

October 14, 1958

INTERNAL CORRESPONDENCE

FROM LESTER V. CRALLEY
PITTSBURGH

TO INDUSTRIAL HYGIENE COMMITTEE

PLAINTIFF'S
EXHIBIT

AL-221

The attached Threshold Limit Values for 1958 are essentially the same as those for 1957. The value for nitric acid has been raised from 5 to 10 ppm by volume and a new tentative limit of 1.0 mg. per cubic meter of air has been set for phosphoric acid.

Also enclosed is a publication of the Michigan Department of Health on the proper use of hand and automatic degreasers.

L. V. Cralley

LVC:DR
Encls. 2

Industrial Hygiene Committee

R. S. Adams - Olean
F. B. Colby - Garwood
E. N. Goas - Cressona
W. E. Goza - Pt. Comfort
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J. P. Welborn - Bridgeport
R. E. Whitson - Bauxite Al.
W. V. M. Williams - Alcoa Sn.
E. B. Youngblut - Edgewater

(See next page)

APC 001262

cc/encis: A. L. Alexander - Alcoa Sm.
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 J. M. Plunkett - ARL - N.K.
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 W. R. Gilliland - Pgh.

Threshold Limit Values for 1958

*Adopted at the 20th Annual Meeting of the American
Conference of Governmental Industrial Hygienists
Atlantic City, April 19-22, 1958*

Threshold limits should be used as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations. They represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. The values listed refer to time-weighted average concentrations for a normal work day. The amount by which these figures may be exceeded for short periods without injury to health depends upon a number of factors, such as the nature of the contaminant, whether very high concentrations even for short periods produce acute poisoning, whether the effects are cumulative, the frequency with which high concentrations occur, and the duration of such periods. All must be taken into consideration in arriving at a decision as to whether a hazardous situation exists. Special consideration should be given to the application of these values in the evaluation of the health hazards which may be associated with exposure to combinations of two or more substances.

Threshold limits are based on the best available information from industrial experience, from experimental studies, and, when possible, from a combination of the two. These values are based on various criteria of toxic effects or on marked discomfort; thus, they should not be used as a common denominator of toxicity, nor should they be considered as the sole criterion in proving or disproving diagnosis of suspected occupational disease.

These limits are intended for use in the field of industrial hygiene and should be employed by persons trained in this field. They are not intended for use, or for modification for use, in the evaluation or control of community air pollution or air-pollution nuisances.

These values are reviewed annually by the Committee on Threshold Limits for changes, revisions, or additions as further information becomes available. The Committee welcomes the suggestion of substances to be added to the list and also comments, references, or reports of experience with these materials.

Submitted for publication May 5, 1958.

RECOMMENDED VALUES

Gases and Vapors

SUBSTANCE	PPM *	Approx. Mg. per Cu. M. †	SUBSTANCE	PPM *	Approx. Mg. per Cu. M. †
Acetaldehyde	200	360	Allyl propyl disulfide ..	2	12
Acetic acid	10	25	Ammonia	100	70
Acetic anhydride	5	20	Amyl acetate	200	1,050
Acetone	1,000	2,400	Amyl alcohol		
Acrolein	0.5	1.2	(isoamyl alcohol)	100	360
Acrylonitrile	20	45	Aniline	5	19
Allyl alcohol	5	12	Arsine	0.05	0.2
Allyl chloride	5	15	Benzene (benzol)	25	80

THRESHOLD LIMIT VALUES FOR 1958

SUBSTANCE	P.P.M. *	Approx. Mc. per Cu. M. †	SUBSTANCE	P.P.M. *	Approx. Mc. per Cu. M. †
Benzyl chloride	1	5	Dimethylaniline		
Bromine	1	7	(N-dimethylaniline) ..	5	25
Butadiene			Dimethylsulfate	1	5
(1,3-butadiene)	1,000	2,200	Dioxane (diethylene dioxide)	100	360
Butanone			Ethyl acetate	400	1,400
(methyl ethyl ketone) ..	250	740	Ethyl acrylate	25	100
Butyl acetate			Ethyl alcohol (ethanol) ..	1,000	1,900
(n-butyl acetate)	200	950	Ethylamine	25	45
Butyl alcohol			Ethylbenzene	200	870
(n-butanol)	100	300	Ethyl bromide	200	890
Butylamine	5	15	Ethyl chloride	1,000	2,600
Butyl cellosolve			Ethyl ether	400	1,200
(2-butoxyethanol)	50	240	Ethyl formate	100	300
Carbon dioxide	5,000	9,000	Ethyl silicate	100	850
Carbon disulfide	20	60	Ethylene chlorohydrin ..	5	16
Carbon monoxide	100	110	Ethylenediamine	10	30
Carbon tetrachloride	25	160	Ethylene dibromide		
Cellosolve			(1,2-dibromoethane) ..	25	190
(2-ethoxyethanol)	200	740	Ethylene imine	5	9
Cellosolve acetate			Ethylene oxide	50	90
(2-ethoxyethyl acetate) ..	100	540	Fluorine	0.1	0.2
Chlorine	1	3	Fluorotrichloromethane ..	1,000	5,600
Chlorine trifluoride	0.1	0.4	Formaldehyde	5	6
Chlorobenzene			Furfural	5	20
(monochlorobenzene) ..	75	350	Gasoline	500	2,000
Chloroform			Heptane (n-heptane) ...	500	2,000
(trichloromethane) ...	100	490	Hexane (n-hexane) ...	500	1,800
1-Chloro-1-nitropropane ...	20	100	Hexanone (methyl butyl ketone)	100	410
Chloropicrin	1	7	Hexone (methyl isobutyl ketone)	100	410
Chloroprene			Hydrazine	1	1.3
(2-chloro-1,3-butadiene) ..	25	90	Hydrogen bromide	5	17
Cresol (all isomers) ...	5	22	Hydrogen chloride	5	7
Cyclohexane	400	1,400	Hydrogen cyanide	10	11
Cyclohexanol	100	410	Hydrogen fluoride	3	2
Cyclohexanone	100	400	Hydrogen peroxide, 90% ..	1	1.4
Cyclohexene	400	1,350	Hydrogen selenide	0.05	0.2
Cyclopropane	400	690	Hydrogen sulfide	20	30
Decaborane	0.05	0.3	Iodine	0.1	1
Diacetone alcohol			Isophorone	25	140
(4-hydroxy-4-methyl- 2-pentanone)	50	240	Isopropylamine	5	12
Diborane	0.1	0.1	Mesityl oxide	25	100
n-Dichlorobenzene	50	300	Methyl acetate	200	610
Dichlorodifluoromethane ..	1,000	4,950	Methyl acetylene	1,000	1,650
1,1-Dichloroethane	100	400	Methyl acrylate	10	35
1,2-Dichloroethane			Methyl alcohol		
(ethylene dichloride) ..	100	400	(methanol)	200	260
1,2-Dichloroethylene	200	790	Methyl bromide	20	80
Dichloroethyl ether	15	90	Methyl cellosolve		
Dichloromonofluoro- methane	1,000	4,200	(2-methoxyethanol) ..	25	80
1,1-Dichloro-1-nitro- ethane	10	60	Methyl cellosolve acetate		
Dichlorotetrafluoroethane ..	1,000	7,000	(ethylene glycol mono- methyl ether acetate) ..	25	120
Diethylamine	25	75	Methyl chloride	100	210
Difluorodibromomethane ..	100	860			
Diisobutyl ketone	50	290			

SUBSTANCE	PPM *	Approx. Mg. per Cu. M. †	SUBSTANCE	PPM *	Approx. Mg. per Cu. M. †
Methylal (dimethoxy- methane)	1,000	3,100	Phosphine	0.05	0.07
Methyl chloroform (1,1,1-trichloroethane)	500	2,700	Phosphorus trichloride ..	0.5	3
Methylcyclohexane	500	2,000	Propyl acetate	200	840
Methylcyclohexanol	100	470	Propyl alcohol (isopropyl alcohol) ..	400	980
Methylcyclohexanone	100	460	Propyl ether (isopropyl ether)	500	2,100
Methyl formate	100	250	Propylene dichloride (1,2-dichloropropane) ..	75	350
Methyl isobutyl carbinol (methyl amyl alcohol) ..	25	100	Propylene imine	25	60
Methylene chloride (dichloromethane)	500	1,750	Pyridine	10	30
Naphtha (coal tar)	200	800	Quinone	0.1	0.4
Naphtha (petroleum)	500	2,000	Stibine	0.1	0.5
Nickel carbonyl	0.001	0.007	Stoddard solvent	500	2,900
Nitric acid	10	25	Styrene monomer (phenylethylene)	100	420
p-Nitroaniline	1	6	Sulfur dioxide	5	13
Nitrobenzene	1	5	Sulfur hexafluoride	1,000	6,000
Nitroethane	100	310	Sulfur monochloride	1	6
Nitrogen dioxide	5	9	Sulfur pentafluoride	0.025	0.25
Nitroglycerin	0.5	5	p-Tertiarybutyltoluene ..	10	60
Nitromethane	100	250	1,1,2,2-Tetrachloroethane ..	5	35
2-Nitropropane	50	180	Tetrahydrofuran	200	590
Nitrotoluene	5	30	Tetranitromethane	1	8
Octane	500	2,350	Toluene (toluol)	200	750
Ozone	0.1	0.2	o-Toluidine	5	22
Pentane	1,000	2,950	Trichloroethylene	200	1,050
Pentanone (methyl propyl ketone) ..	200	700	Trifluoromonobromo- methane	1,000	6,100
Perchloroethylene (tetrachloroethylene) ..	200	1,350	Turpentine	100	560
Phenol	5	19	Vinyl chloride (chloroethylene)	500	1,300
Phenylhydrazine	5	22	Xylene (xylol)	200	870
Phosgene (carbonyl chloride) ..	1	4			

* Parts of vapor or gas per million parts of air by volume.
† Approximate milligrams per cubic meter of air.

Toxic Dusts, Fumes, and Mists

SUBSTANCE	Mg. per Cu. M. ‡	SUBSTANCE	Mg. per Cu. M. ‡
Aldrin (1,2,3,4,10,10-hexachloro- 1,4,4a,5,8,8a-hexahydro-1,4,5,8- dimethanonaphthalene)	0.25	Crag herbicide (sodium 2-[2,4- dichlorophenoxy] ethanol hydrogen sulfate)	15
Ammonium sulfate	15	Cyanide (as CN)	5
Antimony	0.5	2,4-D (2,4-dichlorophenoxyacetic acid) ..	10
ANTU (alpha-naphthyl-thiourea) ..	0.3	DDT (2,2-bis[p-chlorophenyl]-1,1,1- trichloroethane)	1
Arsenic	0.5	Dieldrin (1,2,3,4,10,10-hexachloro- 6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro- 1,4,5,8-dimethano-naphthalene)	0.25
Barium (soluble compounds)	0.5	Dinitrobenzene	1
Cadmium oxide fume	0.1	Dinitrotoluene	1.5
Calcium arsenate	0.1	Dinitro-o-cresol	0.2
Chlordane (1,2,4,5,6,7,8,8- octachloro-3a,4,7,7a-tetrahydro- 4,7-methanoindane)	2	EPN (O-ethyl O-p-nitrophenyl thionobenzenephosphonate)	0.5
Chlorinated camphene, 60%	0.5	Ferbam (ferroc dimethyl dithiocarbamate)	15
Chlorinated diphenyl oxide	0.5		
Chlorodiphenyl (42% chlorine)	1		
Chlorodiphenyl (54% chlorine)	0.5		
Chromic acid and chromates (as CrO ₃) ..	0.1		

THRESHOLD LIMIT VALUES FOR 1958

SUBSTANCE	PPM *	Mg. per Cu. M. ‡	SUBSTANCE	PPM *	Mg. per Cu. M. ‡
Ferrovanadium dust	1		Strychnine	0.15	
Fluoride	2.5		Sulfuric acid	1	
Hydroquinone	2		TEDP (tetraethyl dithionopyrophosphate)	0.2	
Iron oxide fume	15		TEPP (tetraethyl pyrophosphate) ..	0.05	
Lead	0.2		Tellurium	0.1	
Lead arsenate	0.15		Tetryl (2,4,6-trinitrophenyl-methylnitramine)	1.5	
Lintane (hexachlorocyclohexane, gamma isomer)	0.5		Thiram (tetramethyl thiuram disulfide)	5	
Magnesium oxide fume	15		Thallium (soluble compounds)	0.1	
Malathion (O,O-dimethyl dithiophosphate of diethyl mercaptosuccinate) ..	15		Titanium dioxide	15	
Manganese	6		Trichloronaphthalene	5	
Mercury	0.1		Trinitrotoluene	1.5	
Mercury (organic compounds)	0.01		Uranium		
Methoxychlor (2,2-di-p-methoxyphenyl-1,1,1-trichloroethane)	15		(soluble compounds)	0.05	
Molybdenum			(insoluble compounds)	0.25	
(soluble compounds)	5		Vanadium		
(insoluble compounds)	15		(V ₂ O ₅ dust)	0.5	
Nicotine	0.5		(V ₂ O ₅ fume)	0.1	
Parathion (O,O-diethyl O-p-nitrophenyl thiophosphate)	0.1		Warfarin (3-[α-acetonylbenzyl]-4-hydroxycoumarin)	0.5	
Pentachloronaphthalene	0.5		Zinc oxide fumes	15	
Pentachlorophenol	0.5		Zirconium compounds (as Zr)	5	
Phosphorus (yellow)	0.1				
Phosphorus pentachloride	1				
Phosphorus pentasulfide	1				
Picric acid	0.1				
Pyrethrum	2				
Rotenone	5				
Selenium compounds (as Se)	0.1				
Sodium fluoroacetate (1080)	0.1				
Sodium hydroxide	2				

Radiactivity: For permissible concentrations of radioisotopes in air, see "Maximum Permissible Amounts of Radioisotopes in the Human Body and Maximum Permissible Concentration in Air and Water," Handbook 52, U. S. Department of Commerce, National Bureau of Standards, March, 1953. In addition, see "Permissible Dose from External Sources of Ionizing Radiation," Handbook 59, U. S. Department of Commerce, National Bureau of Standards, Sept. 24, 1954.

Revision of the two publications mentioned above is in progress.

‡ Milligrams of dust, fume, or mist per cubic meter of air.

Mineral Dusts

SUBSTANCE	MPPCF §	SUBSTANCE	MPPCF §
Aluminum oxide	50	Silica	
Asbestos	5	high (above 50% free SiO ₂) ...	5
Dust (nuisance, no free silica)	50	medium (5 to 50% free SiO ₂) ..	20
Mica (below 5% free silica)	20	low (below 5% free SiO ₂)	50
Portland cement	50	Silicon carbide	50
Talc	20	Soapstone (below 5% free SiO ₂) ..	20

§ Millions of particles per cubic foot of air.

TENTATIVE VALUES

SUBSTANCE	PPM ‖	Approx. Mg. per Cu. M. ¶	SUBSTANCE	PPM ‖	Approx. Mg. per Cu. M. ¶
(x) Acetylene tetrabromide	1	14	(x) Butyl mercaptan ..	10	35
(x) Allyl glycidyl ether (AGE)	10	45	Chlorine dioxide ..	0.1	0.3
(x) Beryllium		2γ/m ³	(x) Chloroacetaldehyde	1	3
(x) Boron trifluoride ..	1	3	(x) Chlorobromomethane (ClBrCH ₃)	400	2,100
(x) n-Butyl glycidyl ether (BGE) ..	50	270	(x) Diglycidyl ether (DGE)	10	55

A. M. A. ARCHIVES OF INDUSTRIAL HEALTH

SUBSTANCE	PPM †	Approx. Mg. per Cu. M.†	SUBSTANCE	PPM †	Approx. Mg. per Cu. M.†
(x) Dimethyl formamide	20	60	Phosphoric acid ...		1
1,1-Dimethyl hydrazine	0.5	1	n-Propyl nitrate ..	25	110
(x) Dipropylene gly- colmethylether ..	100	600	(x) Propylene oxide ..	100	240
(x) Ethyl mercaptan ..	250	640	(x) Tertiary butyl alcohol	100	300
(x) Furfuryl alcohol ..	50	200	(x) Toluene-2,4- diisocyanate	0.1	0.7
(x) Glycidol	50	150	1,2,3-Trichloropropane ..	50	300
sec-Hexyl acetate	100	590	(x) Triethyl amine	25	100
(x) Isopropyl glycidyl ether (IGE) ...	50	240	Triorthocresyl phosphate		0.1
(x) Lithium hydride ..		25g/m³	(x) Vinyl toluene	100	480
(x) Methyl mercaptan ..	50	100	(x) Yttrium and in- organic compounds		5
(x) α Methyl styrene ..	100	480	(x) Xylidine	5	25
(x) Monomethyl aniline	2	9	(x) Teflon decomposition products	*	*
(x) Paradichloro- benzene	75	450	(x) Pentaborane (B ₅ H ₉)	*	*
(x) Perchloromethyl mercaptan	0.1	0.8			
(x) Phenyl glycidyl ether (PGE)	50	310			

† Parts of vapor or gas per million parts of air by volume.

‡ Approximate milligrams per cubic meter of air.

(x) These values appeared on the tentative list for 1957.

* Until more data are forthcoming, it is important that atmospheric concentrations of these materials to which workers are exposed must be kept as near 0 as possible.

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APC 001268