Transactions of the

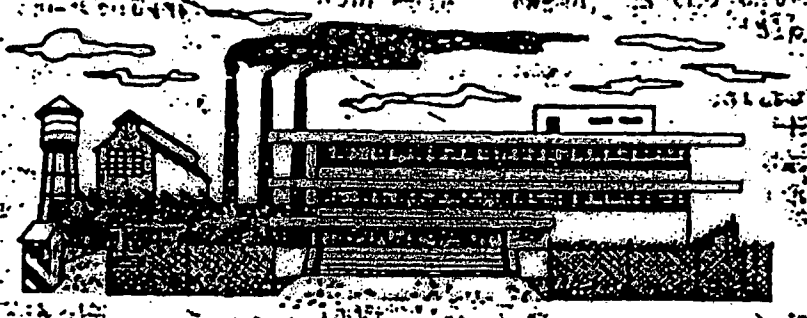
TENTH ANNUAL MEETING

OF THE

AMERICAN CONFERENCE

OF

GOVERNMENTAL INDUSTRIAL HYGIENISTS



BOSTON, MASSACHUSETTS

March 27 - 30, 1948

REPORT OF THE COMMITTEE ON THRESHOLD LIMITS

DR. L. T. FAIRHALL (U. S. Public Health Service): It is obviously difficult, where a large number of substances is involved, to review the maximum allowable concentration values in detail at an annual meeting. For that reason, provision was made early in the organization of the American Conference of Governmental Industrial Hygienists for a Committee on Threshold Limits to study this question and to report to the Conference at its annual meeting. The composition of this Committee is not fixed but is changed by annual appointment and the threshold limit values are similarly maintained in a fluid state by annual revision. For a number of years the Committee has subjected these values to careful scrutiny and attempted to bring them into close conformance with practice.

During the present year, it was felt that the concept of maximum allowable values had now reached a stage where more extensive participation of the members of the Conference in the formulation of these values based upon personal experience in the field would be of decided assistance. This year, therefore, your Committee has for the first time, I believe, made a direct attempt to obtain a statement from each member of the Conference with reference to the annual threshold limit values and the response from the individual members has been most generous and helpful.

In view of the annual revision of threshold limit values, it has been the purpose of the Conference to seek values which, on the one hand protect the individual workman, and on the other would impose no impossible burden on the manufacturer. This balance is difficult to achieve but can be attained by just such a series of adjustments as is provided for in the Constitution of the Conference. There is no industrial poison so potent, so virulent, that it cannot be manufactured safely under carefully controlled conditions. The manufacture and widespread use of such a substance as lead tetraethyl and the preparation of extremely poisonous war gases are good illustrations of this. In fact, the chemical manufacturing industry in general has been able to maintain a high standard of safe industrial practice by the installation of suitable control measures for the protection of its workers. There is no reason why such safe industrial control measures cannot be extended to industry in general wherever industrial poisons occur.

In addition to the comments of the members of the Conference, a few criticisms from other sources have reached us concerning the 1947 values. These may be briefly summarized as follows:

1. Concerning the membership at large, criticism has taken the form that (a) values were arrived at by consulting the membership at large, and (b) that the members were not consulted.

2. The publication of the values in the Industrial Hygiene Newsletter made it appear that the values were those of the U. S. Public Health Service. Whether this was wishful thinking or not, the source of the 1947 values was clearly indicated at the time of publication.

3. Criticism has also taken the form that the values given were not arrived at or based upon scientific evidence. The latter has particularly interested

your present Committee. No specific "scientific evidence" has so far been presented for our consideration along with this criticism.

While it will doubtless be very advantageous to have what might be called permanent or standard maximum allowable concentration values, it must be borne in mind that all our values at the present time are fluid and subject to annual revision. They should not be adopted as fixed or legal values, but merely as guides to assist us in defining more or less safe working conditions. It is felt that eventually definite values can be established which will give full and ample protection to the worker.

The following changes have been made in the values from those of the 1947 conference:

Benzene has been decreased from 50 to 35 ppm
Chlorine has been decreased from 2 to 1 ppm
Formaldehyde has been decreased from 10 to 5 ppm
Hydrogen chloride has been decreased from 10 to 5 ppm
Hydrogen cyanide has been decreased from 20 to 10 ppm
Hydrogen selenide has been decreased from 0.10 to 0.05 ppm
Trichloroethylene has been decreased from 150 to 100 ppm

Iodine has been changed from .1 mg./cu.m. to 1 ppm

2-Butanone has been increased from 200 to 250 ppm
Isopropyl ether has been increased from 400 to 500 ppm
Antimony has been increased from 0.1 mg./cu.m. to 0.5
Arsenic has been increased from 0.1 mg./cu.m to 0.5
Sulfuric acid has been increased from 0.5 mg./cu.m. to 1.0

It must be borne in mind that these values are not indices of toxicity and are not intended to approach that value. Accordingly, the comparative toxicity of these compounds cannot be established on the basis of their numerical maximum allowable concentration value.

People vary greatly in response to drugs and toxic substances. Therefore, it is the opinion of the Committee that we can set down a practical limit below which there is complete safety and immediately above which there may be a high percentage of cases of poisoning among those exposed.

With these facts in mind the Committee has set values below which it is fair to expect reasonable protection and above which it is reasonable to expect that we can have occasional cases of poisoning.

THRESHOLD LIMIT VALUES ADOPTED AT APRIL, 1948, MEETING OF AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS IN BOSTON, MASSACHUSETTS

GASES AND VAPORS

SUBSTANCE	P.P.M.	SUBSTANCE	P.P.M.
Acetaldehyde	200	Acrolein	0.5
Acetic acid	10	Acrylonitrile	20
Acetic anhydride	5	Ammonia	100
Acetone	500	Amyl acetate	200

GASES AND VAPORS (cont'd.)

SUBSTANCE	P.P.M.
iso-Amyl alcohol	100
Aniline	5
Arsine	0.05
Benzene (benzol)	35
Bromine	1
1,3-Butadiene	1,000
n-Butanol	50
2-Butanone	250
n-Butyl acetate	200
Butyl cellosolve	200
Carbon dioxide	5,000
Carbon disulfide	20
Carbon monoxide	100
Carbon tetrachloride	50
Cellosolve	200
Cellosolve acetate	100
Chlorine	1
2-Chlorobutadiene	25
Chloroform	100
1-Chloro-1-nitropropane	20
Cyclohexane	400
Cyclohexanol	100
Cyclohexanone	100
Cyclohexene	400
Cyclopropane (propene)	400
o-Dichlorobenzene	50
Dichlorodifluoromethane	1,000
1,1-Dichloroethane	100
1,2-Dichloroethane (ethylene dichloride)	75
1,2-Dichloroethylene	200
Dichloroethyl ether	15
Dichloromethane	500
Dichloromonofluoromethane	1,000
1,1-Dichloro-1-nitroethane	10
1,2-Dichloropropane (propylene dichloride)	75
Dichlorotetrafluoroethane	1,000
Dimethylaniline	5
Dimethylsulfate	1
Dioxane	100
Ethyl acetate	400
Ethyl alcohol	1,000
Ethyl benzene	200
Ethyl bromide	200
Ethyl chloride	1,000
Ethylene chlorohydrin	5
Ethylene oxide	100
Ethyl ether	400
Ethyl formate	100
Ethyl silicate	100
Formaldehyde	5
Gasolene	500
Heptane	500
Hexane	500
Hydrogen chloride	5
Hydrogen cyanide	10
Hydrogen fluoride	3
Hydrogen selenide	0.05
Hydrogen sulfide	20
Iodine	1
Isophorone	25
Mesityl oxide	50
Methanol	200
Methyl acetate	200
Methyl bromide	20
Methyl butanone	100
Methyl cellosolve	25
Methyl cellosolve acetate	25
Methyl chloride	100
Methylcyclohexane	500
Methylcyclohexanol	100
Methylcyclohexanone	100
Methyl formate	100
Methyl iso-butyl ketone	100
Monochlorobenzene	75
Monofluorotrichloromethane	1,000
Mononitrotoluene	5
Naphtha (coal tar)	200
Naphtha (petroleum)	500
Nickel carbonyl	1
Nitrobenzene	1
Nitroethane	100
Nitrogen oxides (other than N_2O)	25
Nitroglycerin	0.5
Nitromethane	100
2-Nitropropane	50
Octane	500
Ozone	1
Pentane	1,000
Pentanone (methyl propanone)	200
Phosgene	1
Phosphine	0.05
Phosphorus trichloride	0.5
iso-Propanol	400
Propyl acetate	200
iso-Propyl ether	500
Stibine	0.1

GASES AND VAPORS (cont'd.)

SUBSTANCE	P.P.M.	SUBSTANCE	P.P.M.
Stoddard solvent	500	Toluene	200
Styrene monomer	200	Toluidine	5
Sulfur chloride	1	Trichloroethylene	100
Sulfur dioxide	10	Turpentine	100
1,1,2,2-Tetrachloroethane	5	Vinyl chloride	500
Tetrachloroethylene	100	Xylene	200

TOXIC DUSTS, FUMES AND MISTS

SUBSTANCE	Mg. per cu. m.	SUBSTANCE	Mg. per cu. m.
Antimony	0.5	Mercury	0.1
Arsenic	0.5	Pentachloronaphthalene	0.5
Barium	0.5	Pentachlorophenol	0.5
Cadmium	0.1	Phosphorus (yellow)	0.1
Chlorodiphenyl	1	Phosphorus pentachloride	1
Chromic acid and chromates as CrO_3	0.1	Phosphorus pentasulfide	1
Cyanide as CN	5	Selenium, as Se	0.1
Dinitrotoluene	1.5	Sulfuric acid	1.0
Fluoride	2.5	Tellurium	0.1
Iron oxide fume	15	Tetryl	1.5
Lead	0.15	Trichloronaphthalene	5
Magnesium oxide fume	15	Trinitrotoluene	1.5
Manganese	6	Zinc oxide fume	15

MINERAL DUSTS

SUBSTANCE	M.P.P.C.F.	SUBSTANCE	M.P.P.C.F.
Alundum	50	Silica:	
Asbestos	5	high (above 50% free SiO_2)	5
Carborundum	50	medium (5 to 50% free SiO_2)	20
Dust (nuisance, no free silica)	50	low (below 5% free SiO_2)	50
Mica (below 5% free silica)	50	Slate (below 5% free SiO_2)	50
Portland cement	50	Soapstone (below 5% free SiO_2)	20
Talc	20	Total dust (below 5% free SiO_2)	50

RADIATIONS

MATERIAL OR RADIATION	Radiant Energy	MATERIAL OR RADIATION	Radiant Energy
Gamma (roentgen per day)	0.1	Thoron (curies per cubic meter)	10^{-8}
Radon (curies per cubic meter)	10^{-8}	X-ray (roentgen per day)	0.1

(The report of the Committee on Threshold Limits was accepted.)