-toluenesulfonamido)-
Mercury, ethyl(1,4,5,6,7,7-hexachloro-5-norbornene-2,3-dicarboximidato)-
Mercury, ethyl(phosphato)(1)-
Mercury, ethyl(6-sulphophenylthio)-, sodium salt-
Mercury, ethyl(p-toluenesulfonamidato)-
Mercury, ethyl(toluene sulfonato)-
Mercury fulminate-
Mercury, (1,2,3,4,7,7-hexachlorobicyclo(2.2.1) hept-2-ene-5,6-dicarboximido)phenyl-
Mercury, (1,4,5,6,7,7-hexachloro-5-norbornene-2,3-dicarboximido)methyl-
Mercury, hydroxy(3-(5,5-dimethyl-2,4,6-trioxo-(1H,3H,5H)-pyrimidino)-2-isopropyloxypyrrol)-
Mercury, hydroxy(3-(5,5-dimethyl-2,4,6-trioxo-(1H,3H,5H)-pyrimidino)-2-methoxypropyl)-
Mercury, hydroxy(6-hydroxy-7-diiodo-3-oxo-9-(o-sulphonylphenyl)-3H-xanthen-5-yl)-, disodium salt-
Mercury, hydroxy(4-hydroxy-3-nitrophenyl)-
Mercury, hydroxy(4-hydroxy-3-nitrophenyl)-, monosodium salt-
Mercury, hydroxy(8-hydroxy-5-quinolinesulfato)-
Mercury, hydroxyisopropyl-
Mercury, (4-hydroxy-5-methoxy-2-nitro-m-phenylene)bis(acetato)- and acetato(hydroxy-3-methoxy-6-nitro) mercury-
Mercury, hydroxy(2-methoxy-3-(2,4,6-trioxo-(1H,3H,5H)-pyrimidino)propyl)-, sodium salt-
Mercury, hydroxy(2-methoxy-3-(2,4,6-trioxo-(1H,3H,5H)-pyrimidim-1-yl)propyl)-
Mercury, hydroxy(2-methoxy-3-(2,4,6-trioxo-(1H,3H,5H)-pyrimidin-5-yl)propyl)-
Mercury, hydroxy(2-methoxy-3-(2,4,6-trioxo-(1H,3H,5H)-pyrimidin-5-yl)propyl)-, sodium salt-
Mercury, hydroxymethyl-
Mercury, hydroxyphenyl-
Mercury, (2-hydroxyphenyl)hydroxy-
Mercury(II), iminodiacetato-
Mercury(II) iodide-
Mercury(II) iodide-
Mercury, iodo-p-tolyl-
Mercury, (methanethiolato)methyl-
Mercury, (2-methoxyethyl)(tributogen orthosilicate)-
Mercury, methyl-, n-bis(p-tolylsulfonyl)amido-
Mercury, methyl-, dimercaptopropanol-
Mercury(1+), methyl-, ion-
Mercury, methyl(pentachlorophenoxo)-
Mercury, methyl(8-quinolinolato)-
Mercury, methyl(thioacetamido)-
Mercury, nitratophenyl-
Mercury, nitratophenyl- compd. with hydroxyphosphorylmersury (1:1)-
Mercury, (oleato)phenyl-
Mercury(II) oxide-
Mercury, (pentachlorophenoxo)phenyl-
Mercury, (2,4-pentanedionato-o-o'-)phenyl-
Mercury, phenyl(propionyloxy)-
Mercury(II), phenyl(8-quinolinolato)-
Mercury, phenyl(thioacetamido)-
Mercury, phenyl(p-toluenesulfonato)-
Mercury, phenylureido-
Mercury, (salicylato(2-))- 
Mercury(I) sulfate-
Methanearsonic acid, dimercury salt-
2-Naphthalenesulfonic acid, 3,3'-methylene-dimercury-
Nickel(2+), bis(1,2-ethanediamine-n,n')-, (T-4)-tetraakis(thiocyanato-s)mercuroate(2-) (1:1), homopolymer-
7-Oxa-8-mercurobicyle(4.2.0)octa-1,3,5-triene,5-methyl-2-nitro-
1,4-Oxamercuran-
1,4-Oxathiane compd. with mercuric chloride-
Pentanoic acid, 4-hydroxy-5-(hydroxymersury)-2-phenyl- sodium salt-
Phosphate, tris(p-chlorophenyl)-, complex with mercuric chloride (2:1)
Phosphine, tris(p-dimethylaminophenyl) -, complex with mercuric chloride (2:1)
Phosphine, tris(p-methylphenyl) -, complex with mercuric chloride (2:1)
Phosphine, tris(p-methylthiophenyl) -, complex with mercuric chloride (2:1)
Phosphorous acid, tris(2-ethylhexyl)ester, complex with mercury(II) bromide (1:1)
Phosphorous acid, tris(2-ethylhexyl)ester, complex with mercury(II) chloride (1:1)
Potassium tetracyanomercurate(II)
1,2-Pyridazinedicarboximide, tetrahydro-4-(bromomercuri)-5-methoxy-
1,2-Pyridazinedicarboximide, tetrahydro-4-(chloromercuri)-5-methoxy-n-methyl-
Pyridinium, 1-hexadecyl-, bromide, mixture with chloro(2-hydroxyethyl)mercury
Salicylic acid, mercuridi-, disodium salt
Sinnel
Succinic acid, n-((2-methoxy-3-((1,2,3,6-
tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)
mercuri)(propyl)carbamoyl)-
Succinic acid, n-((2-methoxy-3-((1,2,3,6-
tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)
mercuri)(propyl)carbamoyl)-, sodium salt
2-Thiopheneacrylic acid, 5-((3(acetoxymercuri)-
2-methoxypropyl)sulfamoyl)-, ethyl ester
2-Thiopheneacrylic acid, 5-((3(acetoxymercuri)-
2-methoxypropyl)carbamoyl)-
2-Thiophencsulfonyamide, n-(3-acetoxymercuri)-2-
2-methoxypropyl
Uric acid, 9-(3-(hydroxymercuri)-2-
methoxypropyl)-1,3,7-trimethyl
Zinc mercury chromate complex

MONOHALOMETHANES

Bromomethane
Chloromethane
Iodomethane
Methyl chloride
Methyl bromide
Methyl iodide

β-NAPHTHYLAMINE

2-Nitronaphthalene
N-Phenyl-β-naphthylamine

NIAX® CATALYST ESN

bis[2-(Dimethylaminoethyl) ether]
Dimethylaminopropionitrile
Ethylamine, 2,2'-oxybis(n,n-dimethyl-
Propionitrile, 3-(dimethylamino)-

NICKEL, INORGANIC

Inorganic nickel includes elemental nickel and all nickel compounds except organonickel compounds with a covalent carbon-nickel bond, such as nickel carbonyl.

Acetohydroxamic acid, n-fluoren-2-yl-, nickel(2+) complex
Benzoic acid, o-chloro-, nickel(II) salt
Carbamic acid, ethylenebis(dithio-, nickel(II) salt
Cinnamic acid, Nickel(II) salt
Iron oxide, chromium oxide and nickel oxide fume
Nickel
Nickel(II) acetate (1:2)
Nickel acetate tetrahydrate
Nickel alloy Ni,Be
Nickel, bis(2-benzoylbenzoato)bis(3-(1-methyl-2-
pyrroolidiny1)pyridine)-trihydrate
Nickel, bis(dibutylthiocarbamato)-
Nickel, bis(3,4-dichlorobenzoato)-
Nickel, bis(dimethylthiocarbamato)-
Nickel, bis(triphenylphosphine)dichloro-
Nickel(II) carbonate (1:1)
Nickel(II) chloride (1:2)
Nickel(II) chloride, hexahydrate (1:2:6)
Nickel, dithiocyanatobis(triphenylphosphine)-
Nickel(II) fluoborate
Nickel(II) fluoride (1:2)
Nickel(II) fluorosilicate (1:1)
Nickel gallium alloy
Nickel(II) hydroxide
Nickel(III) hydroxide
Nickel iron sulfide
Nickel(II) isodecyl ortho-phosphate(3:2)
Nickel(II) nitrate (1:2)
Nickel(II) nitrate, hexahydrate (1:2:6)
Nickel(II) oxide (1:1)
Nickel(III) oxide
Nickel potassium cyanide
Nickel refinery dust
Nickel selenide (Ni3-Se2)
Nickel(II) sulfamate
Nickel(II) sulfate (1:1)
Nickel(II) sulfate hexahydrate (1:1:6)
Nickel sulfide roasting (as Ni)
Nickel sulfide (3:2)
Nickel telluride
Nickel titanium oxide
Nickel(2+), tris(octamethylpyrophosphoramide),
diperoxylate
2,4-pentanedione, nickel(II) deriv.
Perchloric acid, Nickel(2+) salt, hexahydrate

NITRILES

Acetone cyanohydrin
Acetonitrile
Acetonitrile, hydroxy-
Adiponitrile
n-Butyronitrile
Glycolonitrile
Isobutyronitrile
Lactonitrile, 2-methyl-
Malononitrile
Propanonitrile, 2-methyl-
Propionitrile
Succinonitrile
Tetramethyl succinonitrile

ORGANIC SOLVENTS

RELs exist for approximately 92 chemicals and mixtures that may be defined as organic solvents.

ORGANOTIN COMPOUNDS

Organotin compounds are defined as a group of compounds having at least one covalent bond between carbon and tin.

OXIDES OF NITROGEN

Nitric oxide
Nitrogen dioxide
Nitrogen monoxide
Nitrogen oxide

PESTICIDES, Groups I, II, and III

See Classification of Pesticides, in Appendix V.

POLYCHLORINATED BIPHENYLS

Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
Aroclor 1262
Aroclor 1268
Aroclor 2565
Aroclor 4465
Biphenyl
Chlorodiphenyl
Decachlorodiphenyl
Kanechlor 300
Kanechlor 400
Kanechlor 500

REFINED PETROLEUM SOLVENTS

Benzin
Kerosene
Mineral spirits
Petroleum distillates
Petroleum ether
Petroleum gas (liquefied)
Petroleum hydrocarbon mixture: high naphthenic solvent
Petroleum 60 solvent
Petroleum 70 solvent
Rubber solvent
Stoddard solvent
VM&P naphtha

SYNTHETIC VITREOUS FIBERS
(MANMADE MINERAL FIBERS)

Fibrous glass (including glass fibers and glass filaments)
Mineral wool (including mineral rock wool and slag wool)

THIOLS

Benzenethiol
1-Butanethiol
Cyclohexanethiol
1-Decanethiol
1-Dodecanethiol
Ethanethiol
1-Heptanethiol
1-Hexadecanethiol
1-Hexanethiol
Methanethiol
1-Nonanethiol
1-Octadecanethiol
1-Octanethiol
1-Pentanethiol
1-Propanethiol
1-Undecanethiol

**TUNGSTEN**

Ammonium paratungstate hexahydrate
Antimonic acid, tungsten salt
Phosphotungstic acid
Phosphotungstic acid, sodium salt
Tungstic acid
Tungsten, tris(acetonitrile)tricarbonyl-
Tungstic acid
Tungstic acid, disodium salt
Tungstic acid, sodium salt, dihydrate

**TUNGSTEN (INSOLUBLE)**

Tungsten
Tungsten carbide
Tungsten oxide

**VANADIUM**

Vanadium includes vanadium compounds
(including all chemically combined forms of
vanadium but not alloys, intermetallics, or
vanadium carbide), and metallic vanadium
(including the element alone, in alloys, or in
intermetallics, such as ferrovanadium and
vanadium-aluminum.

Ammonium vanadi-arsenate
Ammonium vanado-arsenate
Aniline vanadate, dihydrate
Copper tetravanadate

---

**Mercury tetravanadate**
**Sodium hexavanadate**
**Sodium pyrovanadate**
**Sodium stibinivanadate**
**Sodium tetravanadate**
**Tetravanadate**
**Vanadate(3-), hexafluoro-, triammonium salt**
**Vanadic acid, ammonium salt**
**Vanadic acid, monosodium salt**
**Vanadic acid, triisobutyl ester**
**Vanadic(II) acid, trisodium salt**
**Vanadious(4+) acid, disodium salt**
**Vanadium**
**Vanadium carbide**
**Vanadium dichloride**
**Vanadium, dichlorooxo-**
**Vanadium ore**
**Vanadium pentoxide (dust)**
**Vanadium pentoxide (fume)**
**Vanadium tetrachloride**
**Vanadium tribromide**
**Vanadium trichloride**
**Vanadium, trichlorooxo-**
**Vanadium trioxide**

**VINYL HALIDES**

Vinyl bromide
Vinyl chloride
Vinyl fluoride
Vinylidene chloride
Vinylidene fluoride

**WASTE ANESTHETIC GASES AND VAPORS**

Chloroform
Enflurane
Fluroxene
Halothane
Methoxyflurane
Nitrous oxide
Trichloroethylene
APPENDIX II

CHEMICALS FOR WHICH NIOSH ADOPTED RELs DURING THE OSHA PEL PROJECT

This appendix lists chemicals for which NIOSH adopted RELs on the basis of their comments during the OSHA PEL Project. These RELs are included in Table 1 of Section B. For further information about these chemicals, readers should refer to OSHA’s final rule on air contaminants in the Federal Register [54 FR 2641 (1989)] and to the 1988 NIOSH testimony on OSHA’s proposed rule on air contaminants [NTIS No. PB-91-115-337].

Acetaldehyde*  Bromacil
Acetic acid    Bromine
Acetic anhydride Bromine pentafluoride
Acetylsalicylic acid Bromoform
Acrrolein      Butane
Acrylic acid   n-Butyl acetate
Allyl alcohol  sec-Butyl acetate
tert-Butyl acetate
Butyl acrylate
n-Butyl alcohol
sec-Butyl alcohol
tert-Butyl alcohol
Butylamine
n-Butyl lactate
o-sec-Butylphenol
p-tert-Butyltoluene
Calcium carbonate
Calcium cyanamide
Calcium hydroxide
Calcium oxide
Calcium silicate
Calcium sulfate
Camphor, synthetic
Caprolactam
Captanol
Captan
Carbofuran
Carbon tetrabromide
Carbonyl fluoride

*Refer to Section A for additional NIOSH activity regarding this chemical.
Catechol  
Cellulose  
Cesium hydroxide  
Chlordane  
Chlorinated camphene  
Chlorinated diphenyl oxide  
Chlorine dioxide  
Chloropicrin  
Cobalt metal  
Crotonaldehyde  
Crylate  
Cumene  
Cyanamide  
Cyanogen  
Cyanogen chloride  
Cyclohexane  
Cyclohexanol  
Cyclohexene  
Cyclohexylamine  
Cyclonite  
Cyclopentadiene  
Cyclopentane  
Cyhexatin  
2,4-D  
Decaborane  
Demeton  
2,6-Di-tert-butyl-p-cresol  
Diazinon  
Diazomethane  
Diborane  
2-N-Dibutylaminoethanol  
Dibutyl phosphate  
Dibutyl phthalate  
Dichloroacetylene  
o-Dichlorobenzene  
p-Dichlorobenzene  
Dichlorodifluoromethane  
1,3-Dichloro-5,5-dimethyl hydantoin  
1,1-Dichloroethane  
1,2-Dichloroethylene  
Dichloroethyl ether  
Dichloromonofluoromethane  
1,1-Dichloro-1-nitroethane  
1,3-Dichloropropene  
2,2-Dichloropropionic acid  
Dichlorotetrafluoroethane  
Dichlorvos  
Dicrotophos  
Dicyclopentadiene  
Dicyclopentadienyl iron  
Diethanolamine  
Diethyl ketone  
Diethyl phthalate  
Diethylamine  
2-Diethylaminoethanol  
Diethylenetriamine  
Difluorodibromomethane  
Disopropylamine  
Dimethyl acetamide  
Dimethylamine  
Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphonate  
Dimethylformamide  
Dimethyl sulfate  
Dimethylphthalate  
Dimethylaniline  
Dinitroimidide  
Dinitrobenzene  
Dioxathion  
Diphenyl  
Diphenylamine  
Dipropyl ketone  
Dipropylene glycol methyl ether  
Diquat  
Disulfiram  
Disulfoton  
Diuron  
Divinyl benzene  
Endosulfan  
Endrin  
EPN  
Ethanolamine  
Ethion
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<th>Chemical Name</th>
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<tbody>
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<td>Ethylandine</td>
</tr>
<tr>
<td>Ethyl amyl ketone</td>
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<tr>
<td>Ethyl benzene</td>
</tr>
<tr>
<td>Ethyl butyl ketone</td>
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<td>Ethyl formate</td>
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<tr>
<td>Ethyl silicate</td>
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<td>Ethylene chlorohydrin</td>
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<td>Hafnium</td>
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<td>Hydrogenated terphenyls</td>
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<td>o-Nitrotoluene</td>
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<td>n-Propyl nitrate</td>
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Tetrasodium pyrophosphate
Tetryl
Thallium
4,4-Thiobis(6-tert,butyl-m-cresol)
Thioglycolic acid
Thionyl chloride
Thiram
Tin, inorganic compounds
Tin oxide
Titanium dioxide
p-Toluidine
Tributyl phosphate
Trichloroacetic acid
1,2,4-Trichlorobenzene
Trichloronaphthalene
1,1,2-Trichloro-1,2,2-trifluoroethane
1,2,3-Trichloropropane
Trifluorobromomethane
Trimethyl benzene
Trimethyl phosphite
Trimethylamine
2,4,6-Trinitrotoluene
Triorthocresyl phosphate
Triphenyl amine
Triphenyl phosphate
Turpentine
Uranium
n-Valeraldehyde
Vegetable oil mist
Vinyl cyclohexene dioxide
Vinyl toluene
Warfarin
Wood dust
m-Xylene α,α'-diamine
Xyloidine
Yttrium
Zinc chloride fume
Zinc stearate
Zirconium compounds
APPENDIX III

CHEMICALS FOR WHICH NIOSH DID NOT ADOPT RELs DURING THE OSHA PEL PROJECT

Appendix III lists chemicals for which NIOSH did not adopt RELs during the OSHA PEL Project. After a limited review of these chemicals, NIOSH concluded that adverse health effects could occur at the proposed OSHA PELs.

Chemicals reviewed by NIOSH

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<thead>
<tr>
<th>Chemical</th>
<th>Proposed OSHA PEL</th>
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<tbody>
<tr>
<td>Acetylene tetrabromide</td>
<td>1 ppm (15 mg/m³) TWA</td>
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<tr>
<td>α-Alumina</td>
<td>10 mg/m³</td>
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<tr>
<td>Benomyl</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>Chlorobenzene</td>
<td>75 ppm (350 mg/m³) TWA</td>
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<tr>
<td>Coal dust (&lt;5% SiO₂)</td>
<td>2 mg/m³ TWA</td>
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<tr>
<td>Coal dust (&gt;5% SiO₂)</td>
<td>0.1 mg/m³ TWA</td>
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<tr>
<td>Emery</td>
<td>10 mg/m³</td>
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<tr>
<td>Ethyl bromide</td>
<td>200 ppm (890 mg/m³) TWA,</td>
</tr>
<tr>
<td></td>
<td>250 ppm (1,110 mg/m³) STEL</td>
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<tr>
<td>Ethyl ether</td>
<td>400 ppm (1,200 mg/m³) TWA,</td>
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<td></td>
<td>500 ppm (1,500 mg/m³) STEL</td>
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<tr>
<td>Ethylene glycol</td>
<td>50 ppm (125 mg/m³) ceiling</td>
</tr>
<tr>
<td>Fenthion</td>
<td>0.2 mg/m³ TWA (skin)</td>
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<tr>
<td>Furfural</td>
<td>2.0 (8 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Glycerin (mist)</td>
<td>10 mg/m³</td>
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<tr>
<td>Graphite (synthetic)</td>
<td>10 mg/m³</td>
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<tr>
<td>2-Isopropanol ethanol</td>
<td>25 ppm (105 mg/m³) TWA</td>
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<tr>
<td>Isopropyl acetate</td>
<td>250 ppm (950 mg/m³) TWA,</td>
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<tr>
<td></td>
<td>310 ppm (1,185 mg/m³) STEL</td>
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<tr>
<td>Isopropylamine</td>
<td>5 ppm (12 mg/m³) TWA,</td>
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<tr>
<td></td>
<td>10 ppm (24 mg/m³) STEL</td>
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<tr>
<td>Magnesium oxide fume</td>
<td>10 mg/m³</td>
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<tr>
<td>Manganese tetroxide (as Mn)</td>
<td>1 mg/m³ TWA</td>
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(Continued)
Chemicals reviewed by NIOSH (Continued)

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<th>Chemical</th>
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<tr>
<td>Molybdenum, soluble</td>
<td>5 mg/m³ TWA</td>
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<tr>
<td>Molybdenum, insoluble</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>Nitromethane</td>
<td>100 ppm (250 mg/m³) TWA</td>
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<tr>
<td>Particulates not otherwise regulated</td>
<td>10 mg/m³</td>
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<tr>
<td>Picloram</td>
<td>10 mg/m³</td>
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<tr>
<td>Rouge</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td>m-Toluidine</td>
<td>2 ppm (9 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Triethylamine</td>
<td>10 ppm (40 mg/m³) TWA,</td>
</tr>
<tr>
<td></td>
<td>15 ppm (60 mg/m³) STEL</td>
</tr>
<tr>
<td>Zirconium tetrachloride</td>
<td>5 mg/m³ TWA</td>
</tr>
</tbody>
</table>
APPENDIX IV

CHEMICALS FOR WHICH NIOSH REVISED RELs DURING THE OSHA PEL PROJECT

Appendix IV lists chemicals for which NIOSH revised existing RELs during the OSHA PEL Project. These chemicals are listed with their previous and current RELs.

### Chemicals with revised RELs

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Previous REL</th>
<th>Current REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylamide</td>
<td>0.3 mg/m³ TWA</td>
<td>Ca; 0.03 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Aldrin</td>
<td>Ca; lowest reliably detectable concentration</td>
<td>Ca; 0.25 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Allyl chloride</td>
<td>1 ppm (3.1 mg/m³) TWA</td>
<td>1 ppm (3 mg/m³) TWA</td>
</tr>
<tr>
<td></td>
<td>3 ppm (9.3 mg/m³) ceiling (15-min)</td>
<td>2 ppm (6 mg/m³) STEL</td>
</tr>
<tr>
<td>Allyl glycidyl ether</td>
<td>9.6 ppm (45 mg/m³) ceiling (15-min)</td>
<td>5 ppm (22 mg/m³) TWA (skin), 10 ppm (44 mg/m³) STEL</td>
</tr>
<tr>
<td>Ammonia</td>
<td>50 ppm (34.8 mg/m³) ceiling (5-min)</td>
<td>25 ppm (18 mg/m³) TWA, 35 ppm (27 mg/m³) STEL</td>
</tr>
<tr>
<td>Asphalt fumes</td>
<td>5 mg/m³ ceiling measured as total particulates</td>
<td>Ca; 5 mg/m³ ceiling measured as total particulate</td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>10,000 ppm (18,000 mg/m³) TWA,</td>
<td>5,000 ppm (9,000 mg/m³) TWA, 30,000 ppm (54,000 mg/m³) STEL</td>
</tr>
<tr>
<td></td>
<td>30,000 ppm (54,000 mg/m³) ceiling (10-min)</td>
<td></td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>1 ppm (3 mg/m³) TWA</td>
<td>1 ppm (3 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td></td>
<td>10 ppm (30 mg/m³) ceiling (15-min)</td>
<td>10 ppm (30 mg/m³) STEL (skin)</td>
</tr>
</tbody>
</table>

(Continued)
### Chemicals with revised RELs (Continued)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Previous REL</th>
<th>Current REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon tetrachloride</td>
<td>Ca; 2 ppm (12.6 mg/m³) ceiling (60-min)</td>
<td>Ca; 2 ppm (12.6 mg/m³) STEL (60-min)</td>
</tr>
<tr>
<td>Chloroform</td>
<td>2 ppm (9.78 mg/m³) ceiling (60-min)</td>
<td>Ca; 2 ppm (9.78 mg/m³) STEL (60-min)</td>
</tr>
<tr>
<td>Cyclohexanone</td>
<td>25 ppm (100 mg/m³) TWA</td>
<td>25 ppm (100 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Deildrin</td>
<td>Ca; lowest reliably detectable concentration</td>
<td>Ca; 0.25 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Di-2-ethylhexylphthalate</td>
<td>Ca; lowest feasible concentration</td>
<td>Ca; 5 mg/m³ TWA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg/m³ STEL</td>
</tr>
<tr>
<td>Dicyclohexylmethane, 4'-diisocyanate</td>
<td>0.055 mg/m³ TWA, 0.21 mg/m³ ceiling (10-min)</td>
<td>0.01 ppm (0.11 mg/m³) ceiling</td>
</tr>
<tr>
<td>Diglycidyl ether (DGE)</td>
<td>Ca; 0.2 ppm (1 mg/m³) ceiling (15-min)</td>
<td>Ca; 0.1 ppm (0.5 mg/m³) TWA</td>
</tr>
<tr>
<td>Dinitro-o-cresol</td>
<td>0.2 mg/m³ TWA</td>
<td>0.2 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Dinitrotoluene</td>
<td>Ca; lowest feasible concentration</td>
<td>Ca; 1.5 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Ethylene dichloride</td>
<td>Ca; 1 ppm (4 mg/m³) TWA, 2 ppm (8 mg/m³) ceiling (15-min)</td>
<td>Ca; 1 ppm (4 mg/m³) TWA, 2 ppm (8 mg/m³) STEL</td>
</tr>
<tr>
<td>Ethylene glycol dinitrate</td>
<td>0.1 mg/m³ ceiling (20-min)</td>
<td>0.1 mg/m³ STEL (skin)</td>
</tr>
<tr>
<td>Ferrovanadium dust</td>
<td>1 mg/m³ TWA</td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL</td>
</tr>
<tr>
<td>Furfuryl alcohol</td>
<td>50 ppm (200 mg/m³) TWA</td>
<td>10 ppm (40 mg/m³) TWA (skin), 15 ppm (60 mg/m³) STEL (skin)</td>
</tr>
<tr>
<td>Hexachloroethane</td>
<td>Ca; lowest feasible concentration</td>
<td>Ca; 1 ppm (10 mg/m³) 8-hr TWA</td>
</tr>
<tr>
<td>Hexane</td>
<td>100 ppm (350 mg/m³) TWA</td>
<td>50 ppm (180 mg/m³) TWA</td>
</tr>
</tbody>
</table>

(Continued)
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Previous REL</th>
<th>Current REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen cyanide</td>
<td>4.7 ppm (5 mg/m³) ceiling (10-min)</td>
<td>4.7 ppm (5 mg/m³) STEL (skin)</td>
</tr>
<tr>
<td>Hydrogen fluoride</td>
<td>3 ppm (2.5 mg/m³) TWA, 6 ppm (5 mg/m³) ceiling (15-min)</td>
<td>3 ppm (2.5 mg/m³) TWA, 6 ppm (5 mg/m³) STEL</td>
</tr>
<tr>
<td>Isophorone diisocyanate</td>
<td>0.005 ppm (0.045 mg/m³) TWA, 0.020 ppm (0.180 mg/m³) ceiling (10-min)</td>
<td>0.005 ppm (0.045 mg/m³) TWA (skin) 0.02 ppm (0.180 mg/m³) STEL (skin)</td>
</tr>
<tr>
<td>Isopropyl alcohol</td>
<td>400 ppm (984 mg/m³) TWA, 800 ppm (1,968 mg/m³) ceiling (15-min)</td>
<td>400 ppm (980 mg/m³) TWA, 500 ppm (1,225 mg/m³) STEL</td>
</tr>
<tr>
<td>Malathion</td>
<td>15 mg/m³ TWA</td>
<td>10 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Mercury, aryl and inorganic</td>
<td>0.05 mg/m³ TWA</td>
<td>0.1 mg/m³ ceiling (skin)</td>
</tr>
<tr>
<td>Mercury vapor</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Methyl alcohol</td>
<td>200 ppm (262 mg/m³) TWA, 800 ppm (1,048 mg/m³) ceiling (15-min)</td>
<td>200 ppm (260 mg/m³) TWA (skin), 250 ppm (325 mg/m³) STEL (skin)</td>
</tr>
<tr>
<td>Methyl ethyl ketone (MEK)</td>
<td>200 ppm (590 mg/m³) TWA</td>
<td>200 ppm (590 mg/m³) TWA, 300 ppm (885 mg/m³) STEL</td>
</tr>
<tr>
<td>Methyl iodide</td>
<td>Ca; lowest feasible concentration</td>
<td>Ca; 2 ppm (10 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Methyl isobutyl ketone</td>
<td>50 ppm (205 mg/m³) TWA</td>
<td>50 ppm (205 mg/m³) TWA, 75 ppm (300 mg/m³) STEL</td>
</tr>
<tr>
<td>Methyl parathion</td>
<td>0.2 mg/m³ TWA</td>
<td>0.2 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>4,4'-Methylene bis (2-chloroanilinc) (MBOCA)</td>
<td>Ca; 0.003 mg/m³ TWA</td>
<td>Ca; 0.003 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Nitric acid</td>
<td>2 ppm (5 mg/m³) TWA</td>
<td>2 ppm (5 mg/m³) TWA, 4 ppm (10 mg/m³) STEL</td>
</tr>
</tbody>
</table>

(Continued)
### Chemicals with revised RELs (Continued)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Previous REL</th>
<th>Current REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen dioxide</td>
<td>1 ppm (1.8 mg/m³) ceiling (15-min)</td>
<td>1 ppm (1.8 mg/m³) STEL</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>0.1 mg/m³ ceiling (20-min)</td>
<td>0.1 mg/m³ STEL (skin)</td>
</tr>
<tr>
<td>Parathion</td>
<td>0.05 mg/m³ TWA</td>
<td>0.05 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Phenol</td>
<td>5 ppm (19 mg/m³) TWA, 15.6 ppm (60 mg/m³) ceiling (15-min)</td>
<td>5 ppm (19 mg/m³) TWA (skin), 15.6 ppm (60 mg/m³) ceiling (skin)</td>
</tr>
<tr>
<td>Phenylhydrazine</td>
<td>Ca; 0.14 ppm (0.6 mg/m³) ceiling (120-min)</td>
<td>Ca; 0.14 ppm (0.6 mg/m³) ceiling (120-min) (skin)</td>
</tr>
<tr>
<td>Styrene</td>
<td>50 ppm (215 mg/m³) TWA, 100 ppm (425 mg/m³) ceiling (15-min)</td>
<td>50 ppm (215 mg/m³) TWA, 100 ppm (425 mg/m³) STEL</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>0.5 ppm (1.3 mg/m³) TWA</td>
<td>2 ppm (5 mg/m³) TWA, 5 ppm (10 mg/m³) STEL</td>
</tr>
<tr>
<td>1,1,2,2-Tetrachloroethane</td>
<td>Ca; lowest feasible concentration</td>
<td>Ca; 1 ppm (7 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Tetramethyl succinonitrile</td>
<td>1 ppm (6 mg/m³) ceiling (15-min)</td>
<td>0.5 ppm (3 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Tin, organic compounds</td>
<td>0.1 mg/m³ TWA</td>
<td>0.1 mg/m³ TWA (skin)</td>
</tr>
<tr>
<td>Toluene</td>
<td>100 ppm (375 mg/m³) TWA, 200 ppm (750 mg/m³) ceiling (10-min)</td>
<td>100 ppm (375 mg/m³) TWA, 150 ppm (560 mg/m³) STEL</td>
</tr>
<tr>
<td>1,1,2-Trichloroethane</td>
<td>Ca; minimize exposure</td>
<td>Ca; 10 ppm (45 mg/m³) TWA (skin)</td>
</tr>
<tr>
<td>Trimellitic anhydride</td>
<td>Should be handled in the workplace as an extremely toxic substance</td>
<td>0.005 ppm (0.04 mg/m³) TWA; should be handled in the workplace as an extremely toxic substance</td>
</tr>
<tr>
<td>Tungsten:</td>
<td>5 mg/m³ TWA</td>
<td>5 mg/m³ TWA, 10 mg/m³ STEL</td>
</tr>
<tr>
<td>Insoluble</td>
<td>1 mg/m³ TWA</td>
<td>1 mg/m³ TWA, 3 mg/m³ STEL</td>
</tr>
<tr>
<td>Soluble</td>
<td></td>
<td>(Continued)</td>
</tr>
</tbody>
</table>
### Chemicals with revised RELs (Continued)

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Previous REL</th>
<th>Current REL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xylene</td>
<td>100 ppm (434 mg/m$^3$) TWA, 200 ppm (868 mg/m$^3$) ceiling (10-min)</td>
<td>100 ppm (435 mg/m$^3$) TWA, 150 ppm (655 mg/m$^3$) STEL</td>
</tr>
<tr>
<td>Zinc oxide, fume</td>
<td>5 mg/m$^3$ TWA, 15 mg/m$^3$ ceiling (15-min)</td>
<td>5 mg/m$^3$ TWA, 10 mg/m$^3$ STEL</td>
</tr>
</tbody>
</table>
APPENDIX V

CATEGORIES OF PESTICIDES

NIOSH recommends three categories to define the toxicity of pesticides for the various routes of exposure (oral, inhalation, and dermal). Group I contains the pesticides that pose a significant risk of (1) adverse acute health effects at low concentrations, or (2) carcinogenic, teratogenic, neurotoxic, or reproductive effects. Group II pesticides pose adverse acute health risks at moderate doses, and Group III pesticides pose minimal risk of adverse acute effects even at relatively high doses. For further discussion and clarification, refer to the 1978 NIOSH criteria document on pesticides (Criteria for a recommended standard: occupational exposure during the manufacturing and formulation of pesticides, DHEW (NIOSH) Publication No. 78-174, NTIS No. PB-81-227-001). Many of the chemicals listed as pesticides have other applications and are presented in Sections A and B.

GROUP I PESTICIDES

Acephate-met
3-(alpha-Acetonylfurfuryl)-4-hydroxycoumarin
3-(alpha-Acetonylfurfuryl)-4-hydroxycoumarin, sodium salt of
Acrolein
Acrylonitrile (C)*
Alachlor
Aldicarb
Aldrin (C) (T) (N)
Alkyl amine acetate (48% C12, 18% C14, 10% C18, 9% C16, 8% C8, 7% C10)
 (as in fatty acids of coconut oil)
Alkyl amine hydrochloride (as in fatty acids of coconut oil)
Alkyl amine tetrachlorophenate (as in fatty acids of coconut oil)
1-(Alkyl amino)-3-aminopropane acetate (as in fatty acids of coconut oil)
1-(Alkyl amino)-3-aminopropane hydroxyacetate (as in fatty acids of coconut oil)
1-(Alkyl amino)-3-aminopropane propionate - copper acetate complex (as in fatty acids of coconut oil)
Alkyl amino betaine (46% C12, 24% C14, 10% C16, 8% C10, 7% C8, 5% C18)
2-Alkyl-1-(2-aminoethyl)-2-imidazoline acetate
Alkyl ammonium salts
Alkyl bis(2-hydroxyethyl) amine acetate (65% C18, 30% C16, 5% C14)
N'-Alkyl-N-(2-cyanoethyl)1,3-diaminopropane (as in fatty acids of coconut oil)
Alkyl diamine monobenzoate (as in fatty acids of coconut oil)
Alkyl diethanolamide (70% C12, 30% C14)
N-Alkyl dihydroxyethyl amine oxide (50% C12, 22% C14, 10% C15, 8% C10, 5% C18)

*Abbreviations: (C) = suspected carcinogen; (N) = suspected neurotoxin;
 (R) = suspected reproductive effect; (T) = suspected teratogen.
N-Alkyl Dipropoxy tert-amine (47% C12, 18% C14, 10% C18, 9% C10, 8% C16, 8% C8)
Alkyl (ethylcyclomimidinium) 3-hydroxy-3-ethyl sodium alcholate, 2-methyl sodium carboxylate-tridecyl polyoxymethylene ethanol-iodine complex (100% C12)
2-Alkyl 1-(2-hydroxyethyl)-1 or 3-benzyl-2-imidazolium chloride (C18 as in fatty acids of tall oil)
2-Alkyl 1-(2-hydroxyethyl)-2-imidazoline acetate (as in fatty acids of tall oil)
2-Alkyl 1-(2-hydroxyethyl)-2-imidazoline (C18 as in fatty acids of tall oil)
2-Alkyl 1-hydroxyethyl imidazoline phosphate (100% C13)
Alkyl monoethanol amide (as in fatty acids of coconut oil)
Allyl alcohol
Aluminium phosphide
4-Aminopyridine
Amiton
Amitrole (C)
Ammonium arsenite (C)
Ammonium fluosilicate
Ammonium sulfamate
Anilinocadmium dilactate
ANTU (α-Naphthylthiourea)
Aromatic petroleum derivative solvent
Aromatic petroleum distillate, oil, solvent or hydrocarbons
Arsenic acid (C)
Arsenic pentoxide (C)
Arsenic sulfide (C)
Arsenic trioxide (C)
Auramine
Azinphos
Azinphos-methyl
Benzadox, ammonium salt of
1,2-Benzothiazolin-3-one
Benzoic acid
Benzy1 bromoacetate
o-Benzyl-p-chlorophenol
o-Benzyl-p-chlorophenol, potassium salt of
o-Benzyl-p-chlorophenol, sodium salt of
Benzy1 diethyl ((2,6-xylylcarbamoylmethyl)ammonium benzoate
Benzy1 (dodecy1carbamoylmethyl) dimethylammonium chloride
Bifenox
1,4-Bis(bromoacetox)-2-butene
Bis(2-chloroethyl)ether (C)
trans-1,2-Bis(propylsulfonyl) ethene
Bis(tributyltin) adipate
Bis(tributyltin) dodecenyl succinate
Bis(tributyltin) oxide
Bis(tributyltin) succinate
Bis(tributyltin) sulfide
Bis(tributyltin) sulfosalicylate
Bis(trichloromethyl) sulfone
Boric acid
Bromacil
Bromacil, lithium salt of
Bromacil, sodium salt of
4-Bromoacetoxymethyl-m-dioxolane
1-Bromo-3-chloro-5,5-dimethylhydantoin
beta-Bromo-beta-nitrostyrene
Bromophos
1,1'-(2'Butylenne) bis(3,5,7-triaza-1-azoniaadamantane chloride)
tert-Butyl hydroperoxide
Butyric anhydride
Cadmium chloride
Calcium arsenate (C)
Calcium arsenite (C)
Calcium cyanide
Calcium cyanamide
Calcium ethylenebisdithiocarbamate (C)
Calcium hypochlorite
Calcium polysulfide
Captan (T)
Captan (T)
Carbofuran
Carbon disulfide
Carbon tetrachloride (C)
Carbophenothion (N)
Carboxin
5-and 6-Carboxy-4-hexyl-2-cyclohexane-1-octanoic acid-iodine complex, polyoxymethylene ethanol esters of
Carboxymethyl-1,1-ethylcarboxymethyl-2-undecylimidazolinium hydroxide, disodium salt of
Cetyl dimethyl ethyl ammonium bromide
Cetyl puridinium bromide
Cetyl pyridinium chloride
Cetyl trimethyl ammonium bromide
Cetyl trimethyl ammonium chloride
Chloramben, and esters and salts (C)
Chlordane (C)
Chlordecone (C) (N) (R)
Chlorfenvinsos
Chlorinated levulinic acid
Chlorine
Chlorine dioxide
Chlorobenzilate
4-Chloro-2-cyclopentylphenol
4-Chloro-2-cyclopentylphenol, potassium salt of
4-Chloro-2-cyclopentylphenol, sodium salt of
5-Chloro-2-(2,4-dichlorophenoxy)phenol
0-(2-Chloro-2-(2,5-dichlorophenyl)vinyl) 0,0-diethyl phosphorothioate
Chloroethylene bisthiocyante
Chloroform (C)
Chloromethoxypropylmercuric acetate
1-Chloro-2-nitropropane
4-Chloro-2-phenylphenol
6-Chloro-2-phenylphenol
6-Chloro-2-phenylphenol, potassium salt of
6-Chloro-2-phenylphenol, sodium salt of
2-((p-Chlorophenyl)phenylacetyl)-1,3-indandione
Chloropicrin
4-Chloropyridine n-oxide
Chlorothalonil
4-Chloro-3,5-xylenol
Chlorpyrifos
Chromic acid
Coal tar (C)
Coal tar acids, coal tar phenols, cresylic acid or cresols
Coal tar neutral oils or coal tar hydrocarbons
Coal tar phenols of coal tar acids
Copper acetoarsenite
Copper arsenate (C)
Copper arsenite (C)
Copper (metallic)
Copper naphthenate
Copper oxide
Copper sulfate
Copper sulfate, basic
Copper-zinc-chromate complex (C)
Coumaphos
Creosote (wood) (C)
Creosote (coal tar), coal tar creosote or coal tar creosote oils (C)
Creosote oil or coal tar creosote oils (C)
Cresol
Cresylic acid
Crotoxyphos
Cryolite
Cupric oxide
Cyanuric acid
Cycloheximide
Cyhexatin
DDD (C)
DDT (C)
Demetron
Dialifor
Dialkyl ammonium salts
Diamidfos
Diarmmonium ethylene bisdithiocarbamate (C)
Diazenon
1,2-Dibromo-3-chloropropane (C)(R)
2,2-Dibromo-3-nitrilopropionamide
Dichlorane
1,2-Dichloropropane, 1,2-dichloropropene and other related compounds
1,3-Dichloropropene
Dichloro-S-triazinetrione
Dichloro-S-triazinetrione, potassium salt
Dichloro-S-triazinetrione, sodium salt of
Dichlorvos
Dicrotophos
Didecylmethyl benzyl ammonium chloride
Dieldrin (C)(T)(N)
0,0-Diethyl 0-(2-(diethylamino)-6-methyl-4-pyrimidinyl) phosphorothioate
N3,N3-Diethyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylenediamine
Diethyl diphenyl dichlороethane and related compounds
N,N-Diethyl-m-toluamide, and other isomers
Difenzoquat methyl sulfate
Diisobutyloctoxyethoxyethyl dimethyl benzyl ammonium chloride
Diisobutylphenoxyethoxyethyl dimethyl benzyl ammonium chloride
Dimethyl 3-hydroxyglutaconate dimethyl phosphate
4,6-Dinitro-o-cresol
4,6-Dinitro-o-cresol, sodium salt of
2,4-Dinitrophenol
Dinoseb, and esters and salts
Dioxathion
Diphenacine, and esters and salts
Diphenamid
Diphenylamine
Di(phenylmercury)ammonium propionate
Di(phenylmercury)dodecenylsuccinate
Diphenylstibene 2-ethylhexanoate
Diquat dibromide
Disodium acid methane arsonate
Disulfoton
DMPA (N)
Dodecylamine lactate
Dodecylamine salicylate
Dodecylammonium methane arsonate
Dodecylammonium sulfate
Dodecylbenzene sulfonic acid
Dodecylbenzene sulfonic acid, diethanolamine salt of
Dodecylbenzene sulfonic acid, monoethanolamine salt of
Dodecylbenzyl octadecyl dimethyl ammonium chloride
Dodecylbenzyl trimethyl ammonium chloride
Dodecylbenzyl trimethyl ammonium 2-ethylhexanoate
Dodecylmethyl benzyl ammonium chloride
Dodecylmethyl benzyl ammonium naphthenate
Dodecylmethyl benzyl ammonium bromide
N-Dodecylmethyl trichlorobenzyl ammonium chloride
Dodecylmethyl 2,4,5-trimethyl benzyl ammonium chloride
Dodecylguanidine hydrochloride
Dodecylguanidine terephthalate
Dodicine and hydrochloride
Endosulfan
Endothall, and esters and salts
Endrin (T)
EFN (N)
Ethephon
Ethion
Ethoprop
Ethylene
Ethylene dichloride
Ethylene dibromide (C)
Ethylene oxide
Ethyl formate
Ethylmercury phosphate
Ethyl 4-(methylthio)-m-tolyl isopropylphosphoramidate
4,4’-(2-Ethyl-2-nitrotrimethylene) dimorpholine
Fenbutatin oxide
Fensulfothion
Ferrous sulfate heptahydrate
Fluoroacetamide
Fluorodifen
Fluosilicic acid
Folpet (T)
Fonofos
Formaldehyde
Formetanate hydrochloride
Glutaraldehyde
Glycolic acid
Glycolic acid, potassium salt of
Haloxon (N)
Heptachlor (C)
2-Heptadecyl-1-methyl-1-(2-(stearoylamido)ethyl) imidazolinium methyl sulfate
1-Heptadecenyl-2-(2-hydroxyethyl) imidazolium chloride
2-Heptadecenyl imidazolium
2-Heptadecenyl imidazolium chloride
2-Heptadecenyl-2-imidazolone acetate
Heptadecyl hydroxyethyl imidazolium
Heptadecyl hydroxyethyl imidazolium chloride
Heptadecyl hydroxyethyl imidazolium hydrochloride
Hexahydro-1,3,5-tris(2-hydroxyethyl)-S-triazine
Hexahydro-1,3,5-tris(2-hydroxypropyl)-S-triazine
Hexakis (2-methyl-2-phenylpropyl)distannoxane
Hydroiodic acid
Hydrocyanic acid
Hydrofluoric acid
Hydrogen chloride
2-((Hydroxymethyl)amino)-2-methylpropanol
S-(2-Hydroxypropyl) thiomethanesulfonate
Indole-3-butyric acid
Iodine
3-Iodo-2-propynyl butylcarbamate
Isobutyric acid
2,4-Isovaleryl-1,3-indandione
2-Isovaleryl-1,3-indandione, calcium salt of
2-Isovaleryl-1,3-indandione, sodium salt of
Lead acetate
Lead arsenate, basic (C)
Lead arsenate, standard (C)
Leptophos (N)
Lindane
Lithium hypochlorite
Maneb (C)
Mercuric chloride
Mercuric oxide
Mercurous chloride
Mercury (metallic)
Metaldehyde
Methidathion
Methomyl
Methyl bromide
Methylododecylbenzyl trimethyl ammonium chloride 80% and methylododecylhexylene bis(trimethyl ammonium chloride) 20%
2,2'-Methylene bis(4-chlorophenol)
2,2'-Methylene bis(4-chlorophenol), sodium salt of
2,2'-Methylene bis(4,6-dichlorophenol), sodium salt of
Methylene bis(thiocyanate)
2,2'-Methylene bis(3,4,6-trichlorophenol)
2,2'-Methylene bis(3,4,6-trichlorophenol), disodium salt of
2,2'-Methylene bis(3,4,6-trichlorophenol), monosodium salt of
Methylmercury quinolinolate
Methyl parathion
Metolachlor
Mevinphos
Mexacarbate
Mirex (C)
Monocrotophos
Nabam (C)
Naled
Nicotine or nicotine alkaloid
Nicotine sulfate
4-(2-Nitrobutyl)morpholine
2-Nitro-1-butyl phosphate
Nitrofen (C)
2-Nitropropane (C)
Nonylphenoxypolyethoxyethanol-iodine complex
Octyl decyl dimethyl ammonium chloride
Octyl dodecyl dimethyl ammonium chloride
2-N-Octyl-4-isothiazolin-3-one
Oil of citronella
Oxalic acid
Oxamyl
Paraformaldehyde
Paraquat bis(methylsulfate)
Paraquat dichloride
Parathion
Parinol
PCNB
Pentachlorophenol
Pentachlorophenol, fatty acid esters of (100 % C6-C20)
Pentachlorophenol, potassium salt of
Pentachlorophenol, zinc salt of alkyl-N-propanediamine (C16-C18)
n-Pentyl valerate
Perfluoride
Petroleum distillate, oils, solvent, or hydrocarbons; also paraffinic hydrocarbons, aliphatic hydrocarbons, paraffin oil
Phenol
Phenylmercuric acetate
Phenylmercuric ammonium acetate
Phenylmercuric ammonium propionate
Phenylmercuric borate
Phenylmercuric carbonate
Phenylmercuric 2-ethylhexanoate
Phenylmercuric formamide
Phenylmercuric lactate
Phenylmercuric oleate
Phenylmercuric propionate
Phenylmercuric triethanol ammonium lactate
o-Phenylphenol
o-Phenylphenol, alkenyl amine salt of (100% C8-C18)
o-Phenylphenol, alkyl amine-copper salt of (100% C8-C18)
o-Phenylphenol, alkyl amino-zinc salt of (100% C18)
o-Phenylphenol, ammonium salt of
o-Phenylphenol, potassium salt of
o-Phenylphenol, tetradecylamine salt of
Phorate
Phosacetin
Phosmet (T)
Phosphamidon
Phosphoric acid
Phosphorus
Fipronil and salts
Polyethoxypolypropoxethanol-iodine complex
Poly(oxyethylene(dimethylimino)ethylene (dimethyliminio)ethylene dichloride
Polyram (C)
Potassium ammonium ethylene bisdithiocarbamate (C)
Potassium chromate
Potassium cyanate
Potassium dichromate
Potassium N-hydroxymethyl-N-methylidithiocarbamate
Potassium mercuric iodide
Potassium permanganate
Profuralin
Propargite
Propionic acid
Propylene oxide
Pyridylmercuric acetate
N1-(2-Quinoxaliny)sulfanilamide
Red squill
Silver fluoride
Sodium aluminum fluosilicate
Sodium arsenate (C)
Sodium arsenite (C)
Sodium azide
Sodium bisulfite
Sodium bisulfate
Sodium chlorite
Sodium chromate
Sodium cyanide
Sodium dichromate
Sodium fluoride
Sodium fluoroacetate
Sodium fluosilicate
Sodium hydroxide
Sodium hypochlorite
Sodium pentachlorophenate
Sodium phosphate
Sodium pyroarsenate (C)
Stoddard solvent
Strychnine
Strychnine sulfate
Sulfamic acid
Sulfur
Sulfur dioxide
Sulfuric acid
Sulfuryl fluoride
Tartar emetic
TEDP
TEPP
Terbufos
Terpene polychlorinates
2,4,5-T, and esters and salts (T)
1,1,2,2-Tetrachloroethane (C)
Tetrachloroethylene (C)
2,3,5,6-Tetrachloro-4-(methylsulfonyl)pyridine
Tetrachlorophenols
Tetrachlorophenols, alkyl amine salt (as in fatty acids of coconut oil)
Tetrachlorophenols, potassium salt of
Tetrachlorvinphos (C)
3,3,4,4-Tetrachlorotetrahydrothiophene-1,1-dioxide (92%) and other chlorinate thiophene dioxide (8%)
Tetradecylbenzene sulfonate-hypochlorous acid complex
Tetradifon
Tetrahydro-3,4-dimethyl-2H-1,3,5-thiadiazine-2-thione
2-(4-Thiazolyl)benzimidazole
2-(Thiocyanomethylthio)benzothiazole
Thiram (T)
Toxaphene
S,S,S-Trichloroacetic acid, sodium salt
Trichloroethylene (C)
2,4,5-Trichlorophenol
2,4,5-Trichlorophenol, sodium salt of
2,3,5-Trichloro-4-propylsulfonyl pyridine 36% other chlorinated pyridines mono(trichloro)tetra-
(mnopotaassium dichloro)penta-s-triazinetrience 4% inert 60%
Trichloro-S-triazinetrione
α, α, α-Trifluoro-4-nitro-m-cresol
Trifuralin (C)
Triforine
3-(Trimethoxysilyl)propyl dimethyl octadecylammonium chloride
Triphenyltin fluoride
Triphenyltin hydroxide
Trisodium phosphate
Vinylene bis(thiocyanate)
Warfarin
Warfarin, sodium salt of
Xylene
Zinc ion and manganese ethylene bisdithiocarbamate 80%, a coordination product of manganese 16%,
zinc 2%, ethylene bisdithiocarbamate 62% (C)
Zinc mercury chromate (C)
Zinc phosphide
Zinc 2-pyridinethiol 1-oxide
Zineb (C)
Ziram
GROUP II PESTICIDES

alpha-Alkyl-omega-hydroxypoly(oxyethylene) (100% C12-C15)
Alkyl poly(oxypropylene) poly(oxyethylene)-iodine complex (100% C12-C15)
Alkyl 1,3-propanediamine (53% C12, 19% C14, 8.5% C16, 7% C8, 6.5% C10, 6% C18)
Alkyl 1,3-propylenediamine (as in fatty acids of coconut oil)
Alkyl 1,3-propylenediamine (42% C12, 26% C18, 15% C14, 8% C16, 5% C10, 4% C8)
Alkyl 1,3-propylenediamine (47% C12, 18% C14, 10% C18, 9% C10, 8% C16, 8% C8)
N-Alkyl 1,3-propylenediamine acetate (as in coconut oil fatty acids)
Alkyl 1,3-propylenediamine acetate (47% C12, 18% C14, 10% C18, 9% C10, 8% C16, 8% C8)
N-Alkyl 1,3-propylenediamine adipate (as in fatty acids of coconut oil)
Alkyl 1,3-propylenediamine monobenzoate (as in fatty acids of coconut oil)
Allethrin
Amethoate
Amitraz
Ammonium polysulfides
Antimycin A
B. lentimorbus
B. popilliae
B. thuringiensis
BAN
Barium carbonate
Barium metaborate
Bentazon, sodium salt of
Benzaldehyde
4-Benzothienyl methylcarbamate
Benzylic alcohol
Benzyl benzoate
(5-Benzyl-3-furyl)methyl 2,2-dimethyl-3-(2-methylpropenyl) cyclopropane-carboxylate
2,3,4,5-Bis(2-butylene)tetrahydro-2-furaldehyde
1,1-Bis(chlorophenyl)-2,2,2-trichloroethanol
Bis(tripropyltin) oxide
Bone oil
2-Bromo-4’-hydroxyacetophenone
Bromoxynil octanoate
Bufencarb
2-Butanol
2-Butoxyethanol
Butoxypropoxypolyoxyethylene-tetraphenoxyethanol-iodine complex
Butralin
tert-Butyl alcohol
sec-Butylamine
tert-Butyl dimethyltrithioperoxycarbamate
Cacodylic acid
Cacodylic acid, sodium salt of
Cadmium-calcium-copper-zinc-sulfate-chromate complex
Cadmium carbonate
Cadmium sebacate
Cadmium succinate
Cadmium sulfate
Calcium propandecarboxonate
Calcium propionate
Carbaryl
Cetyl alcohol
\( \text{n-Cetyl-\text{n-ethyl morpholinium ethylsulfate} } \)
Chloranil
Chlordimeform
Chlordimeform hydrochloride
2-Chloroallyl diethylthiocarbamate
1-(3-Chloroallyl)-3,5,6-triaza-1-azoniaadamantane chloride
S-(4-Chlorobenzyl) diethylthiocarbamate
4-Chloro-m-cresol
2-((4-Chloro-6-(ethylamino)-S-triazine-2-yl)amino)-2-methyl-propionitrile
2-Chloroethyl trimethyl ammonium chloride
2-Chloro-\( \text{n-isopropylacetanilide} \)
5-Chloro-2-mercaptobenzothiazole, lauryl pyridinium salt of
o-Chlorophenol
p-Chlorophenol, sodium salt of
p-Chlorophenoxyacetic acid, diethanolamine salt of
2-(m-Chlorophenoxy)propionamide
2-(m-Chlorophenoxy)propionic acid
2-(m-Chlorophenoxy)propionic acid, sodium salt of
p-Chlorophenyl diiodomethyl sulfone
2-Chloro-4-phenylphenol
2-Chloro-4-phenylphenol, potassium salt of
2-Chloro-4-phenylphenol, sodium salt of
4-Chloro-2-phenylphenol, potassium salt of
4-Chloro-2-phenylphenol, sodium salt of
4 and 6-Chloro-2-phenylphenol, diethanolamine salt of
3-Chloro-p-toluidine hydrochloride
d-trans-Chrysanthemum monocarboxylic acid ester of d-2-allyl-4-hydroxy-3-methyl-2-cyclopenten-1-one
Copper carbonate
Copper oleate
Copper 8-quinolinate
Copper salts of fatty and rosin acids
Crufomate
Cube resins
3-Cyclohexyl-6-\((\text{dimethylamino})-1-\text{methyl-1,3,5-triazine-2,4(1H,3H)-dione} \)
Cythioate
2,4-D
2,4-D, alkanolamine salts of ethanol and isopropyl series of
2,4-D, butyl ester of
2,4-D, dimethylamine salt of
2,4-D, iso-octyl (2-ethylhexyl) ester of
2,4-D, iso-octyl (2-octyl) ester of
2,4-D, isopropyl ester of
2,4-D, lithium salt of
2,4-D, n-oleyl-1,2-propylenediamine salt of
2,4-D, potassium salt of
2,4-D, triethanolamine salt of
2,4-DB
2,4-DB, dimethylamine salt of
1-Decanol
Demeton-S-methyl
Desmediphram
N,N-Diallyl-2-chloroacetamide
Dicapthon
Dichlobenil
Dichlofenthion
o-Dichlorobenzene
p-Dichlorobenzene
2,4-Dichloro-6-(o-chloroanilino)-5-triazine
1,3-Dichloro-5,5-dimethylhydantoin
2,6-Dichloro-4-nitroaniline
4,6-Dichloro-2-phenylphenol
4,6-Dichloro-2-phenylphenol, potassium salt of
3',4'-Dichloropropionanilide
Dichlorprop, and esters and salts
Diethylene dithiobis (thionoformate)
Diethylene glycol monomethyl ether
1,2-Dihydro 3,6-pyridazinedione
1,2-Dihydro-3,6-pyridazinedione, diethanolamine salt of
1,2-Dihydro-3,6-pyridazinedione, potassium salt of
Dioxidomethyl p-tolyl sulfone
Diisobutyl ketone
Dimethoate
p-(Dimethylamine) benzenediazo sodium sulfonate
2,2-Dimethyl-1,3-benzodioxol-4-ol methylcarbamate
Dimethyl tetrachloroterephthalate
Dimethyl(2,2,2-trichloro-1-hydroxyethyl)phosphonate ester of butyric acid
2,4-Dinitrochlorobenzene
Diphenylacetonitrile
Disodium 2,2'-thiobis(4,6-dichlorophenate)
Diuron
Epichlorohydrin
Erbon
Ethanol
6-Ethoxy-1,2-dihydro-2,2,4-trimethyl quinoline
5-Ethoxy-3-(trichloromethyl)-1,2,4-thiadiazole
S-Ethyl dipropyliothiocarbamate
Ethylene diamine
S-Ethyl hexahydro-1H-azine-1-carbothioate
Eugenol
Fampur
Fatty alcohols (54.5% C10, 45.1% C8, 0.4% C6)
Fatty alcohols (56% C10, 42% C8, 1.5% C12, 0.5% C6)
Fatty alcohols (55.10% C10, 42.88% C8, 1.01% C6, 1.01% C12)
Fenitrothion
Fenthion
Fluchloralin
Glyphosate, isopropylamine salt of
Hexachlorobenzene
Hexachlorocyclohexane, technical
Hexachlorocyclopentadiene
Hexachloroethane
2-((Hydroxymethyl)amino)ethanol
2-(Hydroxymethyl)-2-nitro-1,3-propanediol
3-Hydroxy-N,N,5-trimethylpyrazole-1-carboxamide dimethylcarbamate
Isobornyl acetate
Isobornyl thiocynoacetate
Isobutanol
Isopropanol
o-Isopropoxyphenyl methylcarbamate
Isopropyl N-(3-chlorophenyl)carbamate
Isopropyl N-phenylcarbamate
Karbutilate
Malathion
MCPC, and esters and salts
MCPB, and esters and salts
Menthol
2-Mercaptobenzothiazole, and esters and salts
Methanol
Methazole
Methiocarb
Methylated aromatic petroleum derivative
Methylated naphthalenes
Methylcarbophenothon
2,2'-Methylene bis(4,6-dichlorophenol)
Methylene chloride
Methyl esters of fatty acids (C8 - C12)
Methyl ethyl ketone
Methyl isobutyl ketone
Methyl isothiocyanate
Methyl nonyl ketone
4-(Methylthio)-3,5-xylyl methylcarbamate
Mineral oil, mineral seal oil, white mineral oil
Monuron
Monuron trichloroacetate
1-Naphthalencacetic acid, and esters and salts
(2-Naphthoxy) acetic acid
N-1-Naphthylphthalamic acid, and esters and salts
Neodecanoic acid
Nitrapyrin
N-9-Octadecenyl-1,3-propanediamine monogluconate
1-Octanol
Oleic acid
Ovex
10,10'-Oxybisphenarsazine
10,10'-Oxybisphenoxarsine
Peroxyacetic acid
Phenmedipham
Phenothiazine
Phenthroate
2-Phenylethanol
2-Phenyethyl propionate
Phosalone
Pine oil
Pine tar
Pine tar oil
Piperonyl butoxide
Polybutene
Potassium gibberellate
Prometon
Pyrethrins
Pyrethrum powder other than pyrethrins
N-3-Pyridinmethyl-N'-p-nitrophenylurea
Ronnel
Rotenone
Sabadilla alkaloids
Silicon dioxide
Silvex, and esters and salts
Simazine
Sodium N,N-dimethyl dithiocarbamate
Sodium methylidithiocarbamate
Sodium propionate
Sodium 2-pyridinethio 1-oxide
Streptomycin
Streptomycin sulfate
Sulfoxide
Temephos
1,2,4,5-Tetrachloro-3-nitrobenzene
Tetraglycine hydroperiodide
Tetraiodoethylene
0,0,0-Tetrapropyl dithiopyrophosphate
Thiobencarb
3,4'-5-Tribromosalicylanilide
Tributyltin acetate
Tributyltin benzoate
Tributyltin chloride
Tributyltin chloride complex of ethylene oxide condensate of abietylamine
Tributyltin resinate
Trichlorfon
2,3,6-Trichlorobenzoic acid and related polycholorbenzoid acids, dimethamine salt of
Triethylene glycol
Trimethylbenzyl ammonium resin, polybromide form
3,4,5 and 2,3,5-Trimethylphenyl methylcarbamate
Xylene range aromatic solvent
Zinc fluorsilicate
Zinc naphthenate
Zinc sulfate
Zinc sulfate, basic
GROUP III PESTICIDES*

Acephate
Acetic acid
Acetone
Acrylic polymer resins
Allantoin
Allyl isothiocyanate
Aluminum chloride
Aluminum chlorohydroxy allantoinate
Aluminum hydroxybenzenesulfonate
Aluminum sulfate
Amidithion
4-Amino-6-tert-butyl-3-(methylthio)-as-triazine-5(4H)-one
Ammonia
Ammonium alum
Ammonium carbonate
Ammonium citrate
Ammonium hydroxide
Ammonium hydroxide - C8 fatty acid silver complex
Ammonium isobutyrate
Ammonium lauryl sulfate
Ammonium oleate
Ammonium oxalate
Ammonium sulfate
Ammonium thiosulfate
Amyl acetate
o-sec-Amylphenol
p-tert-Amylphenol
p-tert-Amylphenol, potassium salt of
p-tert-Amylphenol, sodium salt of
Anabasine
Ancymidol
Anthracene oil
Asphalt
Asulam, sodium salt of
Atrazine
Benomyl
Bensulide
d-trans(5-Benzl-3-furyl) methyl 2,2-dimethyl-3-(2-methylproeny) cyclopropane carboxylate
Binapacryl
Biphenyl
2,2-Bis(4-chlorophenyl)ethanol

*Approximately 350 compounds in Group III were placed there by default (i.e., there were no data on which to base their classification in another group). For further explanation see Chapter 6 of the NIOSH criteria document on pesticides (Criteria for a recommended standard: occupational exposure during the manufacturing and formulation of pesticides, DHEW (NIOSH) Publication No. 78-174, NTIS No. PB-81-227-001).
2,6-Bis((dimethylamino)methyl)cyclohexanone
N,N-Bis(2-hydroxyethyl) lauramide
Bismuth subgallate
Borax
Butoxypolypropylene glycol
beta-Butoxy beta'-thiocyanodiethyl ether
N-Butylacetanilide
Butyl 3,4-dihydro-2,2-dimethyl-4-oxo-1,2H-pyran-6-carboxylate
1,3-Butylene glycol
2-Butyl-2-ethyl-1,3-propanediol
N-Butyl-N-ethyl-alpha,alpha,alpha,trifluoro-2,6-dinitro-p-toluidine
p-tert-Butylphenol
p-tert-Butylphenol, potassium salt of
p-tert-Butylphenol, sodium salt of
1-(p-tert-Butylphenoxy)-1-methylethyl 1-chloroethyl sulfite
Butyl p-hydroxybenzoate
Calcium acid methanearsonate
Calcium chloride
Calcium chlorate
Calcium naphthenate
Calcium phosphate
Calcium thiosulfate
Camphor
Camphor oil
Canadian balsam
Capsaicin (in oleoresin of capsicum)
Carbon
Castor oil
Cedar leaf oil
Cedarwood oil
Chloramine B
Chloramine T
Chlorbromuron
Chlorobutanol
Chloroneb
0-(3-Chloro-4-nitropheryl) 0,0-dimethyl phosphorothioate
p-Chlorophenyl phenyl sulfone
p-Chlorophenyl 2,4,5-trichlorophenyl sulfide
Chloropropylate
5-Chlorosalicylanilide
2-Chloro-2"-(2,4,6-trichlorophenoc)diethyl ether
Chloroxuron
6-(and 2)-Chloro-3,4-xylyl methylcarbamate
Chromic acetate
Citral
Citric acid
Cobalt naphthenate
Cod liver oil
Copper acetate
Copper ammonium carbonate
Copper chloride, basic
Copper chloride (dihydrate)
Copper dehydroarsteryl ammonium 2-ethylhexoate
Copper ethylenediaminotetraacetate
Copper 2-ethylhexoate
Copper hydroxide
Copper hydroxynaphthenate
Copper linoleate
Copper oxalate
Copper oxychloride
Copper oxychloride sulfate
Copper pyrophosphate
Copper salts of the acids of tall oil
Copper sulfate monohydrate
Copper sulfate pentahydrate
Cottonseed oil
Cupric ferrie subsulfate complex
Cupric zinc sulfate complex, basic
Cuprous thiocyanate
Cyanogen chloride
Cyclohexane
Cyclohexanone
2-Cyclohexylcyclohexanol
Cyprazine
2,4-D, alkyl amine salt of (as in tall oil fatty acids)
2,4-D, alkyl amine salt of (C12)
2,4-D, alkyl amine salt of (C13)
2,4-D, ammonium salt of
2,4-D, amyl(pentyl) ester of
2,4-D, butoxyethoxypropyl ester of
2,4-D, butoxyethyl ester of
2,4-D, butoxypolyethoxypropyl ester of
2,4-D, butoxypropyl ester of
2,4-D, diethanolamine salt of
2,4-D, diethylamine salt of
2,4-D, diethylethanamine salt of
2,4-D, diisopropylamine salt of
2,4-D, N,N-dimethyloleylamine salt of
2,4-D, N,N-dimethyl oleyl-linoleyl amine salt of
2,4-D, dipropylene glycol isobutyl ether ester of
2,4-D, ethanolamine salt of
2,4-D, ethoxethoxyethyl ester of
2,4-D, ethoxethoxypropyl ester of
2,4-D, ethylamine salt of
2,4-D, ethylene glycol butyl ether ester of
2,4-D, ethyl ester of
2,4-D, heptylamine salt of
2,4-D, isoctyl (2-ethyl-4-methylpentyl) ester of
2,4-D, isopropanolamine salt of
2,4-D, isopropylamine salt of
2,4-D, isobutyl ester of
2,4-D, Linoleylamine salt of
2,4-D, methylvamine salt of
2,4-D, methyl ester of
2,4-D, morpholine salt of
2,4-D, octylamine salt of
2,4-D, oleylamine salt of
2,4-D, polyethylene glycol 200 ester of
2,4-D, polypropoxybutyl ester of
2,4-D, polypropylene glycol ester of
2,4-D, propylamine salt of
2,4-D, propylene glycol butyl ether ester of
2,4-D, propylene glycol isobutyl ether ester of
2,4-D, propylene glycol ester of
2,4-D, sodium salt of
2,4-D, triethylamine salt of
2,4-D, triisopropanolamine salt of
2,4-D, trimethylamine salt of
2,4-D, tripropylene glycol isobutyl ether ester of
2,4-D, tetrahydrofurfuryl ester of
Dalapon
Dalapon, diethylene glycol ester of
Dalapon, magnesium salt of
Dalapon, sodium salt of
Daminozide
2,4-DB, butoxyethanol ester of
2,4-DB, butyl ester of
2,4-DB, isooctyl ester of
Decachlorobis(2,4-cyclopentadiene-1-yl)
Dehydroabietylamine
Dehydroabietylamine acetate
Dehydroabietylamine-ethylene oxide condensate
Dehydroabietylammonium pentachlorophenoxide
Dehydroabietylammonium phenoxide
Derris resins
Dextrin
Diacetone alcohol
1,5-Diamino-2,2-difluoroethane
20,25-Diazacholesterol dihydrochloride
2,3-Dibromopropionaldehyde
3,5-Dibromosalicylanilide
4',5-Dibromosalicylanilide
3,5-Dibromo-3'-(trifluoromethyl)salicylanilide
2,6-Di-tert-butyl-p-cresol
Dibutyl succinate
2,6-Di-tert-butyl-p-tolyl methylcarbamate
Dicamba, and esters and salts
Dichlorinate
S-(2,3-Dichloroallyl) diisopropylthiocarbamate
Dichlorodifluoromethane
3,4-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide
4,4'-Dichloro-alpha-methylbenzhydrol
2',5-Dichloro-4'-nitrosalicylanilide, 2-aminoethanol salt of
2,4'-Dichlorophenyl ester of benzenesulfonic acid
p-(N,N-Dichlorosulfamoyl)benzoic acid
Dicryl
Dicyclopentadiene-linseed oil copolymer
Di(dehydroyabietyl)amine acetate
Dietranolamine myristate-iodine complex
2-(2-(2-N,N-Diethylamino)ethoxy)bornane
N,N-Diethyl 2-(1-naphthalenoxy)propionamide
Diethyl 4,4'-0-phenylenebis-(3-thioallophanate)
Dihydroxyabietylamine acetate
5,10-Dihydro-5,10-dioxonaphtho(2,3-8)-p-dithiin-2,3-dicarbonitrile
Dihydrorotenone
N,N-Di(hydroxyethyl)alkyl amine (as in soybean fatty acids)
5,7-Diido-8-quinolinol
Disobutyphenoxyethanol
Dilauryl dimethyl ammonium bromide
Dimethrin
2-(Dimethylamino)-4,5-dimethyl-4-pyrimidinyl dimethylcarbamate
4-(Dimethylamino)-m-tolyl methylcarbamate
2,6-Dimethyl-4-m-dioxan-4-ol acetate
N,N-Dimethyldecylamine acetate
Dimethyl isopropylaminophenanthrene
Dimethyl ((4-methyl-1,3-phenylenebis iminocarbonyl-1H-benzimidazole-1,2-diy))bicarbamate
N'-((2,4-Dimethylphenyl)iminoo)methyl)-N-methanimidamide
Dimethyl phthalate
2,4-Dinitro-6-octyl phenyl crotonate, 2,6-dinitro 4-octyl phenyl crotonate, and nitrooctylphenols
(principally dinitro)
Di-n-propylmaleate isosatrole condensate
Diocytol sodium sulfosuccinate
Dipropetryn
Dipropylene glycol
Dipropylenec glycol methyl ether
Dipropyl insocinchenommmeronate
Disodium cyanodithioimidocarbonate
Disodium dihydroxyethyl ethylenediamine diacetate
Disodium 4-dodecyl-2,4'-oxydibenzencesulfonate
Disodium N-(2-hydroxyethyl)iminodiacetate
Disodium monoethanolamine phosphate
Disodium octaborate tetrahydrate
Disodium 2,2'-oxybis(4-dodecylbenzenesulfonate)
2,2'-Dithiobisbenzothiazole
Beta,beta'-dithiocyanato diethyl ether
Dodecylthiethylamine
Dried blood
Essential oils or perfume
Ester gums
Ethanolamine
Ethiolate
2-Ethoxyethyl-p-methoxycinnamate
Ethoxylated monoethanolamine of lauric acid
Ethoxylated lanolin
Ethyl acetate
Ethyl p-aminobenzoate
2-(Ethylamino)-4-(isopropylamino)-6-methoxy-S-triazine
S-Ethyl cyclohexylethylthiocarbamate
S-Ethyl diisobuty.thiocarbamate
Ethyl alpha-((dimethoxyphosphinothionyl)thio) benzencacetate
Ethylenediaminetetraacetic acid, and esters and salts
Ethylene glycol
Ethylene glycol bis(trichloroacetate)
Ethylene glycol ether of pinene
Ethylene glycol monomethyl ether
1-Ethyl-2-heptadecenyl-1-(2-hydroxyethyl) imidazolinium bromide
2-Ethyl-1,3-hexanediol
2-Ethylhexoate salt of magnesium quinolinolate
Ethyl p-hydroxybenzoate
N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamide
Fenuron
Ferbam
Ferric sulfate
Ferrous ammonium sulfate
Fluoridamid, diethanolamine salt of
Fluometuron
Fospirate
Fuel oil
Fumaric acid
Furfural
Gibberellic acid
Gluconic acid
Glycerol
Glyceryl p-aminobenzoate
Glyphosate
Gum resins
Hardwood distillate
Hardwood oil
Heavy aromatic naphtha
Hexachloroacetone
3,4,5,6,7,7-Hexachloro-N-(methylmercuri)-1,2,3,6-tetrahydro-3,6-endomethano-phthalimide
Hexahydro-1,2,5-triethyl-S-triazine
Hexamethyleneetetramine
1,1'-Hexamethylene bis(5-(p-chloropheny)giguanide) diacetate
n-Hexanol
Hydrocortisone
Hydrogenated castor oil
Hydroxyethylenediaminetetraacetic acid, sodium salt of
Hydroxyethylhexylenediaminetriacetic acid, trisodium salt of
1-(2-Hydroxyethyl)-2-heptadecenylimidazoline
2-Hydroxyethyl octyl sulfide
Ichthammol
Iodine-potassium iodide complex
Isocit
Isocyclic phenoxo polyethoxy ethanol
Isophorone
Isopropalin
Isopropyl-o-cresol
Isopropyl lanolin
Isopropyl myristate
m-Isopropylphenyl methylcarbamate
Isothymoxy chloroethyl ether
Juniper tar
Kerosene or deodorized base oil
Lanolin
Larkspur alkaloid
N-Lauroyl ester of colaminiformylmethylpyridinium chloride
Lauryl alcohol
Lauryl diethanolamide
N-Lauryl diethylene triamine
Lauryl isoquinolinium bromide
Lauryl methacrylate
Limonene
Linseed oil
Linuron
Lithium stearate
Magnesium chloride
Magnesium fluosilicate
Magnesium lauryl sulfate
Magnesium silicate
Magnesium sulfate
Magnesium trichloroacetate
Malachite green
Manganous benzothiazylmercaptide
Manganous dimethyl dithiocarbamate
Methapyrilene hydrochloride
Methoprene
Methoxychlor
1-Methoxy-4-propenylbenzene
Methyl 2-chloro-9-hydroxyfluorene-9-carboxylate 65-70%, methyl 9-hydroxy-fluorene-9-carboxylate 11-13%, methyl 2,7-dichloro-9-hydroxyfluorene-9-carboxylate 12-19%
Methyl-2,2,3-dibromopropionate
Methyl 3-(dimethoxy phosphinyl)oxy crotonate, alpha isomer and related compounds
Methylene blue
Methyl p-hydroxybenzoate
2-Methyl-1-naphthaleneacetamide
2-Methyl-1-naphthaleneacetic acid
Methyl napthalene sulfonate
2-Methyl-2,4-pentanediol
3-(2-Methylpipiridino)propyl 3,4-dichlorobenzoate
6-Methyl-2,3-quinoxalinedithiol cyclic S,S-dithiocarbonate
Methylrosanilene chloride
Methyl salicylate
4-(Methylsulfonyl)-2,6-dinitro-N,N-dipropylaniline
2,2'-((1-Methyltrimethylenedioxy)bis(4-methyl-1,3,2-dioxaborinane)
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Monooctanolamides of the fatty acids of coconut oil
Monoethanolamine laurate
Monoethanolamine oleate
Monosodium acid methanearsonate
Monosodium phosphate
Morpholine
Morpholine polyethoxyethanol
1-Naphthaleneacetamide
Naphthalene
beta-Naphthol
Neburon
Neomycin
Neomycin sulfate
Nickel sulfate hexahydrate
Nitrilotriacetic acid, trisodium salt of
Nitrocellulose
N(alpha-(1-Nitroethyl)benzyl)ethylenediamine, potassium salt of
2-Nitro-2-methyl-1,3-propanediol
p-Nitrophenol
Nonylphenoxypolyethoxyethanol
Norbormide
Norea
Norflurazon
Octachlorohexahydro-4,7-methanoisobenzofuran
Octamethylpyrophosphoramide
Octanoic acid ester of 3,5-dibromo-4-hydroxybenzonitrile
Octylammonium methanearsonate
N-Octyl bicyclohepten dicarboximide
Octylphenol
Octyphenoxypolyethoxyethanol-iodine complex
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Oil of anise
Oil of eucalyptus
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Oxystilbene-tetra-ethylphenol
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Petroleum resins
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Pinene
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Polyamidozygostreptin
Polychlorobicyclopentadiene isomers (chlorine content 60-62% or 62-64%)
Polyethoxypolypropoxypolyethoxethanol-N-alkyl di(beta-hydroxyethyl) benzyl ammonium chloride-iodine complex (54% C12, 18% C14, 9% C18, 9% C16, 5% C10, 5% C8)
Polyethoxypolypropoxy(polyethoxethanol-N-alkyl dimethyl-3,4-dichlorbenzyl ammonium chloride-iodine complex (50% C12m 30% C14, 17% C16, 3% C18)
Polyethoxypolypropoxy(polyethoxethanol iodine complex
Polyethylene
Polyethylene condensate with abietylamine
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N-Polyethylene polyamine (18-mole) N-oleylamine hydrochloride
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Polymerized glyceryl oleate
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Polyoxyethylene sorbitan monooleate
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Polyoxyethylene sorbitol oleate-laurate
Polypropylene glycol
Polyvinylpyrrolidone
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Potassium bisulfate
Potassium bromide
Potassium carbonate
Potassium dodecylbenzene sulfonate
Potassium fish oil soap
Potassium hydroxide
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Potassium iodide
Potassium laurate
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Potassium myristate
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Potassium tetrathionate
Potassium thiosulfate
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Propyl 4-hydroxybenzoate, sodium salt of
Putrescent whole egg solids
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8-Quinolinol sulfate
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Rutralin
Ryania speciosa, powdered stems of
Ryanodine
Safrole
Salicylanilide
Selenium disulfide
Sesame oil
Siduron
Silica, amorphous, gel
Silver
Silver salt of partially polymerized mannuronic acid
Silver thiouromin acrylate co-polymer
Soap
Sodium alkyl benzene sulfonate (100% C9)
Sodium benzoate
Sodium bromide
Sodium carbonate
Sodium chloride
Sodium 5-chloro-2-(4-chloro-2-(3,4-dichlorophenyl)oreido)phenoxy) benzene sulfonate
Sodium n-cyclohexyl-n-palmitoyl taurate-iodine complex
Sodium decyl diphenylether disulfonate
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Sodium di(monoethanolamine)phosphate
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Sodium methyl oleyl taurate
Sodium methyldodecyl benzene sulfonate
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