

Table 3.—NIOSH recommended safety and health standards for industries, processes, and work environments

Industry, process, or work environment	NIOSH recommendation
Animal rendering	RELs for specific hazards are applicable to reduce the risk of mechanical injuries, burns, heat stress, infections from biologic agents, and chemical hazards
Chromite ore processing and chromate pigment manufacturing*	RELs for specific hazards are applicable to reduce the risk of cancer
Coal gasification	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
Coal liquefaction	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
Confined spaces, working in	Various recommendations, including a permit system to prevent worker injury and death
Electronic component manufacturing	Develop a more comprehensive data base on the chemical and physical agents and ergonomic stresses encountered in the manufacture of electronic components
Elevated workstations, emergency egress	Various recommendations concerning means and availability of egress
Excavations, from working in	Many recommendations concerning safety standards for excavations to prevent worker injury and death
Fluorocarbon polymers, decomposition products of	Various recommendations emphasizing good work practices, engineering controls, and medical management to reduce the risk of lung effects and polymer fume fever
Foundry work	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

(Continued)

*REL adopted during OSHA hearings (Appendix II).

Table 3 (Continued).—NIOSH recommended safety and health standards for industries, processes, and work environments

Industry, process, or work environment	NIOSH recommendation
Hazardous materials, working with	Complete system for identifying occupationally hazardous materials
Hazardous energy control during maintenance and servicing (Lockout/Tagout)	Lockout/Tagout guidelines for work practices, and recommendations for controlling hazardous energy during maintenance and servicing activities
Logging from felling to first haul	Extensive work practice and personal protection recommendations
Mechanical power presses, working with	Various recommendations for preventing injuries and amputations resulting from mechanical power presses, specifically those operated by foot or dual palm-button controls
Oil and gas well drilling (land-based)	Comprehensive recommendations for safe work practices and technological improvements
Paint and allied coatings manufacture	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
Precast concrete, production of	Various recommendations for safe work practices and worker safety
Tobacco smoke	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.
Welding, brazing, and thermal cutting	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

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, SbH^3) include but are not limited to the following compounds:

Acetic acid, antimony salt
Acetic acid, bis(nitrilotri-, antimony complex
Acetic acid, (isopropylenedinitrilo)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-dihydroxybutane-dioato(4)-O(sup 1), O(sup 2), O(sup 3), O(sup 4))di-, stereoisomer, dihydrogen, compound with piperazine (1:1)
Antimonic acid, sodium salt
Antimonic acid, tungsten salt
Antimony, bis(trichloro-, compound with 1 mol of octamethyl pyrophosphoramidate
Antimony (III) chloride
Antimony (V) chloride
Antimony, dichlorotriphenyl-
Antimony (III) fluoride (1:3)
Antimony lactate
Antimony oxide
Antimony (V) pentafluoride
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 tartate
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-Dithiastibolane-4,5-dicarboxylic acid, 2,2'-((1,2-dicarboxy-1,2-ethanediyl)bis(thio)), hexasodium salt
 Emetine antimony iodide
 D-Gluconic acid, 2,4:2',4'-O-(oxydistibylidene)bis-, Sb,Sb'-dioxide, trisodium salt, nonahydrate
 Neostam
 m-Phenetidine antimonyl tartrate
 o-Phenetidine antimonyl tartrate
 p-Phenetidine antimonyl 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 antimonite acid
 5-Quinolinesulfonic acid, 8,8'-((hydroxystibylene) 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 thiosalicylate
 Sodium antimonyl citrate
 Sodium antimonyl erythritol
 Sodium antimonyl D-funcitol
 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-dihydroxy
 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-dihydroxy
 m-Toluidine antimonyl tartrate
 o-Toluidine antimonyl tartrate
 p-Toluidine antimonyl 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(1:1)
 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
Arsonic acid, disodium salt, heptahydrate
Bordeauxarsenite
Caesium arsenate
Iron (II) arsenate (3:2)
Iron (III) arsenate (1:1)
Iron (III) o-arsenite, pentahydrate
Lead (II) arsenite
Mercury (II) o-arsenate
Potassium hexafluoroarsenate
Sodium hexafluoroarsenate
Strontium arsenite
Zinc arsenate

ASBESTOS

Asbestos is defined as chrysotile, crocidolite, amosite (cummingtonite-grunerite), anthophyllite, tremolite, and actinolite. The nonasbestiform habits of the serpentine minerals antigorite and lizardite, and the amphibole minerals contained in the series cummingtonite-grunerite, 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-grunerite)
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 zinc salt
Sodium beryllium malate
Sodium beryllium tartrate

CADMIUM

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

Acetic acid, (ethylenedinitrilo)tetra-, cadmium (II) complex
Aerosol of thermovacuum cadmium
Cadmium (II) acetate
Cadmium, bis(diethylthiio-carbamato)-
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 thionein
 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
 1,1,1,2-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 monoethyl ether
 Ethylene glycol monoethyl 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 isoamyl 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, (ethylenedinitrilo)tetra-, 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-hydroxymercur)propyl-5-phenyl
2H-1-benzopyran-3-carboxylic acid, 8-(3-(hydroxymercuri)-2-methoxypropyl)-2-oxo-, sodium salt, compound with theophylline (1:1)
3H-2,1-benzoxamercuriole, 7-nitro-3-oxo
Boric acid, phenylmercury deriv.
Boric acid, phenylmercury silver deriv.
Caffeine, 8-(3-(hydroxymercuri)-2-methoxypropoxy)-
Calo-clor
Chromium, hexacarbonyldi- π -cyclopentadienyl- μ -mercuriodi-
Cobalt(2+), bis(1,2-ethanediamine-N,N')-(T-4)-tetrakis(thiocyanato-s)mercurate(2-) (1:1), homopolymer
Copper(2+), bis(ethylenediamine)-, tetrakis(thiocyanato)mercurate(2-), polymers
Fluorescein, 2',7'-dibromo-4'-(hydroxymercurio)-, disodium salt
Iron(2+), bis(1,2-ethanediamine-N,N')-, (T-4)-tetrakis(thiocyanato-N)mercurate (2-) (1:1), homopolymer
Malonic acid, (2-hydroxy-3-hydroxymercuri)propyl(phenyl)-, sodium salt
Mercurate(1-), acetatophenyl-, ammonium salt
Mercurate(4-), bis(N,N-bis(carboxymethyl)glycinato(3-)-N,O,O',O'-), tetrahydrogen
Mercurate(1-), butyl(mercaptoacetato(2-)-O,S-), sodium
Mercurate(1-), (3-(4-(carboxylatomethoxy)phenyl)-2-hydroxypropyl)hydroxy-, sodium
Mercurate(2-), ((cyclohexylenedinitrilo)tetracetato)-
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-amino-5-sulfophenyl)-
 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-sulfophenyl)-
 Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-1,2,3,6-tetrahydro-7H-purin-7-yl)acetamido)-2-ethoxypropyl)-
 Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-1,2,3,6-tetrahydro-7H-purin-7-yl)acetamido)-2-methoxypropyl)-
 Mercury, acetato(3-(2-(1,3-dimethyl-2,6-dioxo-1,2,3,6-tetrahydro-7H-purin-7-yl)acetamido)-2-propoxypropyl)-
 Mercury, (acetato)ethyl-
 Mercury, acetato(3-formyl-4-hydroxyphenyl)-
 Mercury, acetato(2-hydroxy-5-iodophenyl)-
 Mercury, acetato(4-hydroxy-3-methoxyphenyl)-
 Mercury, acetato(2-hydroxy-5-methylphenyl)-
 Mercury, acetato(4-hydroxy-3-methylphenyl)-
 Mercury, acetato(2-hydroxy-5-nitrophenyl)-
 Mercury, acetato(2-hydroxy-5-nitrosophenyl)-
 Mercury, acetato(2-hydroxy-5-sulfophenyl)-
 Mercury, (acetato)(2-methoxyethyl)-
 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-sulfophenyl)-
 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 acetylde
 Mercury amide chloride
 Mercury, (3-amino-4-hydroxyphenyl)chloro-
 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-2-hydroxyphenyl)-
 Mercury(II), bis(L-cysteinato)-
 Mercury, bis(O,O-dibutylphosphorodithioato-s)-
 Mercury, bis(diethyldithiocarbamato)-
 Mercury(2-), bis(4-(dithiocarboxy)-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-dl-valinato)-
 Mercury(2-), bis(dl-3-mercaptovalinato)dichloro-
 Mercury(II), bis(dl-methionato)-
 Mercury, bis(4-morpholinecarbodithioato)-
 Mercury, bis(trifluoromethylthio)-
 Mercury, bis(1,3,7-trimethyl-8-xanthinyl)-
 Mercury(I) bromide (1:1)
 Mercury(II) bromide (1:2)
 Mercury, bromo(3',6'-dihydroxy-3-oxospiro (isobenzofuran-1(3H),9'-xanthen-4'yl))-, sodium salt
 Mercury, bromohexyl
 Mercury, bromo(2-hydroxyethyl)-
 Mercury, bromo(methoxycarbonyl)-
 Mercury, bromophenyl-
 Mercury, butylchloro-
 Mercury, (3-butylamido-2-methoxypropyl)chloro-

- Mercury, (butyrato)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-(carboxymethoxy)-3-chlorophenyl)(5,5-diethyl-2,4,6-(1H,3H,5H)-pyrimidinetriato-O(sup 2))-, monosodium salt
 Mercury, (carboxymethylthio)(3-(1,2,3,6-tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)-2-methoxypropyl)-
 Mercury, (p-carboxyphenyl)chloro-
 Mercury, (o-carboxyphenyl)hydroxy-
 Mercury, (p-carboxyphenyl)hydroxy-
 Mercury, (o-carboxyphenyl)hydroxy-, sodium salt
 Mercury, (p-carboxyphenyl)hydroxy-, sodium salt
 Mercury, ((o-carboxyphenyl)thio)ethyl-, sodium salt
 Mercury, ((o-carboxyphenyl)thiolato)phenyl-
 Mercury, (3-(3-(3-carboxypropionyl)ureido)-2-methoxypropyl)hydroxy-
 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-trimethylcyclopentyl)carbonyl)amino)-2-methoxypropyl)(mercaptoacetato-s)-, 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(dibutxoyphosphinyl)-
 Mercury, chloro(diisopropoxyphosphinyl)-
 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-methoxy)propyl)-
 Mercury, chloro((3-(2,4-dioxo-5-imidazolidinyl)-2-methoxy)propyl)-
 Mercury, chloro((3-(2,4-dioxo-1-methyl-3-imidazolidinyl)-2-methoxy)propyl)-
 Mercury, chloro((3-(2,4-dioxo-3-methyl-1-imidazolidinyl)-2-methoxy)propyl)-
 Mercury, chloro((3-(2,4-dioxo-3-methyl-5-imidazolidinyl)-2-methoxy)propyl)-
 Mercury, chloroethyl-
 Mercury, chloro(2-furyl)-
 Mercury, chloro(2-hexanamidocyclohexyl)-, (E)-
 Mercury, chloro(2-hydroxy-3,5-dinitrophenyl)-
 Mercury, chloro(4-((2-hydroxy-1-naphthalenyl)azo)phenyl)-
 Mercury, chloro(o-hydroxyphenyl)-
 Mercury, (3-chloro-4-hydroxyphenyl)hydroxy-
 Mercury, (3-chloro-6-hydroxyphenyl)hydroxy-
 Mercury, chloro(1-hydroxy-4-sulfo-2-naphthyl)-
 Mercury, chloro(3-methoxybicyclo(2.2.1)hept-2-yl)-
 Mercury, chloro(trans-2-methoxycyclooctyl)-
 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, chloropropyl-
 Mercury, chloro-3-pyridyl-
 Mercury (II) cyanide
 Mercury, (3-cyanoguanidino)methyl-
 Mercury, cyanohydroxy-
 Mercury, cyanomethyl-
 Mercury, dianilino-

- Mercury, dibenzyl-
 Mercury, (2,4-dibromo-6-((p-bromophenyl) carbamoyl)phenoxy)phenyl-
 Mercury, dibutyl-
 Mercury, di-sec-butyl-
 Mercury, ((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-benzoquinolato)-
 Mercury, diheptyl
 Mercury, (dihydrogen 7,12-bis(1-hydroxyethyl)-3,8,13,17-tetramethyl-2,18-porphinedipropionate (2))-, disodium 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((p-sulfophenyl)thio)-, sodium salt
 Mercury, ethylp-toluenesulfonanilidato)-
 Mercury, ethyl(toluenesulfonato)-
 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-diethyl-2,4,6-trioxo-(1H,3H,5H)-pyrimidino)-2-isopropoxypropyl)-
 Mercury, hydroxy(3-(5,5-diethyl-2,4,6-trioxo-(1H,3H,5H)-pyrimidino)-2-methoxypropyl)-
 Mercury, hydroxy(6-hydroxy-2,7-diiodo-3-oxo-9-(o-sulfophenyl)-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)-pyrimidin-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(I) iodide
 Mercury(II) iodide
 Mercury, iodo-p-tolyl-
 Mercury, (methanethiolato)methyl-
 Mercury, (2-methoxyethyl)(trihydrogen orthosilicato)-
 Mercury, methyl-, n-bis(p-tolylsulfonyl)amido-
 Mercury, methyl-, dimercaptopropanol
 Mercury(1+), methyl-, ion
 Mercury, methyl(pentachlorophenoxy)-
 Mercury, methyl(8-quinolinolato)-
 Mercury, methyl(thioacetamido)-
 Mercury, nitratophenyl-
 Mercury, nitratophenyl-, compd. with hydroxyphenylmercury (1:1)
 Mercury, (oleato)phenyl-
 Mercury(II) oxide
 Mercury, (pentachlorophenoxy)phenyl-
 Mercury, (2,4-pentanedionato-o-o,o')phenyl-
 Mercury, phenyl(propionyloxy)-
 Mercury(II), phenyl(8-quinolinolato)-
 Mercury, phenyl(thioacetamidato)-
 Mercury, phenyl(p-toluenesulfonato)-
 Mercury, phenylureido-
 Mercury, (salicylato(2-))-
 Mercury(I) sulfate
 Methanearsonic acid, dimercury salt
 2-Naphthalenesulfonic acid, 3,3'-methylene-, mercury salt
 Nickel(2+), bis(1,2-ethanediamine-n,n')-, (T-4)-tetrakis(thiocyanato-s)mercurate(2-) (1:1), homopolymer
 7-Oxa-8-mercurabicyclo(4.2.0)octa-1,3,5-triene,5-methyl-2-nitro
 1,4-Oxamercurane
 1,4-Oxathiane compd. with mercuric chloride
 Pentanoic acid, 4-hydroxy-5-(hydroxymercuri)-2-phenyl-, sodium salt
 Phosphine, 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
 Sinmel
 Succinamic acid, *n*-((2-methoxy-3-((1,2,3,6-tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)mercuri)propyl)carbamoyl)-
 Succinamic acid, *n*-((2-methoxy-3-((1,2,3,6-tetrahydro-1,3-dimethyl-2,6-dioxopurin-7-yl)mercuri)propyl)carbamoyl)-, sodium salt
 2-Thiophenecarboxylic acid, 5-((3(acetoxymmercuri)-2-methoxypropyl)sulfamoyl)-, ethyl ester
 2-Thiophenecarboxylic acid, 5-((3(acetoxymmercuri)-2-methoxypropyl)carbamoyl)-
 2-Thiophenesulfonamide, *n*-(3-(acetoxymmercuri)-2-methoxypropyl)
 Uric acid, 9-(3-(hydroxymmercuri)-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 Ni₃Be
 Nickel, bis(2-benzoylbenzoato)bis(3-(1-methyl-2-pyrrolidinyl)pyridine)-trihydrate
 Nickel, bis(dibutylidithiocarbamato)-
 Nickel, bis(3,4-dichlorobenzoato)-
 Nickel, bis(dimethyldithiocarbamato)-
 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) fluosilicate (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)-,
 diperchlorate
 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
 Propanenitrile, 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
Tungsten
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
Acrolein	Butane
Acrylic acid	n-Butyl acetate
Allyl alcohol	sec-Butyl acetate
Allyl propyl disulfide	tert-Butyl acetate
Aluminum	Butyl acrylate
2-Aminopyridine	n-Butyl alcohol
Amitrole	sec-Butyl alcohol
Ammonium chloride fume	tert-Butyl alcohol
Ammonium sulfamate	Butylamine
n-Amyl acetate	n-Butyl lactate
sec-Amyl acetate	o-sec-Butylphenol
o-Anisidine	p-tert-Butyltoluene
p-Anisidine	Calcium carbonate
α -Naphthylthiourea	Calcium cyanamide
Atrazine	Calcium hydroxide
Azinphos-methyl	Calcium oxide
Barium, soluble	Calcium silicate
Barium sulfate	Calcium sulfate
Bismuth telluride, undoped	Camphor, synthetic
Bismuth telluride, Se-doped	Caprolactam
Borates, tetra sodium salts	Captafol
Boron oxide	Captan
Boron tribromide	Carbofuran
Boron trifluoride*	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
Chlorine trifluoride
Chloroacetaldehyde
 α -Chloroacetophenone
Chloroacetyl chloride
o-Chlorobenzylidene malononitrile
Chlorobromomethane
Chlorodifluoromethane
1-Chloro-1-nitropropane
Chloropentafluoroethane
Chloropicrin
o-Chlorostyrene
o-Chlorotoluene
2-Chloro-6-trichloromethyl pyridine
Chlorpyrifos
Chromite ore processing
Chromium(II) compounds
Chromium(III) compounds
Chromium metal
Clopidol
Cobalt metal
Cobalt carbonyl
Cobalt hydrocarbonyl
Copper
Crag herbicide
Crotonaldehyde
Cruformate
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
Diethylene triamine
Difluorodibromomethane
Diisopropylamine
Dimethyl acetamide
Dimethylamine
Dimethyl-1,2-dibromo-2,2-dichloroethyl phosphate
Dimethylformamide
Dimethyl sulfate
Dimethylphthalate
Dimethylaniline
Dinitrolmide
Dinitrobenzene
Dioxathion
Diphenyl
Diphenylamine
Dipropyl ketone
Dipropylene glycol methyl ether
Diquat
Disulfiram
Disulfoton
Diuron
Divinyl benzene
Endosulfan
Endrin
EPN
Ethanolamine
Ethion

Ethyl acetate	Isobutyl alcohol
Ethyl acrylate	Isooctyl alcohol
Ethyl alcohol	Isopropyl ether
Ethylamine	N-Isopropylaniline
Ethyl amyl ketone	Kaolin
Ethyl benzene	Ketene
Ethyl butyl ketone	Limestone
Ethyl formate	Lindane
Ethyl silicate	Liquified petroleum gas
Ethylene chlorohydrin	Lithium hydride
Ethylenediamine	Magnesite
Ethylidene norbornene	Maleic anhydride
N-Ethylmorpholine	Manganese compounds and fumes
Fenamiphos	Manganese cyclopentadienyl tricarbonyl
Fensulfothion	Marble
Ferbam	Mercury (organo) alkyl compounds
Fluorine	Methacrylic acid
Fluorotrichloromethane	Methomyl
Fonofos	Methoxychlor
Formamide	4-Methoxyphenol
Formic acid	Methyl acetate
Gasoline	Methyl acetylene
Germanium tetrahydride	Methyl acetylene-propadiene mixture
Glutaraldehyde*	Methyl acrylate
Glycidol	Methylamine
Grain dust*	Methyl 2-cyanoacrylate
Graphite, natural	Methyl demeton
Gypsum	Methyl ethyl ketone peroxide
Hafnium	Methyl formate
Heptachlor	Methyl isobutyl carbinol
Hexachlorobutadiene	Methyl isocyanate
Hexachlorocyclopentadiene	Methyl isopropyl ketone
Hexachloronaphthalene	Methyl methacrylate
Hexafluoroacetone	Methyl silicate
sec-Hexyl acetate	α -Methyl styrene
Hexylene glycol	Methylacrylonitrile
Hydrogen bromide	Methylal
Hydrogen chloride	Methylcyclohexane
Hydrogen peroxide	Methylcyclohexanol
Hydrogen selenide	o-Methylcyclohexanone
Hydrogenated terphenyls	Methylcyclopentadienyl manganese tricarbonyl
2-Hydroxypropyl acrylate	Metribuzin
Indene	Monocrotophos
Indium and compounds	Monomethyl aniline
Iodine	Morpholine
Iodoform	Naphtha
Iron oxide, dust and fume	Naphthalene
Iron pentacarbonyl	Nicotine
Iron salts, soluble	p-Nitroaniline
Isoamyl acetate	Nitrobenzene
Isoamyl alcohol	p-Nitrochlorobenzene
Isobutyl acetate	Nitroethane

Nitrogen trifluoride
1-Nitropropane
m-Nitrotoluene
o-Nitrotoluene
p-Nitrotoluene
Nonane
Octachloronaphthalene
Oil mist, mineral
Osmium tetroxide
Oxalic acid
Oxygen difluoride
Ozone
Paraffin wax fume
Paraquat
Pentaborane
Pentachloronaphthalene
Pentachlorophenol
Pentaerythritol
Perchloromethyl mercaptan
Perchloryl fluoride
Perlite
Phenothiazine
Phenyl ether, vapor
Phenyl ether-biphenyl mixture, vapor
p-Phenylene diamine
Phenylphosphine
Phorate
Phosdrin
Phosphine
Phosphoric acid
Phosphorus (yellow)
Phosphorus oxychloride
Phosphorus pentachloride
Phosphorus pentasulfide
Phosphorus trichloride
Phthalic anhydride
m-Phthalodinitrile
Picric acid
Pindone
Piperazine dihydrochloride
Plaster of Paris
Platinum
Portland cement
Potassium hydroxide
Propane
Propane sultone
Propargyl alcohol
Propionic acid
Propoxur
n-Propyl acetate
n-Propyl alcohol
n-Propyl nitrate
Propylene dichloride
Propylene glycol dinitrate
Propylene glycol monomethyl ether
Propylene imine
Pyrethrum
Pyridine
Quinone
Resorcinal
Rhodium, soluble and insoluble
Ronnel
Rosin core solder, pyrolysis products
Rotenone
Selenium compounds
Selenium hexafluoride
Silica, amorphous, diatomaceous earth
Silica, amorphous, precipitated and gel
Silicates (<1% crystalline silica)
Silicon
Silicon carbide
Silicon tetrahydride
Silver
Sodium azide
Sodium bisulfite
Sodium fluoroacetate
Sodium metabisulfite
Starch
Stibine
Strychnine
Subtilisins
Sucrose
Sulfur hexafluoride
Sulfur monochloride
Sulfur pentafluoride
Sulfur tetrafluoride
Sulfuryl fluoride
Sulprofos
2,4,5-T
Talc (containing no asbestos)
Tantalum
TEDP
Tellurium
Tellurium hexafluoride
Temephos
TEPP
Terphenyls
1,1,1,2-Tetrachloro-2,2-difluoroethane
1,1,1,2-Tetrachloro-1,2-difluoroethane
Tetrachloronaphthalene
Tetraethyl lead
Tetrahydrofuran
Tetramethyl lead
Tetranitromethane

Tetrasodium pyrophosphate	Trimethyl phosphite
Tetryl	Trimethylamine
Thallium	2,4,6-Trinitrotoluene
4,4-Thiobis(6-tert-butyl-m-cresol)	Triorthocresyl phosphate
Thioglycolic acid	Triphenyl amine
Thionyl chloride	Triphenyl phosphate
Thiram	Turpentine
Tin, inorganic compounds	Uranium
Tin oxide	n-Valeraldehyde
Titanium dioxide	Vegetable oil mist
p-Toluidine	Vinyl cyclohexene dioxide
Tributyl phosphate	Vinyl toluene
Trichloroacetic acid	Warfarin
1,2,4-Trichlorobenzene	Wood dust
Trichloronaphthalene	m-Xylene α,α' -diamine
1,1,2-Trichloro-1,2,2-trifluoroethane	Xylidine
1,2,3-Trichloropropane	Yttrium
Trifluorobromomethane	Zinc chloride fume
Trimethyl benzene	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

Chemical	Proposed OSHA PEL
Acetylene tetrabromide	1 ppm (15 mg/m ³) TWA
α -Alumina	10 mg/m ³
Benomyl	10 mg/m ³
Chlorobenzene	75 ppm (350 mg/m ³) TWA
Coal dust (<5% SiO ₂)	2 mg/m ³ TWA
Coal dust (>5% SiO ₂)	0.1 mg/m ³ TWA
Emery	10 mg/m ³
Ethyl bromide	200 ppm (890 mg/m ³) TWA, 250 ppm (1,110 mg/m ³) STEL
Ethyl ether	400 ppm (1,200 mg/m ³) TWA, 500 ppm (1,500 mg/m ³) STEL
Ethylene glycol	50 ppm (125 mg/m ³) ceiling
Fenthion	0.2 mg/m ³ TWA (skin)
Furfural	2.0 (8 mg/m ³) TWA (skin)
Glycerin (mist)	10 mg/m ³
Graphite (synthetic)	10 mg/m ³
2-Isopropoxyethanol	25 ppm (105 mg/m ³) TWA
Isopropyl acetate	250 ppm (950 mg/m ³) TWA, 310 ppm (1,185 mg/m ³) STEL
Isopropylamine	5 ppm (12 mg/m ³) TWA, 10 ppm (24 mg/m ³) STEL
Magnesium oxide fume	10 mg/m ³
Manganese tetroxide (as Mn)	1 mg/m ³ TWA

(Continued)

Chemicals reviewed by NIOSH (Continued)

Chemical	Proposed OSHA PEL
Molybdenum, soluble	5 mg/m ³ TWA
Molybdenum, insoluble	10 mg/m ³
Nitromethane	100 ppm (250 mg/m ³) TWA
Particulates not otherwise regulated	10 mg/m ³
Picloram	10 mg/m ³
Rouge	10 mg/m ³
m-Toluidine	2 ppm (9 mg/m ³) TWA (skin)
Triethylamine	10 ppm (40 mg/m ³) TWA, 15 ppm (60 mg/m ³) STEL
Zirconium tetrachloride	5 mg/m ³ TWA

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

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

(Continued)

Chemicals with revised RELs (Continued)

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

(Continued)

Chemicals with revised RELs (Continued)

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

(Continued)

Chemicals with revised RELs (Continued)

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

(Continued)

Chemicals with revised RELs (Continued)

Chemical	Previous REL	Current REL
Xylene	100 ppm (434 mg/m ³) TWA, 200 ppm (868 mg/m ³) ceiling (10-min)	100 ppm (435 mg/m ³) TWA, 150 ppm (655 mg/m ³) STEL
Zinc oxide, fume	5 mg/m ³ TWA, 15 mg/m ³ ceiling (15-min)	5 mg/m ³ TWA, 10 mg/m ³ STEL