

PLAINTIFF'S EXHIBIT

BIR-691

MISC. CHEMICAL
STANDARD

BIRD 012666

PART 1910

OCCUPATIONAL SAFETY AND HEALTH
STANDARDS

SUBPART Z—TOXIC AND HAZARDOUS SUBSTANCES

- 1910.1000 Air Contaminants.
- 1910.1001 Asbestos.
- 1910.1002 Coal tar pitch volatiles; interpretation of term.
- 1910.1003 4-Nitrobiphenyl.
- 1910.1004 alpha-Naphthylamine.
- 1910.1005 4,4'-Methylene bis (2-chloroaniline).
- 1910.1006 Methyl chloromethyl ether.
- 1910.1007 3,3'-Dichlorobenzidine (and its salts).
- 1910.1008 bis-Chloromethyl ether.
- 1910.1009 beta-Naphthylamine.
- 1910.1010 Benzidine.
- 1910.1011 4-Aminodiphenyl.
- 1910.1012 Ethyleneimine.
- 1910.1013 beta-Propiolactone.
- 1910.1014 2-Acetylaminofluorene.
- 1910.1015 4-Dimethylaminoazobenzene.
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- 1910.1017 Vinyl Chloride.
- 1910.1018 Inorganic arsenic
- 1910.1028 Benzene.
- 1910.1029 Coke Oven Emissions
- 1910.1043 Cotton dust.
- 1910.1044 1,2 - dibromo - 3 - chloropropane.
- 1910.1046 Exposure to cotton dust in cotton gins.

STANDARDS AND INTERPRETATIONS

SUBPART Z—TOXIC AND HAZARDOUS SUBSTANCES

1910.1000—AIR CONTAMINANTS

An employee's exposure to any material listed in table Z-1, Z-2, or Z-3 of this section shall be limited in accordance with the requirements of the following paragraphs of this section.

(a) Table Z-1:

(1) **Materials with names preceded by "C"—ceiling values.** An employee's exposure to any material in table Z-1, the name of which is preceded by a "C" (e.g., C Boron trifluoride), shall at no time exceed the ceiling value given for that material in the table.

(2) **Other materials—8-hour time weighted averages.** An employee's exposure to any material in table Z-1, the name of which is not preceded by "C", in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average given for that material in the table.

TABLE Z-1

Substance	p.p.m.*	mg./M ³ *
Acetaldehyde.....	200	360
Acetic acid.....	10	25
Acetic anhydride.....	5	20
Acetone.....	1,000	2,400
Acetonitrile.....	40	70
Acetylene dichloride, see 1, 2-Dichloroethylene.....		
Acetylene tetrabromide.....	1	14
Acrolein.....	0.1	0.25
Acrylamide—Skin.....		0.3
Acrylonitrile—Skin.....	20	45
Aldrin—Skin.....		0.25
Allyl alcohol—Skin.....	2	5
Allyl chloride.....	1	3
**C Allylglycidyl ether (AGE).....	10	45
Allyl propyl disulfide.....	2	12
2-Aminoethanol, see Ethanolamine.....		
2-Aminopyridine.....	0.5	2
**Ammonia.....	50	35
Ammonium sulfamate (Am-nate).....		15
n-Amyl acetate.....	100	525
sec-Amyl acetate.....	125	650
Aniline—Skin.....	5	19
Anisidine (o, p-isomers)—Skin.....		0.5
Antimony and compounds (as Sb).....		0.5
ANTC (alpha naphthyl thiourea).....		0.3

See footnotes at end of table.

TABLE Z-1—Continued

Substance	p.p.m.*	mg./M ³ *
Arsine.....	0.05	0.2
Azinphos-methyl—Skin.....		0.2
Barium (soluble compounds).....		0.5
p-Benzoquinone, see Quinone.....		
Benzoyl peroxide.....		5
Benzyl chloride.....	1	5
Biphenyl, see Diphenyl.....		
Bisphenol A, see Diglycidyl ether.....		
Boron oxide.....		15
C Boron trifluoride.....	1	3
Bromine.....	0.1	0.7
Bromoform—Skin.....	0.5	5
Butadiene (1, 3-butadiene).....	1,000	2,200
Butanethiol, see Butyl mercaptan.....		
2-Butanone.....	200	590
2-Butoxy ethanol (Butyl Cellosolve)—Skin.....	50	240
Butyl acetate (n-butyl acetate).....	150	710
sec-Butyl acetate.....	200	950
tert-Butyl acetate.....	200	950
Butyl alcohol.....	100	300
sec-Butyl alcohol.....	150	450
tert-Butyl alcohol.....	100	300
C Butylamine—Skin.....	5	15
C tert-Butyl chromate (as CrO ₃)—Skin.....		0.1
n-Butyl glycidyl ether (BGE).....	50	270
*Butyl mercaptan.....	10	35
p-tert-Butyltoluene.....	10	60
Calcium oxide.....		5
**Camphor.....	2	
Carbaryl (Sevin®).....		5
Carbon black.....		3.5
Carbon dioxide.....	5,000	9,000
Carbon monoxide.....	50	55
Chlordane—Skin.....		0.5
Chlorinated camphene—Skin.....		0.5
Chlorinated diphenyl oxide.....		0.5
*Chlorine.....	1	3
Chlorine dioxide.....	0.1	0.3
C Chlorine trifluoride.....	0.1	0.4
C Chloroacetaldehyde.....	1	3
α-Chloroacetophenone (phenacylchloride).....	0.05	0.3
Chlorobenzene (monochlorobenzene).....	75	350
o-Chlorobenzylidene malononitrile (OCBM).....	0.05	0.4
Chlorobromomethane.....	200	1,050
2-Chloro-1,3-butadiene, see Chloroprene.....		
Chlorodiphenyl (42 percent Chlorine)—Skin.....		1
Chlorodiphenyl (54 percent Chlorine)—Skin.....		0.5
1-Chloro-2,3-epoxypropane, see Epichlorohydrin.....		

STANDARDS AND INTERPRETATIONS

TABLE Z-1—Continued

Substance	p.p.m. ^a	mg./M ³ ^b
2-Chloroethanol, see Ethylene chlorohydrin		
Chloroethylene, see Vinyl chloride		
✓ C Chloroform (trichloromethane)	50	240 ✓
1-Chloro-1-nitropropane	20	100
Chloropicrin	0.1	0.7
Chloroprene (2-chloro-1,3-butadiene)—Skin	25	90
Chromium, sol. chromic, chromous salts as Cr		0.5
Metal and insol. salts		1
Coal tar pitch volatiles (benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene		0.2
Cobalt, metal fume and dust		0.1
Copper fume		0.1
Dusts and Mists		1
Cotton dust (raw)		1
Crag® herbicide		15
Cresol (all isomers)—Skin	5	22
Crotonaldehyde	2	6
Cumene—Skin	50	245
Cyanide (as CN)—Skin		5
Cyclohexane	300	1,050
Cyclohexanol	50	200
Cyclohexanone	50	200
Cyclohexene	300	1,015
Cyclopentadiene	75	200
2,4-D		10
DDT—Skin		1
DDVP, see Dichlorvos		
Decaborane—Skin	0.05	0.3
Demeton®—Skin		0.1
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240
1,2-diaminoethane, see Ethylenediamine		
Diazomethane	0.2	0.4
Diborane	0.1	0.1
Dibutylphthalate		5
C o-Dichlorobenzene	50	300
p-Dichlorobenzene	75	450
Dichlorodifluoromethane	1,000	4,950
1,3-Dichloro-5,5-dimethyl hydantoin		0.2
1,1-Dichloroethane	100	400
1,2-Dichloroethylene	200	790
C Dichloroethyl ether—Skin	15	90
Dichloromethane, see Methylenechloride		
Dichloromonofluoromethane	1,000	4,200
C 1,1-Dichloro-1-nitroethane	10	60
1,2-Dichloropropane, see Propylenedichloride		
Dichlorotetrafluoroethane	1,000	7,000
Dichlorvos (DDVP)—Skin		1
Dieldrin—Skin		0.25
Diethylamine	25	75
Diethylamino ethanol—Skin	10	50
Diethylether, see Ethyl ether		
Difluorodibromomethane	100	860
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Diisobutyl ketone	50	290

See footnotes at end of table.

TABLE Z-1—Continued

Substance	p.p.m. ^a	mg./M ³ ^b
Diisopropylamine—Skin	5	20
Dimethoxymethane, see Methylal		
Dimethyl acetamide—Skin	10	35
Dimethylamine	10	18
Dimethylaminobenzene, see Xylidene		
Dimethylaniline (N-dimethylaniline)—Skin	5	25
Dimethylbenzene, see Xylene		
Dimethyl 1,2-dibromo-2,2-dichloroethyl phosphate, (Dibrom)		3
Dimethylformamide—Skin	10	30
2,6-Dimethylheptanone, see Diisobutyl ketone		
1,1-Dimethylhydrazine—Skin	0.5	1
Dimethylphthalate		5
Dimethylsulfate—Skin	1	5
Dinitrobenzene (all isomers)—Skin		1
Dinitro-o-cresol—Skin		0.2
Dinitrotoluene—Skin		1.5
Dioxane (Diethylene dioxide)—Skin	100	360
Diphenyl	0.2	1
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI))		
Dipropylene glycol methyl ether—Skin	100	600
Di-sec. octyl phthalate (Di-2-ethylhexylphthalate)		5
Endrin—Skin		0.1
Epichlorohydrin—Skin	5	19
EPN—Skin		0.5
1,2-Epoxypropane, see Propyleneoxide		
2,3-Epoxy-1-propanol, see Glycidol		
Ethanethiol, see Ethylmercaptan		
Ethanolamine	3	6
2-Ethoxyethanol—Skin	200	740
2-Ethoxyethylacetate (Cello-solve acetate)—Skin	100	540
Ethyl acetate	400	1,400
Ethyl acrylate—Skin	25	100
Ethyl alcohol (ethanol)	1,000	1,900
Ethylamine	10	18
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	25	130
Ethyl benzene	100	435
Ethyl bromide	200	890
Ethyl butyl ketone (3-Heptanone)	50	230
Ethyl chloride	1,000	2,600
Ethyl ether	400	1,200
Ethyl formate	100	300
C Ethyl mercaptan	10	25
Ethyl silicate	100	850
Ethylene chlorohydrin—Skin	5	16
Ethylenediamine	10	25
Ethylene dibromide, see 1,2-Dibromoethane		
Ethylene dichloride, see 1,2-Dichloroethane		
C Ethylene glycol dinitrate and/or Nitroglycerin—Skin	0.2	1

See footnotes at end of table.

STANDARDS AND INTERPRETATIONS

TABLE Z-1—Continued

Substance	p.p.m.*	mg./M ³ b
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethyleneimine—Skin	0.5	1
Ethylene oxide	50	90
Ethylidene chloride, see 1,1-Dichloroethane		
N-Ethylmorpholine—Skin	20	94
Ferbam		15
Ferrovandium dust		1
Fluoride (as F)		2.5
Fluorine	0.1	0.2
Fluorotrichloromethane	1,000	5,600
Formic acid	5	9
Furfural—Skin	5	20
Furfuryl alcohol	50	200
Glycidol (2,3-Epoxy-1-propanol)	50	150
Glycol monoethyl ether, see 2-Ethoxyethanol		
Guthion ®, see Azinphos-methyl		
Hafnium		0.5
Heptachlor—Skin		0.5
Heptane (n-heptane)	500	2,000
Hexachloroethane—Skin	1	10
Hexachloronaphthalene—Skin		0.2
Hexane (n-hexane)	500	1,800
2-Hexanone	100	410
Hexone (Methyl isobutyl ketone)	100	410
sec-Hexyl acetate	50	300
Hydrazine—Skin	1	1.3
Hydrogen bromide	3	10
C Hydrogen chloride	5	7
Hydrogen cyanide—Skin	10	11
Hydrogen peroxide (90%)	1	1.4
Hydrogen selenide	0.05	0.2
Hydroquinone		2
C Iodine	0.1	1
Iron oxide fume		10
Isoamyl acetate	100	525
Isoamyl alcohol	100	360
Isobutyl acetate	150	700
Isobutyl alcohol	100	300
Isophorone	25	140
Isopropyl acetate	250	950
Isopropyl alcohol	400	980
Isopropylamine	5	12
Isopropylether	500	2,100
Isopropyl glycidyl ether (IGE)	50	240
Ketene	0.5	0.9
Lindane—Skin		0.5
Lithium hydride		0.025
L.P.G. (liquefied petroleum gas)	1,000	1,800
Magnesium oxide fume		15
Malathion—Skin		15
Maleic anhydride	0.25	1
C Manganese		5
Mesityl oxide	25	100
Methanethiol, see Methyl mercaptan		
Methoxychlor		15
2-Methoxyethanol, see Methyl cellosolve		
Methyl acetate	200	610
Methyl acetylene (propyne)	1,000	1,650
Methyl acetylene-propadiene mixture (MAPP)	1,000	1,800
See footnotes at end of table.		

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TABLE Z-1—Continued

Substance	p.p.m.*	mg./M ³ b
Methyl acrylate—Skin	10	35
Methylal (dimethoxymethane)	1,000	3,100
Methyl alcohol (methanol)	200	260
Methylamine	10	12
Methyl amyl alcohol, see Methyl isobutyl carbinol		
Methyl (n-amyl) ketone (2-Heptanone)	100	465
C Methyl bromide—Skin	20	80
Methyl butyl ketone, see 2-Hexanone		
Methyl cellosolve—Skin	25	80
Methyl cellosolve acetate—Skin	25	120
Methyl chloroform	350	1,900
Methylcyclohexane	500	2,000
Methylcyclohexanol	100	470
o-Methylcyclohexanone—Skin	100	460
Methyl ethyl ketone (MEK), see 2-Butanone		
Methyl formate	100	250
Methyl iodide—Skin	5	28
Methyl isobutyl carbinol—Skin	25	100
Methyl isobutyl ketone, see Hexone		
Methyl isocyanate—Skin	0.02	0.05
C Methyl mercaptan	10	20
Methyl methacrylate	100	410
Methyl propyl ketone, see 2-Pentanone		
C α Methyl styrene	100	480
C Methylene bisphenyl isocyanate (MDI)	0.02	0.2
Molybdenum:		
Soluble compounds		5
Insoluble compounds		15
Monomethyl aniline—Skin	2	9
C Monomethyl hydrazine—Skin	0.2	0.35
Morpholine—Skin	20	70
Naphtha (coaltar)	100	400
Naphthalene	10	50
Nickel carbonyl	0.001	0.007
Nickel, metal and soluble cmpds, as Ni		1
Nicotine—Skin		0.5
Nitric acid	2	5
Nitric oxide	25	30
p-Nitroaniline—Skin	1	6
Nitrobenzene—Skin	1	5
p-Nitrochlorobenzene—Skin		1
Nitroethane	100	310
Nitrogen dioxide	5	9
Nitrogen trifluoride	10	29
Nitroglycerin—Skin	0.2	2
Nitromethane	100	250
1-Nitropropane	25	90
2-Nitropropane	25	90
Nitrotoluene—Skin	5	30
Nitrotrichloromethane, see Chloroform		
Octachloronaphthalene—Skin		0.1
*Octane	500	2,350
*Oil mist, mineral		5
Organic Arsenic compounds (as As)		0.5
Osmium tetroxide		0.002
Oxalic acid		1
Oxygen difluoride	0.05	0.1
Ozone	0.1	0.2
Paraquat—Skin		0.5
Parathion—Skin		0.1
Pentaborane	0.005	0.01

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TABLE Z-1—Continued

Substances	p.p.m.*	mg./M ³ *
Pentachloronaphthalene—Skin		0.5
Pentachlorophenol—Skin		0.5
*Pentane	1,000	2,950
2-Pentanone	200	700
Perchloromethyl mercaptan	0.1	0.8
Perchloryl fluoride	3	13.5
Petroleum distillates (naphtha)	500	2,000
Phenol—Skin	5	19
p-Phenylene diamine—Skin		0.1
Phenyl ether (vapor)	1	7
Phenyl ether-biphenyl mixture (vapor)	1	7
Phenylethylene, see Styrene		
Phenylglycidyl ether (PGE)	10	60
Phenyldiazine—Skin	5	22
Phosdrin (Mevinphos ®)—Skin		0.1
Phosgene (carbonyl chloride)	0.1	0.4
Phosphine	0.3	0.4
Phosphoric acid		1
Phosphorus (yellow)		0.1
Phosphorus pentachloride		1
Phosphorus pentasulfide		1
Phosphorus trichloride	0.5	3
Phthalic anhydride	2	12
Picric acid—Skin		0.1
Pival ® (2-Pivalyl-1,3-indandione)		0.1
Platinum (Soluble Salts) as Pt.		0.002
Propargyl alcohol—Skin	1	
Propane	1,000	1,800
n-Propyl acetate	200	840
Propyl alcohol	200	500
n-Propyl nitrate	25	110
Propylene dichloride	75	350
Propylene imine—Skin	2	5
Propylene oxide	100	240
Propyne, see Methylacetylene		
Pyrethrum		5
Pyridine	5	15
Quinone	0.1	0.4
RDX—Skin		1.5
Rhodium, Metal fume and dusts, as Rh.		0.1
Soluble salts		0.001
Ronnel		10
Rotenone (commercial)		5
Selenium compounds (as Se)		0.2
Selenium hexafluoride	0.05	0.4
Silver, metal and soluble compounds		0.01
Sodium fluoroacetate (1080)—Skin		0.05
Sodium hydroxide		2
Stibine	0.1	0.5
*Standard solvent	500	2,950
Strychnine		0.15
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000
Sulfuric acid		1
Sulfur monochloride	1	6
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton ®		
2,4,5-T		10
Tantalum		5
TEPP—Skin		0.2
Tellurium		0.1

See footnotes at end of table.

TABLE Z-1—Continued

Substances	p.p.m.*	mg./M ³ *
Tellurium hexafluoride	0.02	0.2
TEPP—Skin		0.05
C Terphenyls	1	9
1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
1,1,2,2-Tetrachloroethane—Skin	5	35
Tetrachloroethylene, see Perchloroethylene		
Tetrachloromethane, see Carbon tetrachloride		
Tetrachloronaphthalene—Skin		2
Tetraethyl lead (as Pb)—Skin		0.075
Tetrahydrofuran	200	590
Tetramethyl lead (as Pb)—Skin		0.07
Tetramethyl succinonitrile—Skin	0.5	3
Tetranitromethane	1	8
Tetryl (2,4,6-trinitrophenyl-methylnitramine)—Skin		1.5
Thallium (soluble compounds)—Skin as Tl		0.1
Thiram		5
Tin (inorganic empds, except oxides)		2
Tin (organic empds)		0.1
C Toluene-2,4-diisocyanate	0.02	0.14
o-Toluidine—Skin	5	22
Toxaphene, see Chlorinated camphene		
Tributyl phosphate		5
1,1,1-Trichloroethane see Methyl chloroform		
1,1,2-Trichloroethane—Skin	10	45
Titanium dioxide		15
Trichloromethane, see Chloroform		
Trichloronaphthalene—Skin		5
1,2,3-Trichloropropane	50	300
1,1,2-Trichloro 1,2,2-trifluoroethane	1,000	7,600
Triethylamine	25	100
Trifluoromonomobromomethane	1,000	6,100
2,4,6-Trinitrophenol, see Picric acid		
2,4,6-Trinitrophenylmethyl-nitramine, see Tetryl		
Trinitrotoluene—Skin		1.5
Triorthocresyl phosphate		0.1
Triphenyl phosphate		3
Turpentine	100	560
Uranium (soluble compounds)		0.05
Uranium (insoluble compounds)		0.25
C Vanadium:		
V ₂ O ₅ dust		0.5
V ₂ O ₅ fume		0.1
Vinyl benzene, see Styrene		
**C Vinyl chloride	500	1,300
Vinylcyanide, see Acrylonitrile		
Vinyl toluene	100	480
Warfarin		0.1
Xylene (xylol)	100	435
Xylidine—Skin	5	25
Yttrium		1
Zinc chloride fume		1
Zinc oxide fume		5
Zirconium compounds (as Zr)		5

*1970 addition.

Footnotes continued on page 700.

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*"This standard applies in cotton yarn manufacturing until compliance with § 1910.1043 (c) and (e) is achieved.

^a Parts of vapor or gas per million parts of contaminated air by volume at 25° C. and 760 mm. Hg pressure.

^b Approximate milligrams of particulate per cubic meter of air.

(No footnote "c" is used to avoid confusion with ceiling value notations.)

^d An atmospheric concentration of not more than 0.02 p.p.m., or personal protection may be necessary to avoid headache.

^e As sampled by method that does not collect vapor.

^f For control of general room air, biologic monitoring is essential for personnel control.

(b) Table Z-2:

(1) 8-hour time weighted averages. An employee's exposure to any material listed in table Z-2, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

(2) Acceptable ceiling concentrations. An

employee's exposure to a material listed in table Z-2 shall not exceed at any time during an 8-hour shift the acceptable ceiling concentration limit given for the material in the table, except for a time period, and up¹ a concentration not exceeding the maximum duration and concentration allowed in the column under "acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift."

(3) Example. During an 8-hour work shift, an employee may be exposed to a concentration of Benzene above 25 p.p.m. (but never above 50 p.p.m.) only for a maximum period of 10 minutes. Such exposure must be compensated by exposures to concentrations less than 10 p.p.m. so that the cumulative exposure for the entire 8-hour work shift does not exceed a weighted average of 10 p.p.m.

TABLE Z-2

Material	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift.	
			Concentration	Maximum
Benzene (Z37.40-1969) ¹	10 p.p.m.	25 p.p.m.	50 p.p.m.	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970)	2 µg./M ³	5 µg./M ³	25 µg./M ³	30 minutes.
Cadmium fume (Z37.5-1970)	0.1 mg./M ³	3 mg./M ³		
Cadmium dust (Z37.5-1970)	0.2 mg./M ³	0.6 mg./M ³		
Carbon disulfide (Z37.3-1968)	20 p.p.m.	30 p.p.m.	100 p.p.m.	Do.
Carbon tetrachloride (Z37.17-1967)	10 p.p.m.	25 p.p.m.	200 p.p.m.	5 minutes in any 4 hours.
Ethylene dibromide (Z37.31-1970)	20 p.p.m.	30 p.p.m.	50 p.p.m.	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 p.p.m.	100 p.p.m.	200 p.p.m.	5 minutes in any 3 hours.
Formaldehyde (Z37.16-1967)	3 p.p.m.	5 p.p.m.	10 p.p.m.	30 minutes.
Hydrogen fluoride (Z37.28-1969)	do.			
Fluoride as dust (Z37.28-1969)	2.5 mg./M ³			
Lead and its inorganic compounds (Z37.11-1969)	0.2 mg./M ³			
Methyl chloride (Z37.18-1969)	100 p.p.m.	200 p.p.m.	300 p.p.m.	5 minutes in any 3 hours.
Methylene Chloride (Z37.3-1969)	500 p.p.m.	1,000 p.p.m.	2,000 p.p.m.	5 minutes in any 2 hours.
Organo (alkyl) mercury (Z37.30-1969)	0.01 mg./M ³	0.04 mg./M ³		
Styrene (Z37.15-1969)	100 p.p.m.	200 p.p.m.	600 p.p.m.	5 minutes in any 3 hours.
Trichloroethylene (Z37.19-1967)	do.	do.	300 p.p.m.	5 minutes in any 2 hours.
Tetrachloroethylene (Z37.22-1967)	do.	do.	do.	5 minutes in any 3 hours.
Toluene (Z37.12-1967)	200 p.p.m.	300 p.p.m.	500 p.p.m.	10 minutes.
Hydrogen sulfide (Z37.2-1966)		20 p.p.m.	50 p.p.m.	10 minutes once only if no other measurable exposure occurs.
Mercury (Z37.8-1971)		1 mg./10M ³		
Chromic acid and chromates (Z37.7-1971)		do ¹		

¹ Occupational exposures to benzene are subject to the requirements of § 1910.1028 except as specifically exempted by

§ 1910.1028(a)(2). Exposures exempted by § 1910.1028(a)(2) are covered by this § 1910.1000

STANDARDS AND INTERPRETATIONS

(c) **Table Z-3:** An employee's exposure to any material listed in table Z-3, in any 8-hour work shift of a 40-hour work week, shall not exceed the 8-hour time weighted average limit given for that material in the table.

TABLE Z-3—MINERAL DUSTS

Substance	Mppcf*	Mg/M ³
Silica:		
Crystalline:		
Quartz (respirable).....	250 [†]	10mg/M ³ =
	%SiO ₂ +5	%SiO ₂ +2
Quartz (total dust).....		30mg/M ³
		%SiO ₂ +2
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz.		
Tridymite: Use ½ the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth.....	20	80mg/M ³
		%SiO ₂
Silicates (less than 1% crystalline silica):		
Mica.....	20	
Soapstone.....	20	
Talc (non-asbestos-form)...	20 [‡]	
Talc (fibrous). Use asbestos limit		
Tremolite (see talc, fibrous)		
Portland cement.....	50	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 6% SiO ₂).....		2.4mg/M ³ or
		10mg/M ³
For more than 6% SiO ₂		%SiO ₂ +2
Inert or Nuisance Dust:		
Respirable fraction.....	15	5mg/M ³
Total dust.....	50	15mg/M ³

NOTE: Conversion factors—
mppcf×35.3=million particles per cubic meter
=particles per c.c.

* Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

[†] The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

[‡] As determined by the membrane filter method at 430× phase contrast magnification.

[§] Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

[§] Containing < 1% quartz; if > 1% quartz, use quartz limit.

(d) Computation formulae:

(1)

(i) The cumulative exposure for an 8-hour work shift shall be computed as follows:

$$E = \frac{C_1T_1 + C_2T_2 + \dots + C_nT_n}{8}$$

where:

E is the equivalent exposure for the working shift.

C is the concentration during any period of time *T* where the concentration remains constant.

T is the duration in hours of the exposure at the concentration *C*.

The value of *E* shall not exceed the 8-hour time weighted average limit in table Z-1, Z-2, or Z-3 for the material involved.

(ii) To illustrate the formula prescribed in subdivision (i) of this subparagraph, note that isoamyl acetate has an 8-hour time weighted average limit of 100 p.p.m. (table Z-1). Assume that an employee is subject to the following exposure:

Two hours exposure at 150 p.p.m.

Two hours exposure at 75 p.p.m.

Four hours exposure at 50 p.p.m.

Substituting this information in the formula, we have

$$\frac{2 \times 150 + 2 \times 75 + 4 \times 50}{8} = 81.25 \text{ p.p.m.}$$

Since 81.25 p.p.m. is less than 100 p.p.m., the 8-hour time weighted average limit, the exposure is acceptable.

(2)

(i) In case of a mixture of air contaminants an employer shall compute the equivalent exposure as follows:

$$E_m = \frac{C_1}{L_1} + \frac{C_2}{L_2} + \dots + \frac{C_n}{L_n}$$

where:

E_m is the equivalent exposure for the mixture.

C is the concentration of a particular contaminant.

L is the exposure limit for that contaminant, from table Z-1, Z-2, or Z-3.

STANDARDS AND INTERPRETATIONS

The value of E_m shall not exceed unity (1).

(ii) To illustrate the formula prescribed in subdivision (i) of this subparagraph, consider the following exposures:

Material	Actual concentration of 8-hour exposure	8-hour time weighted average exposure limit
Acetone (Table Z-1)	500 p.p.m.	1,000 p.p.m.
2-Butanone (Table Z-1)	45 p.p.m.	200 p.p.m.
Toluene (Table Z-2)	40 p.p.m.	200 p.p.m.

Substituting in the formula, we have:

$$E_m = \frac{500}{1,000} + \frac{45}{200} + \frac{40}{200}$$

$$E_m = 0.500 + 0.225 + 0.200$$

$$E_m = 0.925$$

Since E_m is less than unity (1), the exposure combination is within acceptable limits.

(e) To achieve compliance with paragraph (a) through (d) of this section, administrative or engineering controls must first be determined and implemented whenever feasible. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person. Whenever respirators are used, their use shall comply with § 1910.134.

1910.1001—ASBESTOS

(a) Definitions.

For the purpose of this section.

(1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) Permissible exposure to airborne concentrations of asbestos fibers.

(1) Standard effective July 7, 1972. The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) Standard effective July 1, 1976. The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) Ceiling concentration. No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) Methods of compliance.

(1) Engineering methods.

(i) Engineering controls. Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust

PROPOSED RULES

2—CONCERNING APPENDIX A OF
THE CANDIDATE LIST

Section 710.5(a) (5) of the proposed regulation provided that any mineral specifically designated in Appendix A of the Candidate List would be exempt from the reporting requirements for compilation of the inventory and would be automatically included on the inventory of chemical substances. Any mineral not included in Appendix A, however, would be subject to the general reporting requirements.

The following list entitled "Minerals Currently Under Consideration for Inclusion in Appendix A of the Candidate List" was prepared for EPA by the Department of Interior's Bureau of Mines. The Bureau included all known minerals and rock products which have been produced or processed for the commercial market within the past three years. Minerals mined and consumed wholly in foreign countries were excluded. In reviewing the minerals on this list, EPA intends to apply the following criteria in selecting minerals to be included in Appendix A of the Candidate List:

(1) The mineral has been manufactured or processed for a commercial purpose in the United States during the period beginning July 1, 1974.

(2) The mineral is obtained from a mine, well, or by collection from the land or waters and is unprocessed, dried, or processed only by mechanical or gravitational means such as crushing, grinding, floating, sorting, or sieving.

The mineral is not now recognized to be of immediate toxicological concern to warrant EPA identifying at this time each of its manufacturers.

(4) The mineral is described by a name which identifies it as specifically and narrowly as possible.

EPA now recognizes that some of the minerals on this list do not meet these criteria for a variety of reasons. For example, some entries such as pyrex and charcoal do not meet the second criteria with respect to processing. With respect to the third criteria concerning toxicological effects, several minerals such as asbestos, uranium ore, and mercury ore may be considered inappropriate for Appendix A. Finally, several materials on the list are identified in broad classes. EPA is concerned that such broad classes may include minerals which on the basis of toxicological criteria would otherwise be excluded from Appendix A. Such classes as "feldspar group minerals" and "quartz group minerals" will need to be examined in this regard.

In citing these examples, EPA seeks only to illustrate the considerations which will be taken into account in assembling Appendix A. EPA solicits examination by the public of each entry on the Minerals Under Consideration List with regard to its suitability for inclusion in Appendix A of the Candidate List. EPA also solicits other proposed additions or exclusions. Any request to include a mineral in Appendix A must clearly show that the mineral satisfies the criteria stated above for placing that mineral in Appendix A of the Candidate

List. Any request to exclude a mineral for Appendix A must show that the mineral does not satisfy the above stated criteria.

**MINERALS - CURRENTLY UNDER CONSIDERATION
FOR INCLUSION IN APPENDIX A OF THE CANDIDATE LIST**

[illegible]

diabase
diopside
diorite
diopase
dolomite
dolomitic lime
dumontite
dunite

edingtonite
emerald
euery
enargite
eustatite
epistilbite
epsomite
erikite
erionite
eschwegeite
eucryptite

fauxjante
fayalite
feldspar group
minerals

forsterite
ferghanite
ferrierite
fire clay
flint clay
fluocerite
fluorapatite
fluorite
fluorspar
flyash
foamite
fourmarierite
franklinite
fuchsite
fuller's earth

gabbro
gadolinite
gahnite
galena
gallite
garnet
garnierite
garronite
gaylussite
gem stones
germanite
grocronite
gersdorffite
geversite
gibbsite
diamondine
glauberite
glaucoedite
glauconite
glaucophanite
goethite
gmelinite
gold ore
gonnardite

granite
granite pegmatite
rhyolodiorite
graphite
ravel
greenalite
greenockite
greensand
ruherite
mummite
pyrite
pyrum
salite
salite ores
alloysite
armotome
ardystonite
astute
atchettollite
auynite
ectorite
edenbergite

hellandite
hematite
hemimorphite
hercynite
herschelite
hetaerolite
heterogenite
hollandite
hexagonite
hollingworthite
hornblende
howlite
huebnerite
hutchinsonite
hyalophane
hydroboacite
hydrobacterite
hydrothorite
hydroxynapatite
hyerarsene

lanthinite
illite
flimnrite
flimnerutite
flimnerutite
transite
iron ore
ishikawite.
jacobite
jadite
amesonite
jaroite
johannite
johannite
johannite
johannite

kalkowakite
 kaolin
 kaolinite
 kasolite
 kehoeite
 kernite
 kieserite
 knopite
 koppite
 kyanite

labradorite
 lanthanite
 lapiz lazuli
 laumontite
 laurite
 lazurite
 lead ore
 lemontite
 lepidocrocite
 lepidolite
 leucingite
 leucite
 leucocoxene
 leynite
 lignite
 limestone
 limonite
 linnaeite
 lizardite
 loellingite
 loparite
 lorandite
 ludwigite-palcetto

nackintoite
naghamite
nagshoferrite
nagshite
nagshite
nalschite
nanganese ore
nangaite
narsite
narsite
nari
narmite
nelanocrite
nendlyevite
mercury ore
neosite

19309

uranopilite
uranosphaerite
uranoscapite
uranospinites
uranothallite
urbanite
urea
uvanite

vanadium ore
vermiculite
viseite
vrbaites
vysotskite
voglite
volcanic glass
voltzite

wairakite
wallastonite
walpurgite
water
weinschenkite
wolframite
wollastonite
wurtzite

xenotime

yttrilite
yttrocerite
yttriochroalite
yttriofluorite
yugawavite

zeolites
zeunacrite
zinc-copper
 chalcanthite
zinc-copper
 melanterite
zincite
zinc ore
zinkenite
zippelite
zircon
zirkelite

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