INTERNAL CORRESPONDENCE

MINING AND METALS DIVISION • P. O. BOX 579, NIAGARA FALLS, NEW YORK 14302

essrs.

To (Name) / Division / Location:
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Date: December 7, 1971

Originating Dept.: CALIDRIA Asbestos - Marketing
Research and Development Department

Answering letter date:

essrs.

Copy to:
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Subject: Toxicology Update

PLAINTIFF'S EXHIBIT UC-177

The following information is presented in an attempt to prepare you to answer customer questions with some degree of intelligence. There are still many gray areas but the government agencies involved are taking some action.

The Environmental Protection Agency (EPA) is responsible under the Clean Air Act for non-occupational exposure control. They have just issued proposed standards which include no TLV's for any plant, mine or mill emissions. They are proposing that facilities use fabric filters to prevent emissions to the atmosphere.

The Department of Labor through the Occupational Safety and Health Administration (OSHA) is responsible for occupational exposure. They "depend" on HEW and the ACGIH (American Conference of Government Industrial Hygienists) for guidance in establishing TLV's (Threshold Limit Values) and associated information.

The present TLV for asbestos is published in the Federal Register, Volume 36, No. 157 - Friday, August 13, 1971 as 2 mppcf (million particles per cubic foot) or 12 fibers greater than 5 microns per milliliter of air. The ACGIH has recommended the latter value be lowered to 5 fibers and this may become effective in May 1972. The AFL-CIO has just requested the Department of Labor to take emergency action and lower the value to 2 fibers greater than 5 microns per milliliter of air.

Based on our best available and current information, there are two respirators which we can suggest our customers use for asbestos dust. These are the Willson Model No. 1009 with R-520 filter and MSA No. 86432 with Type "H" Ultra-Filters, described in attached sheets. Both of these are approved by the Bureau of Mines for highly toxic dusts with TLV's less than 2.4 mppcf. These are on the Bureau of Mines Approval List 21B in their Information Circular 8436, dated 12/31/68. We should discontinue recommending the Willson No. 600A, which has been used at the plant. The plant will probably change to one of the above.

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We feel that the two suggested masks will readily conform to even the most stringent new regulations.

Attached is the latest issue we have of the Federal Register which lists TLV's. Asbestos is in Table G-3 along with amorphous silica (Cab-O-Sil) and other minerals. This list may be of value if your customers have questions about other materials.

There is general agreement on the following:

1. Asbestos is an important mineral necessary to the American economy. Its use will not be outlawed.
2. Asbestos is a controllable occupational hazard, not considered a serious hazard to the general public.
3. Asbestos bound in resin or similar compounds or systems does not constitute a hazard.
4. Asbestos can cause lung damage and may, especially in combination with some other substance, be associated with cancer.

We are proceeding as rapidly as possible to develop an action plan. At the request of many customers we are preparing a booklet or report for public dissemination. This will outline Corporate views on the general subject of asbestos toxicology.

None of the information in this letter should be considered as Corporate policy and you should treat it accordingly.

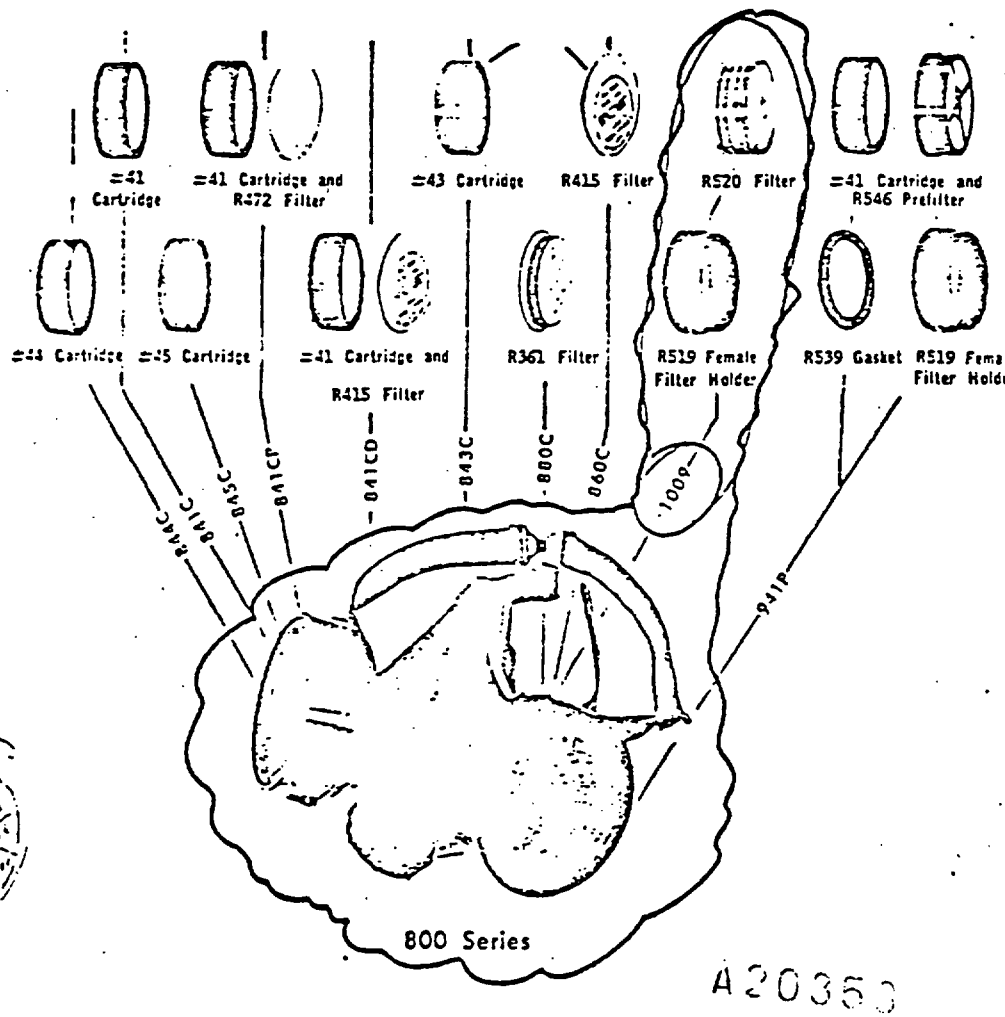
John L. Myers

/cb
Attachments

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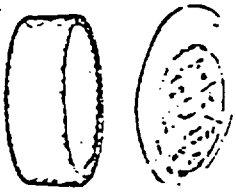
This Willson series provides a complete range of protection against common industrial respiratory hazards. One basic facepiece assembly can be fitted with a variety of cartridges and filters—combining versatile, economical respiratory protection with wearing comfort. A facepiece can be quickly modified for other uses, by simply changing the cartridge-filter combinations.
Facepieces are molded of resilient rubber with soft, comfortable, rolled edges and easily adjusted elastic headbands. All models can be quickly taken apart and easily cleaned.

	1-35	36-71	72+		Boxes	Boxes	Boxes
#1009	8.50	7.65	7.25	R520 (Box of 2)	6.90	6.20	5.90

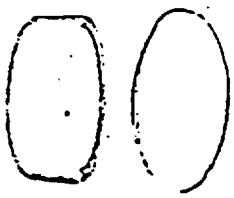




#41 — For protection against 0.1% by volume of organic vapors.



#41CD — Non-Emergency protection against dust and organic vapors and combinations thereof. #41 cartridge and R415 filter.



#41CP — For protection in atmospheres containing no more than 0.1% by volume of organic vapors from solvents and thinners. #41 cartridge and R472 filter.



R546 — Pre filter used with #41 cartridge for Bureau of Mines approved Paint Spray Respirator (941P).



#43 — For Protection against 0.1% by volume concentrations of combinations of organic vapors and acid gases.



#44 — Protection against ammonia in concentrations not exceeding 0.1% by volume.



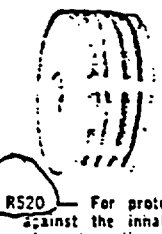
#45 — Protection against metallic mercury vapors.



R415 — For Protection against dusts not significantly more toxic than lead. Also pneumoconiosis producing mists, chromic acid mists and nuisance dust.



R361 — For protection against metal fumes; dusts not significantly more toxic than lead; pneumoconiosis producing dusts, mists and chromic acid mists.

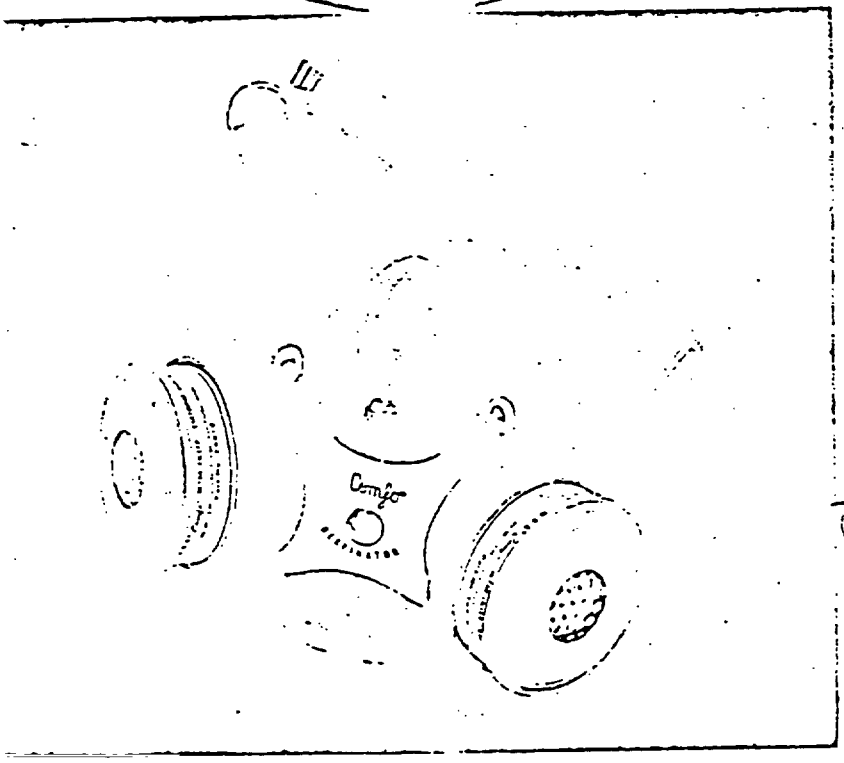


R520 — For protection against the inhalation of radionuclides and highly toxic dusts, fumes and mists having a TLV less than 0.2 milligrams per cubic meter of 2.4 million particles per cubic foot and where the contaminants concentration is known not to exceed 100 times the concentration limit for the radionuclide involved or 100 times the threshold limit value.

ORDERING INFORMATION: #41, 43, 44, and 45 Cartridges are packed 4 to a box. R472 filters packed 100 to box; R415 filters packed 10 and 40 to a box; R546 Prefilter for 941P Paint Respirator packed 10

Union Carbide trial exhibit UC-177: John L. Myers to R. E. Byrne and Others on Toxicology Update for CALIDRIA A... Published by AsbestosClaims.Law
ACL Doc 15445 · Page 3 of 8 asbestosclaims.law/library/15445/3

CUSTOM COMFO AEROSOL FILTER RESPIRATOR



M-S-A Custom Comfo is a comfortable, and versatile respirator with double filters, offering the wearer a variety of breathing protection—all with one facepiece. It takes only a matter of seconds to switch filters to provide the exact kind of protection needed — whether dusts, mists, fumes, smokes, toxic particles, radioactive aerosols, or extra finely divided particulate.

MORE COMFORTABLE FACEPIECE—The facepiece of the M-S-A Custom Comfo is made of a soft Hycar rubber which conforms readily to the contour of the face. The unique inturned lip construction and the deep chin cup supported by the exclusive four-point floating yoke suspension made of formable aluminum assure a close, comfortable fit. Best spectacle integration of any dual filter respirator.

FOUR-PIECE HEADBAND—An adjustable four-piece ¾-in. elastic headband holds the floating yoke firmly and comfortably to the face, accommodating all head and face sizes and contours.

DELRIN CARTRIDGE HOLDERS—Another new feature is the chemical and corrosion resistant Delrin now used for cartridge holders. It's dimensionally stable, tough, and rigid and eliminates potential leakage points associated with other systems.

LOW INVESTMENT ADVANTAGE—Adaptability to different hazards means investment in respirators can be kept low without losing effectiveness of protection.

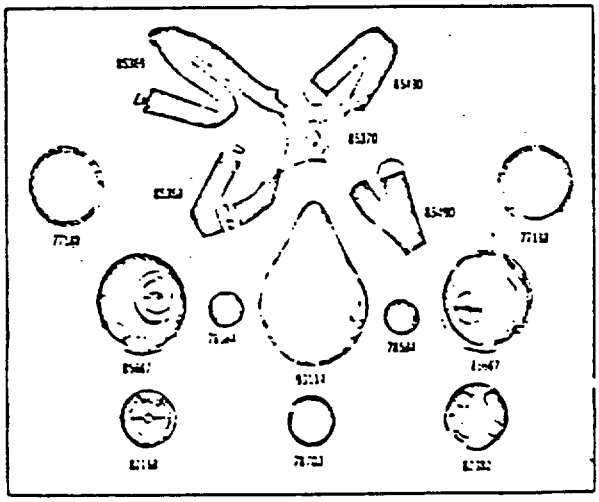
THREE FILTERS FOR SINGLE FACEPIECE—M-S-A Comfo facepiece can be fitted with any of three filters—an interchangeable feature that means real economy.

TYPE "F" FILTER—Type "F" filters are approved for all dusts and mists not significantly more toxic than lead. The Comfo Respirator fitted with these inexpensive filters provides economical effective protection where dusts are the only problem. Bureau of Mines approved. BM-2168

TYPE "S" FILTER—Where metal fumes are a problem, Type "S" filters extend the respiratory protection of the Comfo to include a range of particle sizes considerably finer than that covered by Type "F" filters. Bureau of Mines approved for fumes not significantly more toxic than lead. BM-21B-69

TYPE "H" ULTRA-FILTER—Where toxic aerosols and extremely fine particles are the problem. Type "H" Ultra-Filters provide maximum breathing protection. They effectively filter fine smoke and highly toxic particles including radioactive dusts, as well as air-borne organisms such as bacteria and some viruses. Every filter is tested and certified to be at least 99.98% efficient against 0.3 micron DOP smoke. New domed filter has 50% less breathing resistance than former model. Now approved for materials more toxic than lead. BM-21B-90

★ 76875 Type "H" filters ..... Per Box - 2 / 1-99 Boxes - 2.30 / >100 Boxes — 2.00



CATALOG NUMBERS

10-86430 M-S-A Custom Comfo Respirator with Type "F" Filters, Bureau of Mines approved for dusts

10-86431 M-S-A Custom Comfo Respirator with Type "S" Filters, Bureau of Mines approved for dusts, mists, and fumes

10-86432 M-S-A Custom Comfo Respirator with Type "H" Ultra-Filters, for extra finely divided particles and for toxic particulate matter

★ 86432 M-S-A Comfo Respirator equipped with type "H" filters for protection against extra finely divided and/or toxic particulate matter. Approval No. 21B-90.

1 to 71	each	$ 8.65
72 to 143	each	7.80
144 or more	each	7.40

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Subpart G—Occupational Health and Environmental Control

(1)

§ 1910.93 Air contaminants. (Gases, vapors, fumes, dust, and mists.)

(a) Exposures by inhalation, ingestion, skin absorption, or contact to any material or substance (1) at a concentration above those specified in the "Threshold Limit Values of Airborne Contaminants for 1970" of the American Conference of Governmental Industrial Hygienists, listed in Table G-1, except for the American National Standards listed in Table G-2 of this section and

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except for values of mineral dusts listed in Table G-3 of this section, and (2) concentrations above those specified in Table G-1, G-2, and G-3 of this section, shall be avoided, or protective equipment shall be provided and used.

(b) To achieve compliance with paragraph (a) of this section, feasible administrative or engineering controls must first be determined and implemented in all cases. In cases where protective equipment, or protective equipment in addition to other measures is used as the method of protecting the employee, such protection must be approved for each specific application by a competent industrial hygienist or other technically qualified source.

TABLE G-I

Substance	p.p.m.*	mg./M³ ▸
Abate		15
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 Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
2-Aminoethanol, see Ethanolamine		
2-Aminopyridine	0.5	2
**Ammonia	50	35
Ammonium sulfamate (Ammate)		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
ANTU (alpha naphthyl thiourea)		0.3
Arsenic and compounds (as As)		0.5
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
Boron tribromide	1	10
C Boron trifluoride	1	3
Bromine	0.1	0.7
*Bromine pentafluoride	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	0.5	1.5
p-tert-Butyltoluene	10	60
Calcium arsenate		1
Calcium oxide		5
**Camphor (Synthetic)	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

See footnotes at end of table.

TABLE G-I—Con.

Substance	p.p.m.*	mg./M³ ▸
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 Epichlorhydrin		
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
*Cyanogen	100	
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
Dibutyl phosphate	1	5
Dibutylphthalate		5
*C Dichloroacetylene	0.1	0.4
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
**C Diethylene triamine—Skin	10	42
Diethylether, see Ethyl ether		
Difluorodibromomethane	100	860
C Diglycidyl ether (DGE)	0.5	2.8
Dihydroxybenzene, see Hydroquinone		
Diisobutyl ketone	50	290
Diisopropylamine—Skin	5	20
Dimethoxymethane, see Methylal		
Dimethyl acetamide—Skin	10	35
Dimethylamine	10	15
Dimethylaminobenzene, see Xylidine		
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-Dimethyl heptanone, see Diisobutyl ketone		
1,1-Dimethylhydrazine—Skin	0.5	1
Dimethylphthalate		5

TABLE G-I—Con.

Substance	p.p.m.*	mg./M³ ▸
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
Diphenyl amine		10
Diphenylmethane diisocyanate (see Methylene bisphenyl isocyanate (MDI)		
Dipropylene glycol methyl ether—Skin	100	600
Di-sec. octyl phthalate (Di-2-ethylhexylphthalate)		5
*Endosulfan (Thiodan ®)—Skin		0.1
Endrin—Skin		0.1
Epichlorhydrin—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 (Cellosolve 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
Ethyl mercaptan	0.5	1
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	
Ethylene glycol monomethyl ether acetate, see Methyl cellosolve acetate		
Ethylene imine—Skin	0.5	1
Ethylene oxide	50	90
Ethylidine chloride, see 1,1-Dichloroethane		
N-Ethylmorpholine—Skin	20	94
Ferbam		15
Ferrovanadium 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	1	1.4
Hydrogen selenide	0.05	0.2
Hydroquinone		2
*Indene	10	45
Indium and compounds, as In		0.1
C Iodine	0.1	1
Iron oxide fume		10
Iron salts, soluble, as Fe		1
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

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TABLE G-1—Con.

Substance	p.p.m.[a]	mg./M³ [a]
Isopropylether	500	2,100
Isopropyl glycidyl ether (IGE)	50	240
Ketene	0.5	0.9
Lead arsenate		0.15
Lindane—Skin		0.5
Lithium hydride		0.025
L.P.G. (Liquified petroleum gas)	1,000	1,800
Magnesium oxide fume		15
Malathion—Skin		15
Maleic anhydride	0.25	1
C Manganese and compounds, as Mn		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
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 isoamyl ketone	100	475
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
*Methyl mercaptan	0.5	1
Methyl methacrylate	100	410
Methyl propyl ketone, see 2-Pentanone		
C Methyl silicate	5	30
C α-Methyl styrene	100	450
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 (coal tar)	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 Chloropicrin		
Octachloronaphthalene—Skin		0.1
*Octane	400	1,900
*Oil mist, particulate		[e] 5
Osmium tetroxide		0.002
Oxalic acid		1
Oxygen difluoride	0.05	0.1
Ozone	0.1	0.2
Paraquat—Skin		0.5
Silver, metal and soluble compounds		0.01
Sodium fluoroacetate (1080)—Skin		0.05
Sodium hydroxide		2
Stibine	0.1	0.5
*Stoddard solvent	200	1,150
Strychnine		0.15
Sulfur dioxide	5	13
Sulfur hexafluoride	1,000	6,000

TABLE G-1—Con.

Substance	p.p.m.[a]	mg./M³ [a]
Sulfuric acid		1
Sulfur monochloride	1	6
Sulfur pentafluoride	0.025	0.25
Sulfuryl fluoride	5	20
Systox, see Demeton ®		
2,4,5T		10
Tantalum		5
TEDP—Skin		0.2
Tellurium		0.1
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		[f] 0.100
Tetrahydrofuran	200	590
Tetramethyl lead (as Pb)—Skin		[f] 0.150
Tetramethyl succinonitrile—Skin	0.5	3
Tetranitromethane	1	8
Tetryl (2,4,6-trinitrophenylmethylnitramine)—Skin		1.5
Thallium (soluble compounds)—Skin as Tl		0.1
Thiram		5
Tin (inorganic cmpds, except SnH₄ and SnO₂)		2
Tin (organic cmpds)		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
Parathion—Skin		0.1
Pentaborane	0.005	0.01
Pentachloronaphthalene—Skin		0.5
Pentachlorophenol—Skin		0.5
*Pentane	500	1,500
2-Pentanone	200	700
Perchloromethyl mercaptan	0.1	0.8
Perchloryl fluoride	3	13.5
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		
Phenyl glycidyl ether (PGE)	10	60
Phenylhydrazine—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	
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
Rotenone		10
Rotenone (commercial)		5
Selenium compounds (as Se)		0.2
Selenium hexafluoride	0.05	0.4
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
Trifluorobromomethane	1,000	6,100

TABLE G-1—Con.

Substance	p.p.m.[a]	mg./M³ [a]
*Trimethyl benzene	25	120
2,4,6-Trinitrophenol, see Picric acid		
2,4,6-Trinitrophenylmethylnitramine, see Tetryl		
Trinitrotoluene—Skin		1.5
Triorthocresyl phosphate		0.1
Triphenyl phosphate		3
Tungsten and compounds, as W:		
Soluble		1
Insoluble		5
Turpentine	100	560
Uranium (natural) sol. and insol. compounds as U		0.2
C Vanadium:		
V_2O_5 dust		0.5
V_2O_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.

[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 method that does not collect vapor.

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

TABLE G-2

	8-hour time weighted average
Benzene (Z37.4–1969)	10 p.p.m.
Beryllium and beryllium compounds (Z37.29–1970)	0.002 mg./M³.
Cadmium dust (as Cd) (Z37.5–1970)	0.2 mg./M³.
Cadmium fume (as Cd) (Z37.5–1970)	0.1 mg./M³.
Carbon disulfide (Z37.3–1968)	20 p.p.m.
Carbon tetrachloride (Z37.17–1967)	10 p.p.m.
Ethylene dibromide (Z37.31–1970)	20 p.p.m.
Ethylene dichloride (Z37.21–1969)	50 p.p.m.
Formaldehyde (Z37.16–1967)	3 p.p.m.
Hydrogen fluoride (Z37.28–1969)	3 p.p.m.
Fluoride as dust (Z37.28–1969)	2.5 mg./M³.
Lead and its inorganic compounds (Z37.11–1969)	0.2 mg./M³.
Methyl chloride (Z37.18–1969)	100 p.p.m.
Methylene chloride (Z37.23–1969)	500 p.p.m.
Organo (alkyl) mercury (Z37.30–1969)	0.01 mg./M³.
Styrene (Z37.12–1969)	100 p.p.m.
Tetrachloroethylene (Z37.22–1967)	100 p.p.m.
Toluene (Z37.12–1967)	200 p.p.m.
	Acceptable ceiling concentration
Hydrogen sulfide (Z37.2–1966)	20 p.p.m.
Chromic acid and chromates (Z37.3–1971)	1 mg./10M³.
Mercury (Z37.8–1971)	1 mg./10M³.

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TABLE G-3—MINERAL DUSTS

Substance	Mppcf [a]	Mg/M³ [b]
Silica:		
Crystalline:		
Quartz (respirable).....	250 [c]	10mg/M³ ÷ %SiO₂+5
Quartz (total dust).....		%SiO₂+2 30mg/M³
		%SiO₂+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/M³
Tremolite.....	8	%SiO₂ 20mg/M³
		%SiO₂
Silicates (less than 1% crystalline silica):		
Asbestos—12 fibers per milliliter greater than 5 microns in length [d] or.....	2	
Mica.....	20	
Soapstone.....	20	
Talc.....	20	
Portland cement.....	50	
Graphite (natural).....	15	
Coal dust (respirable fraction less than 5% SiO₂)		2.4mg/M³ or
For more than 5% SiO₂.....		10mg/M³
		%SiO₂+2
Inert or Nuisance Dust:		
Respirable fraction.....	15	5mg/M³
Total dust.....	50	15mg/M³

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

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

[b] 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.

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

[d] 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:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.5 Mg/M³

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