



PLAINTIFF'S EXHIBIT

IHF-514

Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

SEPTEMBER, 1965

(Vol. 29, No. 9)

INDUSTRIAL HYGIENE FOUNDATION

MELLON INSTITUTE

4400 FIFTH AVENUE -- PITTSBURGH, PA. 15213

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INDUSTRIAL HYGIENE FEATURES

Human factors in industrial medicine are discussed in Abst. No. 836.

A report on health education in industry is given in Abst. No. 837.

Abst. No. 839 is concerned with grip measurements as a part of pre-placement evaluation.

Abst. No. 844 presents a study on contact lenses and the railroad industry.

Abst. No. 853 studies experimental lung cancer in hamsters.

See Abst. No. 857 for a description of experimental emphysema produced in rats by papain.

A report of a typical case of mesh skin grafting is given in Abst. No. 867.

Abst. No. 868 investigates the carcinogenic action of motor engine oil additives.

Information concerning the treatment of hydrofluoric acid burns is given in Abst. No. 871.

Pulmonary styrene vapor retention is considered in Abst. No. 877.

A report on cancers in mice from asphalt fractions is given in Abst. No. 883.

A case study of so-called pulmonary thesaurosis from hair sprays is given in Abst. No. 884.

Consult Abst. No. 894 for data on audiometry in industry.

Abst. No. 907 describes a search for some nitro-olefins in polluted air.

The alcoholic in industry and the role of the personnel specialist is the title of Abst. No. 925.

See Abst. No. 927 for a case of traumatic aneurysm of the axillary artery: a golf hazard.

FOUNDATION FACTS

A JOINT EXECUTIVE COMMITTEE-BOARD OF TRUSTEES MEETING was held in Mellon Institute on the morning of September 14. Trustees who attended participated in an IHF Medical-Management Discussional that afternoon. Distinguished authorities led discussions on sick absence, group health insurance, data processing of industrial health information, setting of TLV's, effects of carbon monoxide exposure at certain levels (steel manufacturing) and carbon monoxide research (automobile manufacturing). No proceedings or papers will be published. Sponsored by the Foundation's Medical Committee, the discussional has provided the Foundation's staff with guidance in planning future symposia and research in the interest of the membership.

NURSING SERIES BULLETIN NO. 1 is enclosed with this issue of the Digest. An IHF proposal for the follow-up studies mentioned in the Bulletin has been submitted to the National Institutes of Mental Health for possible initiation in 1966. Progress will be reported later.

THRESHOLD LIMIT VALUES FOR 1965 adopted by the American Conference of Governmental Industrial Hygienists at their 27th Annual Meeting in Houston, Texas on May 2-4, 1965 appear in this issue of the Digest. Tentative plans for a Discussional early in 1966, will be considered by the Chemical-Toxicological Committee at the Foundation's Annual Meeting, October 20-21. Those having suggestions or interest in this Foundation activity may wish to communicate with Dr. Joseph Treon, Atlas Chemical Industries, Inc., Wilmington, Delaware 19899 or Dr. John Zapp, Haskell Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Delaware 19898, co-chairmen of the Committee.

AN ENGINEERING DISCUSSIONAL is tentatively planned for early 1966. Suggestions contained in the questionnaire attached to the Third Quarterly Report have been provided to Dr. Cralley, chairman of the Engineering Committee. Additional suggestions may still be forwarded to reach Dr. Cralley, Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh, Pa. 15219, prior to October 19.

INDUSTRIAL MEDICAL ASSOCIATION OF PITTSBURGH-CLEVELAND AREA held its Fall Scientific and annual business meeting on September 24 at Mellon Institute. Dr. deTreville was on the program and spoke on "Mental Health Programs and Occupational Health Nursing."

NEW REPRINT AVAILABLE UPON REQUEST. "Ozone Toxicity Studies; Destruction of Alveolar Septa—a Precursor of Emphysema?" P. Gross; L. D. Scheel and H. E. Stokinger. Presented at 7th Conf. Res. in Emphysema, Aspen 1964; Med. thorac. 22, 376-381 (1965).

30th ANNUAL MEETING — OCTOBER 20-21, 1965

Programs and registration cards have been mailed to all members. This is your meeting and an excellent program has been arranged. Plan now to be with us and let us have your preregistration card as soon as possible.

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THRESHOLD LIMIT VALUES FOR 1965

Adopted at the 27th Annual Meeting of the
American Conference of Governmental
Industrial Hygienists, Houston, Texas
May 2-4, 1965.

The Threshold Limit Values refer to air-borne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. Because of wide variation in individual susceptibility, exposure of an occasional individual at or even below the threshold limit may not prevent discomfort, aggravation of a pre-existing condition, or occupational illness.

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. Exceptions are the substances given in Appendix A and certain of the substances given in Appendix B. The values not given a "C" listing refer to time-weighted average concentrations for a normal workday.

The amount by which these concentrations 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. Enlightened industrial hygiene practice inclines toward controlling exposures below the limit rather than maintenance at the limit.

Threshold limits are based on the best available information from industrial experience, from experimental human and animal studies, and when possible, from a combination of the three. The basis on which the values are established may differ from substance to substance; protection against impairment of health may be the guiding factor for some, whereas reasonable freedom from irritation, narcosis, nuisance or other forms of stress may dominate the basis for others. The Committee holds to the opinion that

limits based on physical irritation should be considered no less binding than those based on physical impairment, growing bodies of evidence indicate that physical irritation may promote and accelerate physical impairment.

Documentation of Threshold Limit Values:

A separate companion piece to the TLVs will be issued by ACGIH under this title. This publication gives the pertinent scientific information and data with reference to literature sources, that were used to base each limit. Each documentation also contains a statement defining the type of response against which the limit is safeguarding the worker. For a better understanding of the TLVs it is essential that the Documentation be consulted when the TLVs are being used.

Ceiling vs. Time-Weighted Average Limits:
Although the time-weighted average concentration provides the most satisfactory, practical way of monitoring air-borne agents for compliance with the limits, there are certain substances for which it is inappropriate. In the latter group are substances which are predominantly fast acting and whose threshold limit is more appropriately based on this particular response. Substances with this type of response are best controlled by a ceiling "C" limit that should not be exceeded. It is implicit in these definitions that the manner of sampling to determine compliance with the limits for each group must differ, a single brief sample, that is applicable to a "C" limit, is not appropriate to the time-weighted limit; here, a sufficient number of samples are needed to permit a time-weighted average concentration throughout a complete cycle of operations or throughout the work shift.

Whereas the ceiling limit places a definite boundary which concentrations should not be permitted to exceed, the time-weighted average limit requires an explicit limit to the excursions that are permissible above the listed values. The magnitude of these excursions may be pegged to the magnitude of the threshold limit by an appropriate factor shown in Appendix C. It should be noted that the same factors are used

by the Committee in making a judgement whether to include or exclude a substance for a "C" listing.

Skin Notation: Listed substances followed by the designation "Skin" refer to the potential contribution to the over-all exposure by the cutaneous route including mucous membranes and eyes, either by air-borne, or more particularly, by direct contact with the substance. Vehicles can alter skin absorption. This attention-calling designation is intended to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated.

Mixtures: Special consideration should be given also to the application of these values in assessing the health hazards which may be associated with exposure to mixtures of two or more substances. A brief discussion of basic considerations involved in developing threshold limit values for mixtures, and methods for their development, amplified by specific examples are given in Appendix B.

"Inert" or Nuisance Particulates: A number of dusts or particulates that occur in the working environment ordinarily produce no specific effects upon prolonged inhalation. Some insoluble substances are classed as inert (e.g. iron and steel dusts, cement, bentonite, silicon carbide, titanium dioxide, cellulose), others may be soluble (starch, soluble oils, calcium carbonate) but are of such a low order of activity that in concentrations ordinarily encountered do not cause physiologic impairment; still others may be readily eliminated or destroyed by the body (vegetable oils, glycerine, sucrose). In the case of the insoluble substances, there may be some accumulation in the respiratory passages. In the case of the soluble substances, this accumulation will ordinarily be temporary but may interfere to some extent with respiratory processes. Hence, it is desirable to control the concentrations of such particulates in the air breathed by any individual, in keeping with good industrial hygiene practice.

A threshold limit of 15mg. m³ or 50 mppcf, whichever is less, is recommended for substance

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ii.

ces in these categories and for which no specific threshold limits have been assigned. This limit, for a normal work day, does not apply to brief exposures at higher concentrations. Neither does it apply to those substances which may cause physiologic impairment at lower concentrations but for which a threshold limit has not yet been adopted. Some "inert" particulates are given in Appendix D.

Simple Asphyxiants--"Inert" Gases or Vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The minimal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, pO_2 , of 135 mm Hg). Atmospheres deficient in O_2 do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants are listed in Appendix E. Some asphyxiants present an explosion hazard. Account should be taken of this factor in limiting the concentration of the asphyxiant.

These limits are intended for use in the field of industrial hygiene and should be interpreted and applied only by persons trained in this field. They are not intended for use, or for modification for use, (1) as a relative index of toxicity, by making a ratio of two limits, (2) in the evaluation or control of community air pollution or air pollution nuisances, (3) in estimating the toxic potential of continuous uninterrupted exposures, (4) as proof or disproof of an existing disease of physical condition, or (5) for adoption by countries whose working conditions differ from those in the U.S.

Physical Factors. It is recognized that such physical factors as heat, ultraviolet and ionizing radiation, humidity, abnormal pressure and the like may place added stress on the body so that the effects from exposure at a threshold limit may be altered. Most of these stresses act

adversely to increase the toxic response of a substance. Although most threshold limits have been built-in safety factors to guard against adverse effects of moderate deviations from normal environments, the safety factors of most substances are not of such a magnitude as to take care of gross deviations. For example, continuous work at temperatures above $90^{\circ}F$ or over-time, extending the work-week more than 50%, might be considered gross deviations. In such instances judgement must be exercised in the proper adjustments of the threshold limit values.

These values are reviewed annually by the Committee on Threshold Limits for revision or additions, as further information becomes available.

"Notice of Intent" At the beginning of each year, proposed actions of the Committee for the forthcoming year are issued in the form of a "Notice of Intent." This Notice provides not only an opportunity for comment, but solicits suggestions of substances to be added to the list. The suggestions should be accompanied by substantiating evidence.

Legislative Action. The Conference does not consider the Threshold Limit Values appropriate matter for adoption in legislative codes and regulations, and recommends against such use. If, however, the list is so used, it should be based on the current TLV list and pertinent documentation.

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RECOMMENDED VALUES (In Alphabetical Order)

Substance	ppm*	Mg/M ³ **
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	20
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylonitrile - Skin	20	45
Aldrin (1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8a-hexahydro-1, 4, 5, 8-di-methano-naphthalene) - Skin	-	0.25
Allyl alcohol - Skin	2	5
Allyl chloride	1	3
C Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	2	12
Ammonia	50	35
Ammonium sulfamate (Ammate)	-	15
n-Amyl acetate	100	525
Amyl alcohol (isoamyl alcohol)	100	360
Aniline - Skin	5	19
Antimony & compounds (as Sb)	-	0.5
ANTU (alpha naphthyl thiourea)	-	0.3
Arsenic & Compounds (as As)	-	0.5
Arsine	0.05	0.2
Barium (soluble compounds)	-	0.5
C Benzene (benzol) - Skin	25	80
Benzidine-Skin	-	Al
Benzyl chloride	1	5
Beryllium	-	0.002
Boron oxide	-	15
C Boron trifluoride	1	3
Bromine	0.1	0.7
Butadiene (1, 3-butadiene)	1,000	2,200

*Part of value of gas, per million parts of air by volume at 25°C and 760 mm Hg pressure.
**Appropriate milligrams of particulate per cubic meter of air.
A Number, See Appendix A

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Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰
2-Butanone (methyl ethyl ketone)	200	590	Chloroprene (2-chloro-1,3-butadiene) - Skin	25	90	Dieldrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene) - Skin	-	0.25
2-Butoxy ethanol (Butyl Cellosolve) - Skin	50	240	Cobalt	-	0.1	Diethylamine	25	75
Butyl acetate (n-butyl acetate)	-	-	Copper Fume	-	0.1	Diffuorodibromomethane	100	860
Butyl alcohol	100	300	Dusts and Mists	-	1.0	C Diglycidyl ether (DGE)	0.5	2.8
tert. Butyl alcohol	100	300	Crag (R) herbicide [sodium 2-(2,4-dichlorophenoxy) ethanol hydrogen sulfate]	-	15	Diisobutyl ketone	50	290
C Butylamine-Skin	5	15	Cresol (all isomers) - Skin	5	22	Dimethyl acetamide - Skin	10	35
C tert. Butyl chromate (as CrO ₃) - Skin	-	0.1	Cyanide (as CN) - Skin	-	5	Dimethylamine (N-dimethyl-aniline) - Skin	5	25
n-Butyl glycidyl ether (BGE)	50	270	Cyclohexane	-	-	Dimethylformamide - Skin	-	-
Butyl mercaptan	10	35	†† Cyclohexanol	50	200	1,1-Dimethylhydrazine - Skin	0.5	1
p-tert. Butyltoluene	10	60	Cyclohexanone	50	200	Dimethylsulfate - Skin	1	5
Cadmium oxide fume	-	0.1	†† Cyclohexene	-	-	Dinitrobenzene	-	-
Calcium arsenate	-	1	2,4-D (2,4-dichlorophenoxy-acetic acid)	-	10	(all isomers) - Skin	-	1
Calcium oxide	-	5	DDT [2,2-bis (p-chlorophenyl)-1,1,1-trichloroethane] - Skin	-	1	Dinitro-o-cresol - Skin	-	0.2
Camphor	-	2	DDVP (O, O-Dimethyl-2,2-dichloro-vinyl phosphate) - Skin	-	1	Dinitrotoluene - Skin	-	1.5
Carbon dioxide	5,000	9,000	Decaborane - Skin	0.05	0.3	Dioxane	-	-
Carbon disulfide - Skin	20	60	Demeton (systox) (R) - Skin	1.0	-	(diethylene dioxide) - Skin	100	360
Carbon monoxide	-	-	Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240	Diisopropylene glycol methyl ether - Skin	100	600
Carbon tetrachloride - Skin	10	65	Diborane	0.1	0.1	Endrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro 1,4-endo-5,8-dimethanonaphthalene) - Skin	-	0.1
Chlordane (1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoin-dane) - Skin	-	0.5	+ 1,2-Dibromoethane (ethylene dibromide) - Skin	-	-	Epichlorohydrin-Skin	5	19
Chlorinated camphene, (linoxaphene) - Skin	-	0.5	C o-Dichlorobenzene	50	300	EPN (O-ethyl O-p-nitrophenyl thionobenzenephosphonate)-Skin	-	0.5
Chlorinated diphenyl oxide	-	0.5	p-Dichlorobenzene	75	450	Ethanolamine	3	6
† Chlorine	-	-	Dichlorodifluoromethane	1,000	4,950	Ethyl acetate	400	1,400
Chlorine dioxide	0.1	0.3	1,1-Dichloroethane	100	400	Ethyl acrylate - Skin	25	100
C Chlorine trifluoride	0.1	0.4	1,2-Dichloroethane (ethylene dichloride)	50	200	Ethyl alcohol (ethanol)	1,000	1,900
C Chloroacetaldehyde	1	3	1,2-Dichloroethylene	200	790	†† Ethylamine	-	-
Chlorobenzene (monochlorobenzene)	75	350	C Dichloroethyl ether-Skin	15	90	†† C Ethylbenzene	-	-
Chlorobromomethane	200	1,050	Dichloromono-fluoromethane	1,000	4,200	Ethyl bromide	200	890
Chlorodiphenyl (42% chlorine) - Skin	-	1	C 1,1-Dichloro-1-nitroethane	10	60	Ethyl chloride	1,000	2,600
Chlorodiphenyl (54% chlorine) - Skin	50	240	Dichlorotetrafluoroethane	1,000	7,000	Ethyl ether	400	1,200
C Chloroform (trichloromethane)	20	100				Ethyl formate	100	300
1-Chloro-1-nitropropane	0.1	0.7				†† C Ethyl mercaptan	-	-
Chloropercum	-	-						

† 1965 Addition or deletion of *C-see Tentative Values
 † 1964 Revision -see Tentative Values
 † 1965 Revision -see Tentative Values

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iv.

Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰
Ethyl silicate	100	850	†† Iron oxide fume	—	—	Methyl isobutyl carbinol (methyl amyl alcohol) - Skin	25	100
Ethylene chlorohydrin - Skin	5	16	Isophorone	25	140	Methyl mercaptan	—	—
Ethylendiamine	10	25	Isopropylamine	5	12	Methyl methacrylate	100	410
C Ethylene glycol dinitrate - Skin	0.2	1.2	Isopropyl glycidyl ether (IGE)	50	240	C α Methyl styrene	100	480
†† Ethylene imine - Skin	—	—	Ketene	0.5	0.9	C Methylene bis phenyl isocyanate (MDI)	0.02	0.2
Ethylene oxide	50	90	Lead	—	0.2	Methylene chloride (dichloromethane)	500	1,750
2 Ethoxyethanol Skin	200	740	Lead arsenate	—	0.15	Molybdenum (soluble compounds)	—	5
2-Ethoxyethylacetate	—	—	Lindane (hexachlorocyclohexane, gamma isomer) - Skin	—	0.5	(insoluble compounds)	—	15
Ferbam (feric dimethyl dithiocarbamate)	100	540	Lithium hydride	—	0.025	Monomethyl aniline - Skin	2	9
Ferrovanadium dust	—	15	Magnesium oxide fume	—	15	Naphtha (coal tar)	200	800
Fluoride (as F)	—	2.5	Malathion (O, O-dimethyl dithiophosphate of diethyl mercaptosuccinate) - Skin	—	15	Naphtha (petroleum)	500	2,000
Fluorine	0.1	0.2	C Manganese	—	5	Naphthalene	10	50
Fluorotrichloromethane	1,000	5,600	Mercury - Skin	—	0.1	β - Naphthylamine	—	A2
C Formaldehyde	5	6	Mercury (organic compounds) - Skin	—	0.01	Nickel carbonyl	0.001	0.007
Furfural - Skin	5	20	Mesityl oxide	25	100	Nicotine - Skin	—	0.5
Furfuryl alcohol	50	200	Methoxychlor (2, 2-di-p- methoxy-phenyl-1, 1, 1- trichloroethane)	—	15	Nitric acid	—	—
Gasoline	500	2,000	Methyl acetate	200	610	p-Nitroaniline - Skin	1	6
Glycidol 12, 3-Epoxy-1- propanol)	50	150	Methyl acetylene (propyne)	1,000	1,650	Nitrobenzene - Skin	1	5
Halium	—	0.5	Methyl acrylate - Skin	10	35	Nitroethane	100	310
Heptachlor (1, 4, 5, 6, 7, 8, 8a-heptachloro-3a, 4, 7, 7a-tetrahydro-4, 7- methanonane) - Skin	—	0.5	Methylal (dimethoxymethane)	1,000	3,100	C Nitrogen dioxide	5	9
Heptane (n-heptane)	500	2,000	Methyl alcohol (methanol)	200	260	C Nitroglycerin - † EGDN - Skin	0.2	2
Hexane (n-hexane)	500	1,800	C Methyl bromide - Skin	20	80	Nitromethane	100	250
Hexanone (methyl butyl ketone)	100	410	Methyl cellosolve (2-methoxy- ethanol) - Skin	25	80	1-Nitropropane	25	90
sec-Hexyl acetate	50	295	Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate) - Skin	25	120	2-Nitropropane	25	90
Hexone (methyl isobutyl ketone)	100	410	C Methyl chloride	100	210	N - Nitrosodimethylamine (Di- methylnitrosamine) - Skin	A3	—
Hydrazine - Skin	1	1.3	Methyl chloroform (1, 1, 1-tri- chloroethane)	350	1,900	Nitrotoluene - Skin	5	30
Hydrogen bromide	3	10	Methyl cyclohexane	500	2,000	Octane	500	2,350
C Hydrogen chloride	5	7	Methylcyclohexanol	100	470	Oil mist (mineral)	—	5
Hydrogen cyanide - Skin	10	11	o-Methylcyclohexanone - Skin	100	460	Osmium tetroxide	—	0.002
Hydrogen fluoride	3	2	Methyl formate	100	250	Ozone	0.1	0.2
Hydrogen peroxide, 90%	1	1.4				Parathion (O, O-diethyl O-p- nitrophenyl thiophosphate) - Skin	—	0.1
Hydrogen selenide	0.05	0.2				Pentaborane	0.005	0.01
Hydrogen sulfide	—	—				Pentachloronaphthalene - Skin	—	0.5
Hydroquinone	—	2						
C Iodine	0.1	1						

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† 1945 Addition or deletion of *C-see Tentative Values
 † 1964 Revision -see Tentative Values
 † 1965 Revision -see Tentative Values

Substance	ppm*	Mg/M ³ **
Nickel, metal and soluble compounds	-	1
Nitric acid	2	5
p-Nitrochlorobenzene - Skin	-	1
Nitrogen trifluoride	10	29
Oxalic acid	-	1
Oxygen difluoride	0.05	0.1
p-Phenylene diamine - Skin	-	0.1
++Phenyl ether (vapor)	1	7
++Phenyl ether-Biphenyl mixture (vapor)	1	7
Phosgene	0.1	0.4
Phthalic anhydride	2	12
++Pival (2-Pivalyl)-1,3-indandione	-	0.1
Propane	1,000	1,800
Propylene imine - Skin	2	5
Rhodium, Metal fume and dusts	-	0.1
soluble salts	-	0.001
Selenium compounds	-	0.2
++Selenium hexafluoride	0.05	0.4
Silver, metal and soluble compounds	-	0.01
++Tellurium hexafluoride	0.02	0.2
1, 1, 1, 2 - Tetrafluoro-2, 2 - difluoroethane	500	4170
++Tetramethyl lead (TML) (as lead) - Skin	-	0.075
++Tetramethyl succinonitrile - Skin	0.5	3
++Tremolite	5 mgpcf	-
++1, 1, 2-Trichloroethane - Skin	10	45
Xylene	100	435
Yttrium	-	1

* Parts of vapor or gas per million parts of air by volume at 25°C and 150 mm Hg pressure

** Approximate milligrams of particulate per cubic meter of air

1965 Revision

1965 Additions

Appendix A

- A' Benzidine** Because of high incidence of bladder tumors in man, any exposure, including skin, is extremely hazardous
- A' β-Naphthylamine** Because of the extremely high incidence of bladder tumors in workers handling this compound and the inability to control exposures, β-naphthylamine has been prohibited from manufacture, use and other activities that involve human contact by the State of Pennsylvania
- A' N-Nitrosodimethylamine** Because of extremely high toxicity and presumed carcinogenic potential of this compound, contact by any route should not be permitted
- A' Polytetrafluoroethylene *** decomposition products
At least one identified component of the decomposition products is extremely toxic, but in the absence of more complete toxicity information and suitable analytic methods, a definite Threshold Limit Value is not recommended at this time, but air concentrations should be minimal.
- A' β-Propiolactone** Because of high acute toxicity and demonstrated skin tumor production in animals, contact by any route should be avoided

* Trade Names: Algoflon, Fluon, Halon Teflon, Teflan

Appendix B

B.1 THRESHOLD LIMIT VALUES FOR MIXTURES

When two or more hazardous substances are present, their combined effect, rather than that of either individually, should be given primary consideration. In the absence of information to the contrary, the effects of the different hazards should be considered as additive. That is, if the sum of the following fractions,

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_n}{T_n}$$

exceeds unity, then the threshold limit of the mixture should be considered as being exceeded. C indicates the observed atmospheric concentration, and T: the corresponding threshold limit. (See Example 1A.)

Exceptions to the above rule may be made when there is good reason to believe that the chief effects of the different harmful substances are not in fact additive, but independent as when purely local effects on different organs of the body are produced by the various components of the mixture. In such cases the threshold limit ordinarily is exceeded only when at least one member of the series (C₁ or C₂ etc.) itself has a value exceeding unity. (See Example 1A.b.)

Antagonistic action or potentiation may occur with some combinations of atmospheric contaminants. Such cases at present must be determined individually. Potentiating or antagonistic agents are not necessarily harmful by themselves. Potentiating effects of exposure to such agents by routes other than that of inhalation is also possible, e.g. inhibited alcohol and inhaled narcotic (trichloroethylene). Potentiation is characteristically exhibited at high concentrations, less probably at low.

When a given operation or process characteristically emits a number of harmful dusts, fumes, vapors or gases, it will frequently be only feasible to attempt to evaluate the hazard by measurement of a single substance. In such cases the threshold limit used for this substance should be reduced by a suitable factor for the magnitude of which will depend on the number, toxicity and relative quantity of the other contaminants ordinarily present.

Examples of processes which are typically associated with two or more harmful atmospheric contaminants are wetting automobile repair blasting painting lacquering certain foundry operations diesel exhausts, etc. (Example 2.)

THRESHOLD LIMIT VALUES FOR MIXTURES

EXAMPLES

1A General case, where air is analyzed for each component

a ADDITIVE EFFECTS

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_n}{T_n}$$

Air contains 5 ppm of carbon tetrachloride (TLV 10), 20 ppm of ethylene dichloride (TLV 50) and 10 ppm of ethylene dibromide (TLV 25)

$$\frac{5}{10} + \frac{20}{50} + \frac{10}{25} = 0.5 + 0.4 + 0.4 = 1.3$$

Threshold limit is exceeded

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b INDEPENDENT EFFECTS

Air contains 0.15 mg m⁻³ of lead (TLV, 0.2) and 0.7 mg m⁻³ of sulfuric acid (TLV, 1)

0.15 0.75 1 0.7

Threshold limit is not exceeded.

18 Special case when source of contaminant is a mixture and atmospheric composition is assumed similar to that of original material, i.e. vapor pressure of each component is the same at the observed temperature.

a ADDITIVE EFFECTS, approximate solution

1 A mixture of equal parts (1) trichloroethylene (TLV 100) and (2) methyl chloroform (TLV 350)

C = C₁ + C₂ = 350 + 350 = 700

C₁ = C₂ = 350

C₁ = C₂ = 350

7C 2C 700

T_m 700 x 2 155 ppm

18b General Exact Solution for Mixtures of M Components With Additive Effects and Different Vapor Pressures

$$(1) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$(2) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$(21) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$(3) C_1 = \frac{C}{T_1} \times T_m$$

$$(4) p_1 = \frac{C_1}{T_1} \times T_m$$

$$(5) C_1 = \frac{C}{T_1} \times T_m$$

Combining (1), (2), (3), (4) and (5), we obtain

$$(6) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

and solving for T_m

$$(61) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$(62) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

1 Threshold Limit Value in ppm
C = Vapor concentration in ppm
p = Vapor pressure of component in solution

p = Vapor pressure of pure component
T = Mol fraction of component in solution

a = A constant of proportionality
Subscripts 1, 2, n relate the above quantities to components 1, 2, n, respectively

Subscript i refers to an arbitrary component from 1 to n
Absence of subscript relates the quantity to the mixture

Solution to be applied when there is a reservoir of the solvent mixture whose composition does not change appreciably by evaporation

Exact Arithmetic Solution of Specific Mixture

	Mol wt	Density	T	p at 25°C	Mol fraction in half and half solution by volume
Trichloroethylene (1)	131.4	1.46 g/ml	100	73mm Hg	0.527
Methylchloroform (2)	133.42	1.33 g/ml	150	125mm Hg	0.473

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

Note difference in TLV when account is taken of vapor pressure and mol fraction in comparison with above example where such account is not taken

2 A mixture of one part of (1) parathion (TLV 0.1) and two parts of (2) EPN (TLV 0.5)

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

1C. T. L. V. for Mixtures of Mineral Dusts.

For mixtures of biologically active mineral dusts the general formula for mixtures may be used. With the exception of asbestos, pure minerals are assigned TLV's of 2.5, 20 or 50.

For a mixture containing 80% talc and 20% quartz, the TLV for 100% of the mixture "C" is given by:

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = \frac{C}{T_m}$$

Essentially the same result will be obtained if the limit of the more (most) toxic component is used provided the effects are additive. In the above example the limit for 20% quartz is 10 mppcl.

1955 Revision
1955 Additions

Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰	Substance	ppm*	Mg/M ¹⁰⁰
Pentachlorophenol - Skin	-	0.5	Selenium compounds (as Se)	-	-	Tri (inorganic lipids)	-	2
Pentane	1,000	2,950	Sodium fluoroacetate (1080)	-	-	(organic lipids)	-	0.1
Pentanone (methyl propyl ketone)	200	700	- Skin	-	-	Titanium dioxide	-	15
Perchloroethylene (tetra-chloroethylene)	100	670	Sodium hydroxide	-	0.05	Toluene (toluol)	200	750
Perchloromethyl mercaptan	0.1	0.8	Sodium hydroxide	0.1	0.5	o-Toluidine - Skin	5	22
Perchloroethyl fluoride	3	13.5	Stoddard solvent	500	2,900	C.Toluene-2,4-disulfonylate	100	0.02
Phenol - Skin	5	19	Styrene monomer	-	0.15	Trichloroethylene	-	520
Phenyl glycidyl ether (PGE)	50	310	(phenylethylene)	100	420	Trichloroethylene - Skin	-	5
Phenylhydrazine - Skin	5	22	Sulfur dioxide	5	13	1, 2, 3-Trichloropropane	50	300
Phosdin (Mevinphos)(R)	5	22	Sulfur hexafluoride	1,000	6,000	1, 1, 2-Trichloro 1, 2, 2-trifluoroethane	1,000	7,600
(2-carbomethoxy-1-methyl vinyl dimethyl phosphate) - Skin	-	0.1	Sulfuric acid	-	1	Triethylamine	25	100
Phosgene (carbonyl chloride)	-	-	Sulfur monochloride	1	6	Trifluoromonomethane	1,000	6,100
Phosphine	0.3	0.4	Sulfur pentachloride	0.025	0.25	Trimethylololuen - Skin	-	1.5
Phosphoric acid	-	1	Sulfuryl fluoride	5	20	Trior thocresyl phosphate	-	0.1
Phosphorus (yellow)	-	0.1	2, 4, 5T (2, 4, 5-trichlorophenoxyacetic acid)	-	10	Tripentene	100	560
Phosphorus pentachloride	-	1	Tantalum	-	5	Uranium (soluble compounds)	-	0.05
Phosphorus pentasulfide	-	1	TECP (tetraethyl dithionophosphate) - Skin	-	0.2	(insoluble compounds)	-	0.5
Phosphorus trichloride	-	1	Teflon (R) decomposition products	-	-	C. Vanadium (V 20 s dust)	-	0.1
Picric acid - Skin	0.5	3	TEPP (tetraethyl pyrophosphate) - Skin	-	A4	(V2O5 fume)	-	0.1
Platinum (Soluble Salts)	-	0.002	Tellurium	-	0.05	C. Vinyl chloride (chloroethylene)	500	1,300
Polytetrafluoroethylene decomposition products	-	-	1, 1, 2, 2-Tetrachloroethane	5	35	Vinyl toluene	100	480
β-Propiolactone	-	A4	- Skin	-	-	Wafatin (3-α acetylbenzyl hydroxyacetonin)	-	0.1
n-Propyl acetate	200	840	1, 1, 2, 2-Tetrachloro-1,2-difluoroethane	500	4,170	Xylene (xylol)	-	-
Propyl alcohol (isopropyl alcohol)	400	980	Tetraethyl lead (as Pb) - Skin	-	0.075	Xylidine - Skin	5	25
Propyl ether (isopropyl ether)	500	2,100	Tetrahydrofuran	200	590	Yttrium	-	5
n-Propyl nitrate	25	110	Tetranitromethane	1	8	Zinc oxide fume	-	5
Propylene dichloride (1, 2-dichloropropane)	75	350	Tetryl (2, 4, 6-trinitrophenyl-methyl/nitramine) - Skin	-	1.5	Zirconium compounds (as Zr)	-	5
Propyleneimine - Skin	100	240	- Skin	-	0.1			
Pyrethrum	-	5	Thiam (tetramethyl thiam disulfide)	-	5			
Pyridine	5	15						
Quinone	0.1	0.4						
Rolenone (commercial)	-	5						

* Parts of vapour or gas per million parts of air by volume at 25°C and 760 mm Hg pressure.
 Approximate milligrams of particulate per cubic meter of air.
 A Numbers: See Appendix A.

1965 Addition or deletion of 'C'-see Tentative Values
 1964 Revision - see Tentative Values
 1965 Revision - see Tentative Values

For another mixture of 25% quartz, 25% amorphous silica and 50% talc:

$$TLV = \frac{0.25}{2.5} + \frac{0.25}{20} + \frac{0.5}{20} = 0.133 \text{ approx}$$

The limit for 25% quartz approximates 8 mppcf.

Appendix C BASES FOR ASSIGNING LIMITING "C" VALUES

By definition in the Preface, a listed value bearing a "C" designation refers to 'ceiling' value that should not be exceeded; all values should fluctuate below the listed value. In general the bases for assigning or not assigning a "C" value rest on whether excursions of concentration above a proposed limit for periods up to 15 minutes may result in a) intolerable irritation, b) chronic or irreversible tissue change, or c) narcosis of sufficient degree to increase accident proneness impair self rescue or materially reduce work efficiency.

In order for the Committee to decide whether a substance is a candidate for a "C" listing, some guidelines must be formulated on the permissive fluctuation above the limit in terms of the seriousness of the response in the categories a, b, c, given above. For this the factors given in the table below have been used by the Committee. For both technical and practical reasons, the factors have been pegged to the concentration in an inverse manner. It will be noted that as the magnitude of the T L V increases a correspondingly decreased range of fluctuation is permitted, not to decrease the factor for T L V's of increasing magnitude would permit exposures to large absolute quantities, an undesirable condition, a condition that is minimized at low T L V's. More over, larger factors at the lower T L V's are consistent with the difficulties in analyzing and controlling trace quantities.

TLV RANGE ppm* or mg/m ³	Test TLV Factor	Examples
0 to 1	3	Toluene diisocyanate T L V .002 ppm, if permitted to rise above 0.06 ppm may result in sensitization in a single subsequent exposure "C" listing; recommended on category b

Appendix D

Some "Inert" or Nuisance Particulates

Aluminum (Al ₂ O ₃)	Limestone
Bentonite	Magnesite
Calcium carbonate	Marble
Cellulose	Plaster of Paris
Portland Cement	Rouge
Corundum (Al ₂ O ₃)	Silicon Carbide
Emery	Starch
Glycerine Mist	Sucrose
Gypsum	Tin Oxide
Vegetable oil mists (excepting castor, cashew nut, or similar irritant oils)	Titanium Dioxide

Appendix E

Some Simple Asphyxiants "Inert" Gases and Vapors.

Acetylene	Hydrogen
Argon	Methane
Ethane	Neon
Ethylene	Nitrogen
Helium	Nitrous Oxide

E. J. Barei	Harold N. MacFarland, Consultant
Allan L. Coleman	E. Mastromatteo
Hervey B. Elkins	Russel G. Scovill
W. G. Fredrick	Ralph G. Smith
Bernard Grubbs	George W. Wright, Consultant
Paul Gross	Mitchell R. Zaron
Wayland J. Hayes, Jr.	
Herbert E. Stokinger, Chairman	

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The American Conference of Governmental Industrial Hygienists will welcome requests for permission to republish or reprint these Threshold Limit Values. Requests for such permission should be directed to the Secretary-Treasurer, 1014 Broadway, Cincinnati, Ohio 45202.

The 2nd edition of the Documentation of Threshold Limit Values, rewritten and greatly enlarged to include the approximately 400 substances in the list will be available shortly and may be purchased from the Secretary-Treasurer. The Documentation should be consulted when using the Threshold Limit Values herein.

Single Copies - 30 cents

* Whichever unit is applicable

As stated in the preface, the same factors may be used as guides for reasonable excursions above the limit for substances to which the time weighted average applies. The time weighted average implies that each excursion above the limit is compensated by a comparable excursion below the limit.

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INDUSTRIAL HYGIENE DIGEST
Literature and News

NEWS ITEMS

820 Safety Publication.

A new publication devoted to safety and published by the New York State Department of Labor has been announced by Industrial Commissioner M. P. Catherwood. In an introduction to the first issue Commissioner Catherwood wrote: "This new publication is dedicated to the task of focusing attention on this all-important subject. Since the latter part of the 19th Century, the Department of Labor has been protecting workers in New York State in two ways: by providing safety education and engineering services and by enforcing occupational safety and health laws." The first issue of Spotlight on Safety was published in March. The second issue was published in June and is distributed free to interested persons. Names may be placed on the mailing list by writing to the Office of Public Information, New York State Department of Labor, State Office Building Campus, Albany, New York 12226. -- Safety Maint. 130, 13 (Aug. 1965)

821 Automobile Manufacturers Association.

An informative 16-page booklet being offered by the Automobile Manufacturers Association (AMA) does two things. First, it is the text of the presentation that AMA made in Detroit on April 7 before the Special Senate Subcommittee on Air and Water Pollution regarding Senate Bill 306 to amend the Clean Air Act. Second, it provides a succinct summary of the conclusions and confusions that have attended the development of automotive air pollution controls in California and elsewhere. The booklet can be had by writing directly to Automobile Manufacturers Association, Inc., 320 New Center Building, Detroit, Michigan 48202. -- J. Air Poll. Control Assn. 15, 332 (July, 1965)

822 Empty Drums May be Fatal.

A warning against using cutting torches on "empty" oil drums was sounded at the 56th National Meeting of the American Institute of Chemical Engineers. Several people in the United States kill themselves each year by using such devices on drums that apparently are empty but which contain lethal amounts of gas. Professor Noel de Nevers, of the Chemical Engineering Department of the University of Utah, told a symposium on lecture demonstration experiments. Professor de Nevers' warning was given during presentation of a paper, An Inexpensive Time Bomb. Cond. from Safety Maint. 130, 54 (Aug. 1965)

823 Professional Engineers Conference.

The 3rd Annual National Conference of Professional Engineers in Industry will be held October 15 and 16 at the Oklahoma-Sheraton Hotel, Oklahoma City. The sponsor is the National Society of Professional Engineers. The theme will be Management and the Engineer in Industry. For further information write the society at 2029 K Street, N. W., Washington, D. C. 20006. -- Chem. Eng. News 43, 59 (Aug. 2, 1965)

01 132 2811

824 Society of Toxicology Meeting.

The annual scientific meeting of the Society of Toxicology will be held in Williamsburg, Virginia, on March 14, 15, and 16, 1966. Anyone interested may attend. At the 1965 annual meeting, 80 scientific papers in all phases of toxicology were presented. Abstracts of these appeared in the journal of the Society, Toxicology and Applied Pharmacology, Volume 7, pages 478-504 (May, 1965). Papers for the 1966 meeting may be submitted or must be sponsored by members of the Society. Additional information about the meeting may be obtained from the Secretary: Mr. Carrol S. Weil, Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pa. 15213.

COMING EVENTS

- 825 Oct. 10-14 Water Pollution Control Federation, Annual Conference, Atlantic City, N. J.
 Oct. 11-13 American Oil Chemists' Society Fall Meeting, Cincinnati, Ohio.
 Oct. 11-14 Association of Official Agricultural Chemists, Annual Meeting, Washington, D. C.
 Oct. 12-14 Congress on Occupational Health, Indianapolis, Ind.
 Oct. 12-14 Oak Ridge National Laboratory, 9th Conference on Analytical Chemistry in Nuclear Technology, Gatlinburg, Tenn.
 Oct. 15-17 American Heart Association, Bal Harbour, Fla.
 Oct. 15-22 College of American Pathologists, Chicago, Ill.
 Oct. 15-23 American Society of Clinical Pathologists, Chicago, Ill.
 Oct. 17-20 National Agricultural Chemicals Association, 32nd Annual Meeting, Hollywood, Fla.
 Oct. 17-21 American Society for Microbiology, Washington, D. C.
 Oct. 18-20 Association of Life Insurance Medical Directors of America, Pasadena, Calif.
 Oct. 18-22 American Association of Public Health Physicians, Chicago, Ill.
 Oct. 18-22 American College of Surgeons, Annual Clinical Congress, Atlantic City, N. J.
 Oct. 18-22 American Public Health Association, Chicago, Ill.
 Oct. 18-22 Contamination Control Seminar, Sponsored by Rochester Institute of Technology, Rochester, N. Y.
 Oct. 19-21 Association of Analytical Chemists, Anachem Conference, Detroit, Mich.
 Oct. 20-21 Industrial Hygiene Foundation, 30th Annual Meeting, Mellon Institute, Pittsburgh, Pa.
 Oct. 20-22 Parenteral Drug Association, Annual Convention, New York, N. Y.
 Oct. 21-29 American Occupational Therapy Association, Bal Harbour, Fla.
 Oct. 22-23 American Association of Automotive Medicine, Rochester, Minn.
 Oct. 25 American Association of Poison Control Centers, Chicago, Ill.
 Oct. 25-28 National Safety Council, National Safety Congress and Exhibition, Chicago, Ill.
 Oct. 26 American Society of Safety Engineers, Annual Meeting and Conference, Chicago, Ill.
 Oct. 26-27 Selenium-Tellurium Development Association, Properties and Uses of Selenium and Tellurium, New York, N. Y.
 Oct. 27-29 American Cancer Society, New York, N. Y.
 Oct. 30-31 Conference on Disaster Medical Care, Chicago, Ill.

LEGAL DEVELOPMENTS

826 Number of States with Specified Types of Labor Laws in November 1964.

Thirty States, the District of Columbia, and Puerto Rico have minimum wage laws in operation. (Four others have such laws on their statute books, but they are not in operation.) Of the laws in operation, those of 16 States and Puerto Rico apply to persons regardless of sex.

Twenty set a statutory minimum, and seven now equal or exceed the Federal minimum wage rate. Forty-seven States, the District of Columbia, and Puerto Rico have wage payment laws, and the labor commissioner is specifically authorized to collect wages for the worker in 22 of them. Every State, the District of Columbia, and Puerto Rico has a child labor law; 24 States and Puerto Rico set a basic minimum age of 16 for employment. Forty-six States, the District of Columbia, and Puerto Rico provide mediation services, and in most States there is much activity in this area. Thirteen States and Puerto Rico have labor relations acts. Twenty-five States and Puerto Rico have fair employment practices acts which prohibit discrimination in employment because of race, creed, color, national origin, and ancestry. Seventeen States and Puerto Rico prohibit discrimination in employment because of age. Forty-five States, the District of Columbia, and Puerto Rico regulate private employment agencies. Forty States, the District of Columbia, and Puerto Rico have laws granting general rulemaking authority in the field of occupational safety and most of these have utilized this authority to considerable extent. Forty-six States have laws or regulations for the control of radiation hazards, 32 of these authorize Federal-State agreements, and 8 of the 32 have concluded such agreements with the Atomic Energy Commission. Every State, the District of Columbia, and Puerto Rico has a workmen's compensation law, also two Federal laws apply to longshoremen and harbor workers and to Federal employees. Of these 54 laws, 30 are compulsory; 53 apply to at least some occupational diseases, 34 to all occupational diseases.

-- Bureau of Labor Standards, U. S. Dept. of Labor, Bulletin 272, (Nov. 17, 1964)

BOOKS, PAMPHLETS AND NOTICES

- 827 Directory of Safety and Construction Codes U. S. A. States and Cities. K. Siemon.
AVAILABLE FROM: Code Publishing Co., P. O. Box 442, Westfield, N. J. 07091. 264 pp
PRICE: \$6.80.

A new directory that presents hard-to-find information on the safety and construction codes and laws adopted and enforced by the states and cities in the U. S. A., is now available. It also lists health regulations applying to the construction industry and to the operation of industrial establishments. Valuable information may be provided to engineers and plant managers, contractors, architects, factory and fire insurance companies, and to government agencies.

-- Safety Maint. 130, 26 (Aug. 1965)

- 828 Installations of Bulk Oxygen Systems at Consumer Sites. NFPA No. 566. National Fire Protection Association. AVAILABLE FROM: National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. 02110. 10 pp. (1965) PRICE: 50 cents.

A newly revised edition of the NFPA standard for the installation of bulk oxygen systems at consumer sites has recently been released by the National Fire Protection Association. This 1965 text incorporates changes prepared by the Sectional Committee on Industrial Gases under the chairmanship of Myron A. Snell, Hartford Accident and Indemnity Company, and represents extensive updating over the previous edition. New requirements for electrical equipment at bulk oxygen storage areas and new provisions for relief valves for ASME containers are included in this revised standard. An additional section in the 1965 edition requires noncombustible surfacing for areas where liquid oxygen leakage might occur. "Installation of Bulk Oxygen Systems at Consumer Sites (NFPA No. 566)", formerly also issued by the National Board of Fire Underwriters as NBFU No. 566, is now available only in the official NFPA edition.

- 829 Installation of Sprinkler Systems. NFPA No. 13. National Fire Protection Association. AVAILABLE FROM: National Fire Protection Association, 60 Batterymarch Street, Boston, Mass. 02110. 170 pp. (1965). PRICE: \$1.00.

A revised edition of the standard for the installation of sprinkler systems has just been issued by the National Fire Protection Association. Extensive changes in the 1965 text of this publication include the addition of a new appendix on indoor general storage and one on wood working

plants. Also added are important new provisions for the permissive use of intermediate or high temperature rated sprinklers in occupancies where it is expected that there will be a fast developing fire or a rapid release of heat. A new section explains why fewer sprinklers opening means better pressure and distribution from those that do open, consequently causing less extensive water damage. This new standard was prepared by the Committee on Automatic Sprinklers, Gordon F. Price, of the South-Eastern Underwriters Association, Atlanta, chairman. Installation of Sprinkler Systems (NFPA No. 13), formerly also issued by the National Board of Fire Underwriters as NBFU No. 13, is now available only in the official NFPA edition.

- 830 Fourth Annual Bio-Environmental Engineering Symposium. Water and Air Pollution Control. U.S. Air Force School of Aerospace Medicine, Aerospace Medical Division (AFSC). (Sept. 29-Oct. 1, 1964). 149 pp.

In this Symposium, the Honorable John Steven Monagan reported that water pollution has become the nation's single most desperate natural resources problem. Colonel Charles C. Dills, Strategic Air Command Headquarters' Chief Industrial Hygiene Engineer, reported on the U.S. Air Force (USAF) program of domestic and industrial waste treatment, tabulating effects of a number of chemicals on aquatic life. Vernon G. MacKenzie and B.G. Giel, M.D., Chief and Assistant Chief, respectively, of the Division of Air Pollution, U.S. Public Health Service reported on the Federal Clean Air Act and Air Pollution Evaluation Techniques. Professor Leslie Silverman of Harvard provided a status report on air pollution problems and controls, including power plant SO₂ effluent treatment. In his opinion, a "crash" training program is apparently needed to produce the several hundred air pollution control officers which will be required over the next five years.

USAF Surgeon General Office's Colonel Alvin F. Meyer, Jr., (Assistant Chief for Bio-Environmental Engineering and Sciences), spoke on the newly conceived Bio-Medical Sciences Corps. Other USAF speakers covered research and development of environmental health hazard controls and human factors engineering considerations of the future. A limited number of copies of the proceedings of this interesting and timely Symposium may be obtained, while the supply lasts, by writing Colonel Harold V. Ellingson, USAF School of Aerospace Medicine, Aerospace Medical Division, Brooks Air Force Base, Texas. No charge is quoted -- RTP deT

- 831 Illustrated Guide for Grading Eye Irritation by Hazardous Substances. U.S. Department of Health, Education, and Welfare, Food and Drug Administration. AVAILABLE FROM: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. PRICE: \$1.00.

The Draize technique for evaluating the irritant capacity of liquids and solids, based on instillation of the substances into the rabbit eye, has been in use for a number of years. A description of the test, including a grading and scoring system, is given in "Appraisal of the Safety of Foods, Drugs, and Cosmetics" published in 1959 by the Association of Food and Drug Officials of the United States. This test has been modified to satisfy one of the criteria (in Sec. 191.1 (g) (3) of Regulations) for determining whether or not a substance is an eye irritant under the Federal Hazardous Substances Labeling Act. The modified test appears as Sec. 191.12 of the Regulations. As with any test which relies on subjective interpretation, grading of ocular reactions poses a major problem. The purpose of the photographs in this report is to provide guidance and clarification, so that observers may attain greater uniformity in grading the severity of ocular responses, especially in borderline cases. -- Abstracted from Introduction

- 832 Steel Mill Ventilation. Committee on Industrial Hygiene of American Iron and Steel Institute. 118 pp. (May, 1965).

This publication was prepared by the Committee on Industrial Hygiene with the endorsement of the Committee on Industrial Relations and the Committee on Manufacturing Problems of American Iron and Steel Institute. Despite the fact that a considerable body of knowledge is available today in the field of ventilation for the control of in-plant air contaminants as required

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to maintain healthful working conditions at minimal costs, plant engineers too frequently do not apply such knowledge in the evaluation and solution of employee environmental health problems. The result is that many ventilation problems are still unresolved in plants, mills and buildings. This publication is a guide, and does not set forth standards to be followed. Rather, its primary purpose is the collection, collation and presentation between the covers of a single volume, the concepts, principles, formulae and considerations which enter into and govern the design, installation and maintenance of ventilating systems which will achieve effective control of in-plant atmospheres at minimum cost.

-- Cond. from Preface

A Partial Table of Contents follows:

1. Introduction
2. Contaminants: Methods of Generation and Sources in Steel Mills
3. Fundamentals of Air Flow
4. General Ventilation
5. Local Exhaust Ventilation
6. Exhaust Duct Design
7. Supply Duct Design
8. Fans
9. Air and Gas Cleaning
10. Testing

Bibliography

Appendix I - Threshold Limit Values

Appendix II- Explosive Limits

This reference volume, is clearly written and illustrated, beautifully printed and bound. It is intended specifically for plant engineering and industrial hygiene engineering personnel in the steel industry. There is no mention of its general availability and no price is quoted.

-- RTP deT

- 833 Occupational Health Practices—Iron and Steel Industry. Committee on Industrial Health of American Iron and Steel Institute. 95 pp. (May, 1965).

Part of the responsibility for the preservation of health and well-being rests with the Medical Departments of the various steel companies. How they go about discharging this responsibility, what are the facilities at their disposal, how their activities fit into the general organization of the company, and what are the relations of industrial medical departments and medical practitioners and organizations outside the mills is the subject of this revised edition of the book first issued by American Iron and Steel Institute in 1953 under the title STUDY OF INDUSTRIAL HEALTH PRACTICES FOR THE IRON AND STEEL INDUSTRY. It is anticipated that this book will be of value to all steel companies in their widespread facilities. It is quite probable that it will also be of interest to many other industrial operations. The publication of this book is an indication of the ever growing interest of the iron and steel industry of the Western Hemisphere in its employees.

-- Cond. from Foreword

In addition to those copies distributed to members of the Institute, copies have in the past been distributed, on request, to libraries, teaching institutions, professional and business associations, and individuals interested in industrial health, both in the United States and abroad, as long as copies were available. Aside from covering the objectives and functions of a modern medical program in the steel industry, such subjects as the following are covered in some detail and excellent clarity of style: Industrial Hygiene Activities, Health Insurance, Absenteeism, Community Relations, Mental and Emotional Health, and special problems involving rehabilitation. The new book, completely revised, beautifully bound, may be obtained from the Committee on Industrial Health, American Iron and Steel Institute, 150 East 42nd St., New York, N. Y. 10017 for \$2.40.

-- RTP deT

- 834 Progress in Chemical Toxicology. Volume 2. Edited by A. Stolman. AVAILABLE FROM: Academic Press Inc., 111 Fifth Avenue, New York, N. Y. 10003. 416 pp. (March 10, 1965). PRICE: \$14.00

This book is written for the toxicologist, clinical biochemist, pathologist and pharmacologist. It will be of interest to many industrial hygienists because of its discussion of newly developed techniques and methodology of toxicological investigations and their significance.

Topics included in this volume are:

1. The Absorption, Distribution and Excretion of Poisons and their Metabolites.
2. Detection of Volatile Organic Compounds and Toxic Gases in Humans by Rapid Infrared Techniques.
3. An Approach to the Analysis of Biological Specimens for Basic Drugs.
4. Rapid Methods of Toxicological Analysis by Ion-Exchange Paper Chromatography and Ionophoresis.
5. Developments in Spectrography: Sample Preparation.
6. Thin Layer Chromatography Application in Toxicology.

Related information concerning absorption, distribution and excretion of poisons, is in some instances too brief, e.g. in comparison to Patty's thorough coverage (See Industrial Hygiene Digest, Abstract No. 123, page 6, February, 1965). Mention of Kehoe's work appears restricted, in the index and text, to the triethyl lead metabolite of tetraethyl lead (page 160). No reference is made in the author index to either Browning's comprehensive review "Toxicity of Industrial Metals" or to Patty's excellent reference text. The volume is not recommended as a basic industrial hygiene reference text, but as a "yearbook of technical progress." Inclusion of certain Threshold Limit Values (TLV's) from those published by the American Conference of Governmental Industrial Hygienists (ACGIH) in 1963 will require early revision, as certain materials, such as phosgene and carbon monoxide, have already been lowered in subsequent ACGIH publications. (TLV's for 1965 reproduced on page i, this issue of Digest). -- RTP deT

INDUSTRIAL MEDICAL PRACTICE

- 835 The Utilization of Employee Health Service in Hospitals. An Analysis of 40,000 Patient Visits.
C.E. Lewis. Arch. Environmental Health 11, 16-21 (July, 1965).

Information has been collected on 40,000 consecutive visits to the Health Service for employees and students at the University of Kansas Medical Center. Twenty-four hundred employees made approximately 11,000 visits per year. The average annual number of visits per employee increased for a period of at least three years following the institution of an occupational health service. Now, each employee makes about five visits per year. The average number of immunizations, skin tests and x-rays and laboratory tests per employee are reported according to hospital departments. Approximately 4% to 7% of all visits resulted in an employee being temporarily removed from duty. The cost of such a comprehensive occupational health program within the Medical Center environment was approximately \$15 per employee per year. -- Cond. from author's summary

- 836 Human Factors in Industrial Medicine: The Challenge of the Industrial Health Professions. Reviews of a Symposium. J.S. Felton. J. Occ. Med. 7, 189-192 (May, 1965).

Any consideration of the human factors involved in today's work force requires the capabilities of a sophisticated occupational health team, whose skills will be challenged even more in the future because of the changes in industry's population configuration and production methodology. Whether the combined efforts of an enlightened management group, a knowing medical and paramedical organization, and a different kind of labor body can retain for all the emotional satisfactions derivable from work can be told only when the next decade has filled its place in history. -- Author's summary

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- 837 Health Education in Industry. Potential and Practice. Lorraine V. Klerman.
Ind. Med. & Surg. 34, 563, 566-570 (July, 1965).

Four hundred thirteen blue collar and clerical workers in eight industrial plants with a wide range of health programs were interviewed to determine their contact with various plant health educational programs and the impact of such programs on their level of health information. This study indicates that an improvement in methods is necessary if health education is to realize its potential role in industry. For example, effectiveness probably would be increased if greater stress were placed upon person-to-person techniques utilizing the industrial physician and nurse. More attention should also be given to the problem of designing materials which will be of interest to older persons, those with less education, and those with language difficulties. Good health education programs are not accidental or haphazard, nor can they depend exclusively on an erratic supply of materials from outside the plant, as is so often the case at present. Superior health education programs in industry, as elsewhere, must be planned.

-- Cond. from author's summary

- 838 Implementing Improvements in An Outpatient Department. W.R. Tucker, et al.
Arch. Environmental Health 11, 22-27 (July, 1965).

As a result of the study assessing the value of the periodic examination of outpatients undertaken by Lashof and Turner at Presbyterian-St. Luke's Hospital in Chicago, it became apparent that the outpatient clinic itself required periodic evaluation. This evaluation led to changes and innovations in the following areas: (1) broadening the scope of a new patient work-up; (2) instituting periodic physical examinations for patients in the medicine clinics; (3) co-ordination of services in the management of the patient; (4) medical student assignments; (5) establishment of a diagnostic index; (6) the establishment of a quarterly chart review by the physicians and students; (7) the design of a mechanical system for the storage of medical and financial information; and (8) the design of a medical care check list. It was not possible to document improvement in the level of medical care as a result of these innovations. This may be due in part to our inability to accurately define and measure the level of medical care. However, it was felt that such measures can lead to improvements in medical care.

-- Authors' summary

- 839 Grip Measurements as a Part of the Pre-Placement Evaluation. H.M. Patterson.
Ind. Med. & Surg. 34, 555-557 (July, 1965).

The preplacement evaluation should include grip measurements, a record of which is the major hand and a detailed history of any hand or upper extremity injury. The premise "grip in major hand equal grip in minor hand plus 10%" is so inaccurate it should be discarded. The fairest means of determining grip loss following a specific injury is to use the ratio of the grip in major hand compared to that in the minor hand prior to the injury and by using this formula determine what the grip in the injured hand should be, the difference being the actual grip loss. The dynamometer used should be the one preferred by your State Industrial Accident Commission. The author feels that the Jamar dynamometer is the best available instrument.

-- Author's summary

- 840 The Overweight Problem. J.H. Hutton. Ind. Med. & Surg. 34, 623-627 (Aug. 1965).

In most cases we do not know the cause of obesity. There probably are multiple etiological factors. Patients must expect to diet the rest of their lives. This does not mean that they must be on a semi-starvation diet. It merely means that they must watch the amount of food they eat, weigh themselves frequently and skip a meal whenever they gain two pounds. Endocrine disorders are often found in connection with obesity. Whether this is a cause-and-effect relationship or merely coincidental is not known. However, treatment of the endocrinopathy seems to help patients lose weight. Patients have a choice of programs and the doctor should select that one which is most likely to fit the patient. Moreover, be kind to fat people—their condition is not their fault but their misfortune.

-- Cond. from author's summary

- 841 Environment in Relation to Gynecologic Disease. Mary DeWitt Pettit.
Arch. Environmental Health 11, 116-126 (July, 1965).

Woman as well as man is intimately affected by psychological, educational, cultural, genetic, hormonal, nutritional, environmental factors and infectious disease from conception through birth to death. Gynecologic complaints mirror the woman's personality traits, cultural, hereditary, and physical background. Environmental factors such as infections, exposure to noxious agents, and malnutrition are preventable in the ideal society. With the increasing manipulation of environmental factors possible in our time, one would hope for increasingly effective preventive medical efforts. There are 64 references. -- Author's summary

- 842 The Midwell Seminars: A Report on Industrial Psychiatry for Small Industries.
R. Crawshaw. Arch. Environmental Health 11, 92-97 (July, 1965).

A series of seminars were conducted for five small manufacturing firms. The seminar focused on human behavior concepts, in an attempt to help the management of these rapidly growing firms anticipate and deal with problems which could be distorting and crippling in the later development of the firms. Psychoanalytic knowledge was relied on, the format was lecture-group discussion and summation. As judged by the response of the participants and staff, the seminars were successful. -- Author's conclusion

- 843 Tension Myositis. H. J. Flax. Ind. Med. & Surg. 34, 558-561 (July, 1965).

Tension myositis is the resultant of poor body mechanics, weakened muscles, and occupational strain in emotionally unstable individuals. The main symptom is muscle pain, which may be localized or referred and may completely incapacitate some patients. The referred pain follows a definite pattern from localized primary and sometimes secondary trigger points. Treatment consists in reassuring the patient that he has no organic disease such as arthritis or cancer, correction of poor body posture, strengthening weakened muscles, and increasing impaired joint motion. The trigger areas may be injected with 1% procaine hydrochloride solution to break up the vicious circle producing pain. Symptomatic therapy should not be emphasized, and mechanical supports should not be prescribed. Ataraxic drugs muddle the mind, and if they are given in dosage sufficient to produce muscle relaxation, most patients complain of somnolence. Most important, however, is to discuss the principal underlying cause of this condition—the anxiety tension state producing this psychophysiological syndrome. The patient must be made to understand that once he has developed emotional security, this maturity will cure his symptoms. -- Author's summary

- 844 Contact Lenses and the Railroad Industry. C. J. Black.
Ind. Med. & Surg. 34, 632-635 (Aug. 1965).

There is at present some confusion as to the procedure for fitting and the design and care of the contact lens. There is the problem of the change in shape of the cornea resulting in an inability to use spectacles in conjunction with contact lenses, particularly in cases of emergency. Corneal contact lenses are prohibitive in certain dusty environments. They also may not produce as good visual acuity as spectacles, and lastly they do cause moments of discomfort no matter how many years the lenses have been worn. They have utility in that they can be substituted for spectacles, and in so doing may be of aid tomorrow. Only in special eye problems, such as keratoconus and aphakia, do they have more value than spectacles, and then only if the vocation is suitable. -- Author's summary

- 845 New Aspects of Mycobacterial Skin Tests. III. Simultaneous or Sequential Infection with Different Mycobacteria. W. W. Johnston, et al.
Arch. Environmental Health 11, 37-49 (July, 1965).

A method of skin testing in man which utilizes multiple PPDs administered in duplicate and read by comparison has been proposed as a practical substitute for the scattergram type of testing employed with the experimentally infected guinea pigs.

-- Cond. from authors' summary

- 846 The Cultivation of a Novel Type of Common Cold Virus in Organ Cultures. D.A.J. Tyrrell and M.L. Bynoe. *Brit. Med. J.* 1, 1467 (June 5, 1965).

Colds developed when volunteers treated with dimethylchlorotetracycline were given the filtered nasal washings from a boy with a cold; no colds developed if the washings were treated with ether. The virus in the washings would not grow in any of a variety of tissue cultures or in embryonated eggs, but was regularly propagated in organ cultures of human fetal tracheal epithelium. The colds produced by washings and culture fluids were similar and in the aggregate, distinct from those produced by M. rhinoviruses. The sera of a few infected volunteers showed small rises in antibody titer against influenza C and Sendai viruses, but most showed no rise to ether-labile human respiratory viruses. There were slight degenerative changes in infected organ cultures, and marked resistance to the growth of another virus-virus interference. -- J. Am. Med. Assn. References & Reviews

- 847 Refractory Heart Failure. R.H. Sellar, et al. *J. Am. Med. Assn.* 193, 147-148 (July 12, 1965).

When dealing with refractory heart failure, the physician should first secure a complete and accurate diagnosis. Then all remedial cardiac and extracardiac conditions should be corrected. Next, he should attain optimal conditions for diuresis by establishing electrolyte balance, full digitalization, and complete bed rest. Once these conditions have been achieved, diuresis in patients with so-called refractory edema can usually be achieved by using multiple diuretic regimens including parenterally administered mercurials, potent orally administered sulfonamide diuretics, and antialdosterone agents with acidifying drugs and other substances which potentiate diuretic activity. Dialytic procedures and radioactive iodine therapy are occasionally useful. -- Authors' summary

- 848 The Electrocardiogram and Ischemic Heart Disease in Aircraft Pilots. G.W. Manning. *Can. Med. Assn. J.* 93, 158-160 (July 24, 1965).

A review of the Royal Canadian Air Force electrocardiographic (ECG) program for selection of aircrew and detection of coronary disease in trained aircrew is presented. Twenty reported cases of death due to coronary disease in pilots while at the controls of an aircraft are reviewed. The use of routine electrocardiography in the selection of aircrew has proved to be of considerable value, particularly in view of the high cost of training. The ECG continues to be the most sensitive means of detecting asymptomatic coronary disease in aircrew personnel. It is apparent that from both the military and commercial standpoint the incidence of aircraft accidents due to coronary disease is extremely small. This is due in large part to the careful medical supervision of flying personnel including the routine use of electrocardiography in the assessment of flying fitness of aircrew. -- Author's abstr.

- 849 Causes of Death in Acute Leukemia. A Ten-Year Study of 414 Patients from 1954-1963. E.M. Herish, et al. *J. Am. Med. Assn.* 193, 105-109 (July 12, 1965).

Major causes of death in acute leukemia were infection in 70% of patients and hemorrhage in 52%. In 38% of the patients there was more than one cause of death. Striking changes took place during the 10-year-study period. Fatal hemorrhage declined to nearly half the early rate, and fatal staphylococcal infection from 23.5% to 3.1%. At the same time fatal infections due to fungi increased from 8.2% to 23.2%. -- Authors' abstr.

- 850 An Outbreak of Hepatitis Traced to Food Contamination. P.R. Joseph, et al. *New Engl. J. Med.* 273, 188-194 (July 22, 1965).

Between November 23 and December 16, 1961, 22 officers and one enlisted man at a naval air installation contracted infectious hepatitis. All officers had eaten at the dining room of the Bachelor Officers' Quarters on October 26 and 27; this was the only activity common to those who became ill. One hundred and sixty-two officers ate one or more of the suspect meals.

Follow-up information was obtained on 158. Food questionnaires revealed that none of the 22 denied having eaten potato salad at the dining room, whereas 25% of the 136 others who did not acquire hepatitis indicated that they had not eaten potato salad. It was concluded that the disease was primarily spread through potato salad. A salad handler with minor illness in October, perhaps anicteric hepatitis, who evidenced unusual behavior relating to urination, was considered to be the likely source of contamination. The mechanics of contamination are obscure although fragmentary evidence suggests that salad dressing, perhaps contaminated by urine, may have been the specific responsible ingredient. The one case in an enlisted man occurred in a man assigned to the salad makers' unit and thus was perhaps peripherally related to the outbreak. There are 21 references. -- Authors' summary

- 551 Disc Surgery and Chronic Low-Back Pain. M. L. Rowe.
J. Occ. Med. 7, 196-202 (May, 1965).

The similarities in age, history of back condition, mode of onset of symptoms, physical signs, and x-ray and laboratory characteristics between a study group of 160 men with proved disc protrusions and a previously reported undiagnosed group of patients with chronic low-back problems were striking and tended to fortify the opinion that the most common cause of nonspecific low-back pain is degeneration of the intervertebral disc, in its earlier or milder stages. Hernia occurred more than twice as frequently among men with proved disc disturbances as it did in a survey group of male employees of comparable age doing the same types of work in the same plant. This observation is subject both to genetic and to mechanistic interpretations, as is the fact that the men in the disc group averaged nearly 2-inches taller than their fellow workers. Further clinical observations and a refined knowledge of chromosome mapping may provide clarification of the meaning of these findings. The end-result statistics cannot be compared with those reported in other studies because of the manner of selection of cases and the criteria used in this study for end-result rating. It is hoped that these statistics may give the industrial physician some idea of what to expect in terms of time lost from work and the probabilities of permanent job restriction when disc operation is required. Some of the correlations between end results and other factors seem to carry valid prognostic information and a few of them may have some therapeutic implications of value. Six references are given. -- Author's summary

- 852 Histologic Changes in Esophagus in Relation to Smoking Habits. O. Auerbach, et al.
Arch. Environmental Health 11, 4-15 (July, 1965).

A microscopic study was made of 12,598 sections of esophagus from 1,268 men who died and were brought to autopsy at the Veterans Administration Hospital, East Orange, N. J. The smoking habits of these men were ascertained by interviewing their relatives. Epithelial cells with atypical nuclei were found far more frequently in cigarette smokers than in nonsmokers; they increased in frequency with amount of cigarette smoking and with age and were found more frequently in ex-cigarette smokers than in nonsmokers. Epithelial cells with disintegrating nuclei were found primarily in ex-cigarette smokers. Basal cell hyperplasia of the epithelium was found more frequently in cigarette smokers than in nonsmokers and increased with amount of cigarette smoking. Hyperactive glands were found more frequently in cigarette smokers than in nonsmokers. Cellular infiltration of the wall tended to be somewhat more pronounced and ulceration tended to occur somewhat more often in nonsmokers than in cigarette smokers. -- Authors' summary

- 853 Experimental Lung Cancer in Hamsters. Repetitive Intratracheal Applications of Two Carcinogenic Hydrocarbons. P. Gross, Ethel Tolker, Mary A. Babyak, and Marianne Kaschak.
Arch. Environmental Health 11, 59-65 (July, 1965). Reprints Available from Industrial Hygiene Foundation Upon Request.

Hamsters were given 4 to 13 intratracheal applications of 9,10-dimethyl-1, 2-benzanthracene in mineral oil in doses of 100 micrograms over periods from 4 to 16 months. Of 14 hamsters surviving 4 months or longer after the initial dosage, 8 or 57% developed a tracheal or peripheral lung cancer. Other hamsters given the same carcinogen in gelatin or 3,4-benz(a)pyrene in either mineral oil or gelatin intratracheally developed respiratory tract tumors with a significantly smaller rate of occurrence. This method of repetitive intratracheal application of carcinogens is of doubtful value because it is associated with a mortality rate of 60% prior to the development of the first tumor (at 4 months). -- Authors' summary

- 854 An Epidemic of Streptococcal Wound Infections. R. W. Quinn and J. W. Hillman.
Arch. Environmental Health 11, 28-33 (July, 1965).

This paper presents the epidemiologic, clinical and bacteriologic findings of a small epidemic of surgical wound infections due most likely to a single strain of group A hemolytic streptococci. The source of infection for four of the five patients was one of the members of the surgical operating team who had a streptococcal infection at the time he assisted at the operations. The mode of transmission would appear to be direct contamination of the open wound from streptococci expelled through the surgical mask of a surgical assistant. The surgeon himself was infected after changing the dressings of one of the patients. The lesson to be learned from this outbreak is that no one with a streptococcal infection should perform surgical procedures and that gauze masks are inefficient in protecting the environment from hemolytic streptococci.

-- Authors' summary

- 855 Reactions to Tetanus-Diphtheria Toxoid (Adult). C. W. Sisk and C. E. Lewis.
Arch. Environmental Health 11, 34-36 (July, 1965).

A survey of the incidence of reactions to combined diphtheria-tetanus toxoid containing 2 Lf of diphtheria toxoid and 20 Lf of tetanus toxoid per ml. was accomplished in 50 consecutive new employees seen in a Hospital Health Service. Nine per cent local reactions and less than 0.8% systemic reactions were noted. Previous studies have indicated this dosage to be effective in producing adequate concentration of antitoxin. Evidence from this series indicates that this combined toxoid is a safe, routine immunizing agent in adults and does not require cumbersome preinjection screening with Schick or Moloney tests.

-- Authors' summary

- 856 Lack of Effect of Two Hexachlorophene-Containing Soaps Under Normal Hospital Working Conditions. C. R. MacPherson, M. F. Sparkman, and D. R. Whitney.
Am. J. Surg. 109, 699-704 (June, 1965).

Two soaps containing 0.5% and 2.0% hexachlorophene, respectively, were compared with a standard hard bar soap for a 5-week period. It was found that with normal hospital usage, neither of the soaps containing hexachlorophene offers any detectable advantage over the standard hard bar soap in the reduction of the superficial skin flora. There was neither a rapid fall in bacteria counts in the first week nor a progressive fall over the five weeks of the experiment. A statistical analysis of all possible factors including climatic variation showed no association which could explain this lack of effect. The authors did not test liquid hexachlorophene preparations the disinfectant effects of which are firmly established. Contact with water precipitates hexachlorophene and prevents its transfer from soap to skin.

-- J. Am. Med. Assn. References & Reviews

- 857 Experimental Emphysema. Its Production with Papain in Normal and Silicotic Rats. P. Gross, E. A. Pfitzer, Ethel Tolker, Mary A. Babyak, and Marianne Kaschak.
Arch. Environmental Health 11, 50-58 (July, 1965). Reprints Available from Industrial Hygiene Foundation Upon Request.

The intratracheal injection of papain produced emphysema in all rats so injected. The emphysema, initially purely of centrilobular type, was demonstrable within six hours after the papain injection. The severity and extent of emphysema tended to vary from animal to animal, even with the same dose level of papain and the same survival time, but the impression was gained that, in general, the disease was more severe and of mixed, centrilobular and panlobular, character with larger dosage or longer survival. The papain-induced emphysema resembled clinical emphysema not only in its centrilobular and panlobular forms, but also in the occurrence of alveolar destruction without an associated inflammatory reaction. Severely silicotic lungs were less susceptible to the development of papain-induced emphysema than normal lungs. There was also a significantly greater tolerance of silicotic rats to intratracheal papain than was the case with normal rats. The papain-induced emphysema, in its early stages, exhibits three stigmata in thin histologic sections that are indicative of alveolar destruction. These are the presence of alveolar spurs, of fore-shortened T- or inverted L-shaped structures, and of

acute angulation of septa, often forming angles of less than 30° with the alveolar floor. The initial localization of the papain-induced emphysema to the respiratory bronchiole and adjoining alveolar ducts is explained on the basis that the proximal portions of the primary lobule are the most vulnerable to noxious agents. Reasons are advanced for the greater vulnerability of this region to damage from noxious materials. This method may prove to be a useful tool for the study of factors that may be thought to aggravate emphysema. There are 13 references.

-- Authors' summary

SKIN DISEASES AND BURNS

- 858 Cutaneous Carbohydrate Studies: Glucose Content of Skin of Back of Normal Persons. E. S. Peterka and R. M. Fusaro. *J. Invest. Dermatol.* 44, 381 (June, 1965).

The average glucose content of the skin of the back of 24 subjects free of diabetes and other diseases was determined in the fasting state by the glucose oxidase method, and it was found to be 40 to 50 mg./100 gm. wet weight of skin. This figure is lower than any other in previously reported studies. The ratio of the skin glucose to blood glucose was 55%, which appears to be consistent with other reports. -- J. Am. Med. Assn. References & Reviews

- 859 Contact Dermatitis from Synthetic Oil of Mustard. L. E. Gaul. *Arch. Dermatol.* 90, 158 (1964).

A Negro patient developed an acute contact dermatitis from a household liniment. Patch-testing to all the ingredients showed that synthetic oil of mustard was the sensitizer. A patch test with 0.1% oil of mustard gave a positive reaction. The principle ingredient of synthetic oil of mustard is allylisothiocyanate. -- J. Occ. Med. Absts.

- 860 Vesicant Dermatitis Due to Prairie Crocus (Anemone Patens L.). T. H. Aaron and E. L. Muttitt. *Arch. Dermatol.* 90, 168 (1964).

The prairie crocus has been used as a folk remedy for many years. It contains an active vesicant principle. It should be considered in a differential diagnosis of any vesiculating dermatitis, especially in prairie areas. -- J. Occ. Med. Absts.

- 861 Insect-Sting Allergy. Questionnaire Study of 2,606 Cases. Insect Allergy Committee of the American Academy of Allergy. *J. Am. Med. Assn.* 193, 115-120 (July 12, 1965).

Analysis of questionnaires from 2,606 persons sensitive to insect sting reveals an expectancy of progressively severe reactions in about 65% of persons not hyposensitized. Following hyposensitization, reactions to subsequent stings are reduced in about 90% of treated persons. Protection may be maintained for years or may be lost in less than a year. Progressively severe reactions to stings are uncommon following recent adequate hyposensitization. Hyposensitization is recommended for persons who have had any degree of systemic sensitivity following an insect sting. Epinephrine is the primary drug of choice for treatment of an acute, immediate reaction to insect sting. -- Authors' summary

- 862 Itching Eruption in Miners Caused by a Rare Beetle (Triboleum Castaneum). D. M. Williamson. *Brit. J. Dermatol.* 76, 388 (1964).

Coal miners engaged in the filling of sacks with broken rocks developed a parasitic papular eruption mainly of the trunk. It was shown that there was an associated infestation of the jute sacks by the beetle Triboleum castaneum. -- J. Occ. Med. Absts.

- 863 Serum Sickness and Recurrent Angioedema After Bee Sting. R. K. Sheehan.
J. Am. Med. Assn. 193, 155-156 (July 12, 1965).

A case of recurrent angioedema and serum sickness following a bee sting is presented. Other atypical sensitivity reactions to Hymenoptera stings as recorded in the literature are briefly mentioned.

-- Author's summary

- 864 Incidence of Contact Sensitivity in Atopic Dermatitis. S. Epstein and A.H. Mohajerin.
Arch. Dermatol. 90, 234 (1964).

The general belief that a contact dermatitis occurs rarely, or certainly not more frequently, in patients with atopic dermatitis than in normal individuals is challenged. One hundred patients with atopic dermatitis were compared to 100 patients with psoriasis and 20 with acne. It was found that 28% of the atopics and 9% of the psoriatics had significant contact sensitivities to coal tar. The incidence of contact dermatitis in patients with atopic dermatitis is due to increased exposure and to a constitutional factor. The presence of contact dermatitis in patients with atopic dermatitis should be appreciated and promptly diagnosed since it may be of the greatest help to the patient.

-- J. Occ. Med. Absts

- 865 Lincomycin in Dermatologic Practice. B. Kanee.
Can. Med. Assn. J. 93, 220-222 (July 31, 1965).

In clinical studies with a new oral antibiotic, lincomycin, excellent results were obtained in the treatment of carbuncles, furuncles, folliculitis, cellulitis, lymphangitis, lymphadenitis, pyonychia and dermatitis infectiosa eczematoides due to coagulase-positive Staphylococcus aureus and to Streptococcus hemolyticus Type A. Encouraging results were noted in a small series of acne conglobata (cystic acne). Loose stools and diarrhea were frequently encountered but these symptoms abated when the dosage was reduced.

-- Author's abstr.

- 866 Oxygen Bandage and Asiaticoside in Treatment of Burns. J.A. Gravel.
Laval Med. 36, 413-415 (May, 1965).

Oxygen bandage and administration of asiaticoside (Madecassol) were employed in the treatment of three severely burned patients. This open method of therapy consists in suspending the burned limb in plastic sacs filled with pure oxygen. An oxygen tent is used when the burns are present over the entire body. The favorable effect of asiaticoside was evidenced in all patients by the rapid healing of burns. The occurrence of infection, which causes high mortality among patients treated by conventional methods, was never noted in this study.

-- J. Am. Med. Assn. References & Reviews

- 867 Mesh Skin Grafting. Report of a Typical Case. J.C. Tanner, Jr., J.J. Vandeput, and W.H. Bradley.
J. Occ. Med. 7, 175-176 (May, 1965).

The mesh skin graft offers a new technique of resurfacing denuded areas. By this method, a split-thickness sheet of skin is transformed into a mesh of skin by using a Meshgraft dermatome. (Illustrated in the report). This instrument consists of two 4-inch rollers, one knurled and the other with multiple parallel cutting blades with staggered gaps. The split-thickness skin graft is turned between the rollers, producing multiple staggered cuts, so that when the graft is expanded, a mesh is produced. Meshing allows the skin graft to expand moderately, to have complete drainage, to have increased edge exposure for epithelial growth, and to regain area loss in shrinkage when a graft is removed. These qualities are most important in therapy of burns, and in the case described, mesh grafting allowed early and uneventful skin coverage of a major burn in a 5-year-old child. A 30% third-degree burned area was grafted with a 10% donor area with immediate good results. This new method of skin grafting is being used in several major medical centers and evaluation of the results will be subsequently reported.

CHEMICAL HAZARDS

- 868 Carcinogenic Action of Motor Engine Oil Additives. R. W. Baldwin, G. J. Cunningham, and D. Pratt. Brit. J. Cancer 18, 503-507 (Sept. 1964).

Examination of component fractions of a proprietary engine oil additive previously shown to be carcinogenic for mouse skin has demonstrated that the carcinogenic substances are contained almost exclusively in the base oil. A further additive agent used mainly as an upper cylinder lubricant also proved to be carcinogenic for mouse skin. The significance of the findings are discussed, particularly with regard to the possibility that these substances may be atmospheric pollutants. There are 13 references. -- Public Health Eng. Absts.

- 869 Synergism Among Oral Carcinogens III. Simultaneous Feeding of Four Bladder Carcinogens to Dogs. W. B. Deichmann, et al. Ind. Med. & Surg. 34, 640-649 (Aug. 1965).

Each of four bladder carcinogens was fed individually by capsule to female beagle dogs over a period of three years (31-37 months) (1.0 mg./kg./dog, five times a week). 2-Naphthylamine: 4.7-9.3 g./dog (0.55-0.77 g./kg./dog), six dogs: no neoplasia. 4-Aminobiphenyl: 5.4-7.3 g./dog (0.66-0.74 g./kg./dog), six dogs: each showing either one or several papillomas or carcinomas. 4-Nitrobiphenyl: 5.2-7.6 g./dog (0.68-0.75 g./kg./dog), six dogs: no neoplasia. Benzidine: 4.8-8.5 g./dog (0.60-0.74 g./kg./dog), six dogs: no neoplasia. Each of another group of female beagle dogs received by capsule 1.0 mg./kg. of each of these four compounds or a total of 4.0 mg./kg./dog, five times a week. Total dose: 19.7-40.8 g./dog (2.08-3.92 g./kg./dog). Six dogs: five developed papillomas or carcinomas, one dog remained negative. The carcinogenic action of 2-naphthylamine, 4-aminobiphenyl, 4-nitrobiphenyl and benzidine are not additive when fed together, each in a dose of 1.0 mg./kg./dog. 4-Aminobiphenyl is very considerably more carcinogenic to the urinary bladder of the beagle dogs than previously reported. It is definitely more carcinogenic than 2-naphthylamine, 4-nitrobiphenyl or benzidine. -- Authors' conclusion

- 870 Safe Handling of Phosphorus. R. E. LeMay and J. K. Metcalfe. Chem. Eng. Progr. 60, 69-73 (Dec. 1964).

Operating experience is related: Production, piping, pumping, measurement, metering, storage, transportation, maintenance, sampling, and safety. Emphasis is given to the electric furnace method of production, and handling phosphorus in the molten state when it is spontaneously flammable and toxic. The phosphate ore is reduced with carbon with silica. Dust removal process and centrifugal separation of phosphorus are explained. Waste sludge—about 4% phosphorus—is burned in a phosphoric acid unit. Elemental phosphorus is shipped in insulated and heated tank cars. Six figures show process and operating features. -- Public Health Eng. Absts.

- 871 Treatment of Hydrofluoric Acid Burns. J. M. Wetherhold and F. P. Shepherd. J. Occ. Med. 7, 193-195 (May, 1965).

Hydrofluoric acid represents a serious hazard wherever it is encountered. It passes readily through the horny layers of the skin and continues to spread deeper and deeper into the underlying tissues, even in the fingertips, down to the bone. The burns it produces are painful and generally slow to heal. Contact with the anhydrous hydrogen fluoride or with a concentrated solution causes immediate pain, and signs of tissue necrosis appear almost at once. The dangerous feature of hydrofluoric acid is that contact with a dilute solution generally goes unnoticed. The use of cold to restrict lymph and blood flow, thus inhibiting the development of edema, has been established as useful in the treatment of burns of all types. Hydrofluoric acid burns are to be set apart as having particular requirements as to treatment. The use of cold in

conjunction with Hyamine 1622 has served to meet some of these special requirements. However, the mechanism through which this quaternary amine neutralizes or counteracts hydrofluoric acid in the tissues remains uncertain. Nonetheless, the combination of cold and Hyamine (0.2%), in the form of iced Hyamine baths or soaks, has yielded by far the best results in the treatment of over 100 cases of hydrofluoric acid burns.

- 872 Histopathologic Effects of Chromate Chemicals. Report of Studies in Rabbits, Guinea Pigs, Rats, and Mice. C. H. Steffee and Anna M. Baetjer.
Arch. Environmental Health 11, 66-75 (July, 1965).

Rabbits, guinea pigs, rats, and mice were exposed by inhalation or intratracheal injection to various chromium chemicals, simulating the exposures in the old chromate refining plants. No malignant tumors of the respiratory tract were produced. The number of adenomas found in the mice, rats and guinea pigs was not significantly greater in the chromate exposed animals than in the control animals. One rat exposed by inhalation to chromate dust developed a keratinizing tumor of the lung, but this was considered benign by histologic criteria. The previously reported increased incidence of lymphosarcomas in rats inhaling mixed chromate dust was not confirmed. A high incidence of prominence of alveolar epithelium was found in rabbits, guinea pigs, and mice injected intratracheally with a complex zinc chromate pigment. A significantly higher incidence of alveolar and interstitial inflammation with or without prominent alveolar epithelium and fibrosis was found in guinea pigs which inhaled the chromium chemicals and in mice injected with zinc chromate than in control animals not exposed to chromates. Granulomata appeared in a significant number of the chromate-exposed rabbits, guinea pigs, and rats but were not seen in the control animals. Infection of rats with PR⁸ influenza virus associated with intratracheal injection of chromates did not lead to the production of tumors and no demonstrable long term effects on pulmonary or other visceral lesions. The attempt to induce malignancy in alveolar epithelium of mice by the combined action of zinc chromate and a carcinogenic hydrocarbon was unsuccessful. There are 21 references.

-- Authors' summary

- 873 Pulmonary Retention and Excretion of Mercury Vapors in Man. J. Teisinger and V. Fiserova-Bergerova. Ind. Med. & Surg. 34, 580-584 (July, 1965).

Five experiments were carried out in an exposure chamber, in which experimental subjects inhaled mercury vapors in a concentration of 100 micrograms/cu. m. for seven hours (in one case, 200 micrograms/cu. m. was used). A retention of 76% was found in nasal inspiration and mouth expiration; while retention decreased up to 20% in mouth inhalation. Retention was constant from the beginning of the experiment. In people who had worked with mercury for many years, retention was unchanged. Mercury is retained predominantly in respiratory tracts (no mercury was found in alveolar air). Pulmonary desaturation is low and rapid in comparison with solvents. Mercury excretion in urine is protracted and irregular, and thus the absorbed amount cannot be estimated.

-- Authors' summary

- 874 Studies of Nickel Carcinogenesis. Fractionations of Nickel in Ultracentrifugal Supernatants of Lung and Liver by Means of Dextran Gel Chromatography. F. W. Sunderman.
Am. J. Clin. Pathol. 42, 228-236 (Sept. 1964).

The relation of the inhalation of nickel to pulmonary carcinogenesis has been the subject of numerous clinical and experimental studies. In previous studies, published from the author's laboratory, pulmonary carcinomas have been induced in rats by means of exposure to the toxic vapors of nickel, especially nickel carbonyl, and nickel has been implicated as a pulmonary carcinogen in tobacco smoke. In the current study chromatographic fractionations were performed on the ultracentrifugal supernatants of homogenates of rat lung and liver by the use of columns of dextran gel (Sephadex G-100). A major portion of nickel in these tissue supernatants has been demonstrated to be firmly bound to macromolecular constituents. Following acute and chronic inhalation of carcinogenic levels of nickel vapors, the predominant increases in the concentrations of nickel have been observed in the macromolecular fractions. These findings are consistent with the previous demonstration of nickel in purified preparations of ribonucleic acids (RNA) from several rat tissues, and with the observation of increased concentrations of nickel in high molecular weight RNA from lung and liver following the inhalation of nickel vapors.

-- APCA Absts.

- 875 Induction of Liver Tumors in the Syrian Golden Hamster by Feeding Dimethylnitrosamine. L. Tomatis, P. N. Magee, and P. Shubik. *J. Natl. Cancer Inst.* **33**, 341 (Aug. 1964).

Continuous administration of dimethylnitrosamine in the drinking water to Syrian golden hamsters resulted in a high incidence of both cholangio-carcinomas and liver-cell carcinomas. One adenoma of the kidney and two hemangioendotheliomas of the liver were observed also. No tumors of the trachea or lung were recorded. -- *J. Occ. Med. Absts.*

- 876 Anaphylactic Death After Administration of Triphenylmethane Dye. S. Hepps and M. Dollinger. *New Engl. J. Med.* **272**, 1281 (June 17, 1965).

A triphenylmethane dye, alphazurine 2G, which was recently introduced, reportedly stains only viable tissues, thus enabling immediate differentiation of second and third degree burns. This dye was administered to a small series of burned patients in whom early debridement and grafting was considered. In one patient an immediate anaphylactic reaction occurred which subsequently led to his death. Previously administered commonly used drugs with related chemical structures may have been responsible for the development of a hypersensitivity state in this patient. Alphazurine 2G should be used with caution until its toxicity and antigenicity are established. -- *J. Am. Med. Assn. References & Reviews*

- 877 Pulmonary Styrene Vapor Retention. V. Fiserova-Bergerova and J. Teisinger. *Ind. Med. & Surg.* **34**, 620-622 (Aug. 1965).

Experiments with styrene were carried out in seven volunteers who inhaled styrene vapor concentrations of 65 micrograms/liter to 162 micrograms/liter. Styrene retention following nasal inspiration and mouth expiration averaged 66%; following mouth inspiration and expiration only 59%, and did not change during the two or five hours of exposure. Air analysis of one deep expiration showed that styrene concentration in expired air decreases with time according to a curve that may be described by the sum-total of two exponentials. Of inhaled styrene, a concentration of about 6% is retained in alveolar air. After ending exposure styrene was not expired by the lung. -- Authors' summary.

- 878 Comparative Hazards from Some Insecticides. H. G. S. van Raalte. *Ind. Med. & Surg.* **34**, 578-579 (July, 1965).

The author presents data which show that pesticides as a group, are not an important cause of accidental poisoning. This is notably true as regards the so-called "persistent" organochlorine insecticides. Over the last 12 years he has collected data on 110 cases of fatal poisoning by aldrin, dieldrin and endrin that have occurred worldwide. He is almost certain that these represent all the cases that have occurred. As can be seen from a table, the great majority, or almost 75% of all cases were suicidal and thus not accidental. Parathion was the major cause of fatal insecticide poisoning in more than 3,100 cases, involving six years' experience in Japan. A review of the literature will clearly show that fatal accidental poisoning by organophosphate insecticides occurs much more frequently than by organochlorine insecticides.

- 879 Aplastic Anemia Following Exposure to Benzene Hexachloride (Lindane). J. P. Loge. *J. Am. Med. Assn.* **193**, 110-114 (July 12, 1965).

In two fatal cases of aplastic anemia, there was a prolonged indoor exposure to vaporized benzene hexachloride (lindane). The chemical was in pellet form and vaporized by electrical warming of a ceramic jacket. The literature was reviewed and although benzene hexachloride has been a suspected toxin before, this is, to the author's knowledge, the first detailed report of benzene hexachloride exposure and aplastic anemia in which other suspicious drugs or chemical agents were not used. These two cases allow only a presumptive conclusion to be made. Further repeated observations by others will be necessary to make historical evidence alone sufficient for an etiologic diagnosis. More specific *in vitro* and *in vivo* testing procedures are urgently needed to screen the increasingly complex array of drugs to which most of us are exposed. Only in this way can a precise relationship between cause and effect be made. There are 34 references. -- Author's abstr.

- 880 DDA Excretion Levels. Studies in Persons with Different Degrees of Exposure to DDT. W.F. Durham, J.F. Armstrong, and G.E. Quinby. Arch. Environmental Health 11, 76-79 (July, 1965).

The excretion of DDA (dichlorodiphenyl acetic acid) in urine by people in various dietary, environmental, and occupational exposure groups with regard to DDT contact was determined. The DDA excretion levels for the general population ranged from below the experimental limit of the analytical method (0.02 ppm) to 0.35 ppm. Of the 79 samples in this group which were tested, 56 (74%) did not contain detectable quantities of DDA. There was no indication that any important difference in DDA excretion level existed among the general population, meat abstiners, or people with heavy environmental or light occupational exposure. However, striking differences in DDA excretion exist for groups with widely different degrees of exposure. A more sensitive method for determination of DDA excretion levels in urine is needed, since the present procedure gives values below the limit of sensitivity for about three fourths of subjects from the general population group. There are 11 references.

-- Authors' summary

- 881 Organic Pesticides and Water Pollution. C.M. Weiss. Public Works 95, 84-87 (Dec. 1964).

The chlorinated hydrocarbon and organic phosphorus insecticides are discussed with reference to their significance in the aquatic environment. The toxic action of these two groups of insecticides in fish is compared and structural formulas are given for some of the more commonly used compounds of each group. Problems such as taste and odor production associated with pesticides in water supplies, their residual life, and their removal are also discussed.

-- Cond. from Public Health Eng. Absts.

- 882 Organophosphorus Insecticides and Mental Alertness. W.F. Durham, H.R. Wolfe, and G.E. Quinby. Arch. Environmental Health 10, 55-56 (Jan. 1965).

The effect on the mental alertness of cropduster pilots, duster aircraft ground crews and agricultural workers exposed to organic phosphorus insecticides is discussed. A brief description of the three mental alertness tests used in the study is included. The statistical results of the three tests taken by each occupational group involved and by a control group are presented in tabular form. Conclusions drawn from these test scores and from actual cases of severe organic phosphorus poisoning, two of which are included in the article, indicate that the mental alertness of clinically well workmen is not modified by exposure to organic phosphorus insecticides. There are 16 references.

-- Public Health Eng. Absts.

- 883 Cancers in Mice from Asphalt Fractions. M.H. Simmers. Ind. Med. & Surg. 34, 573-577 (July, 1965).

Steam-refined asphalt was separated into four fractions: asphaltenes, aromatics, saturates, and resins. The method of separation is given. The aromatics and saturates fractions showed essentially all the ultraviolet light fluorescence of the four fractions. These two fractions were pooled and tested for oncogenesis by painting on the skin of C57 black mice. Thirty-two per cent of the mice thus treated and coming to autopsy developed cancers.

-- Cond. from author's summary

INDUSTRIAL DUSTS

- 884 Thesauriosis from Inhaled Hair Spray? R.M. Cares. Arch. Environmental Health 11, 80-85 (July, 1965).

A case study of so-called pulmonary thesaurosis following occupational exposure to commercial hair sprays is presented. An allergic mechanism or individual idiosyncrasy is possible. The pathology is compatible with a hypersensitivity reaction as seen in other in-

determinate granulomas. Histochemical studies for many other extrinsic organic and inorganic agents were negative. The histological pattern seen in this case did not simulate that of naturally occurring granulomas such as Boeck's sarcoid. A causal relationship to inhalation of hair spray cannot be excluded although the rarity of such reactions in the face of widespread use of hair sprays is puzzling. There are 14 references.

-- Author's summary

- 385 A Helium Leak-Detection Method for Respirator Control. H. Flyger.
Health Physics 11, 223-224 (March, 1965).

The overall protection offered by a dust mask depends on its intrinsic structural quality, including the efficiency of the canister filter itself, any imperfections in the face-piece and outlet valve, and the unpredictable and variable leakage from its face sealing surface. An accurate and fast method of estimating this last class of leakage is presented; it involves the use of a gas chamber.

-- Public Health Eng. Absts.

- 386 The Tyndalloscope, an Optical Dust Measuring Apparatus with an Electrical Indicator.
J. Stuke and J. Rzeznik. Staub 24, 366-368 (Sept. 1964).

In the West German coal-mining industry, the tyndalloscope has been employed for more than 10 years as a routine dust measuring apparatus. In order to measure and record automatically, a continuously recording, optical-electric dust measuring apparatus was developed. The construction and mode of operation of this tyndallograph and the problems that had to be solved in its development are reported.

-- Public Health Eng. Absts.

- 387 Energy and Efficiency Characteristics of the Ejector Venturi Scrubber. L. S. Harris.
J. Air Poll. Control Assn. 15, 302-305 (July, 1965).

The scrubbing and pumping actions in the Ejector Venturi Scrubber are two separate phenomenon occurring simultaneously. Each phenomenon requires energy and has efficiency of operation and collection efficiency. These energy and efficiency relationships are discussed and illustrated in the form of numerous graphs. The scrubbing energy requirements and how they vary with particle sizes down to one micron are also discussed and presented in form of numerous graphs.

-- Author's abst.

- 388 Maba-Tron Electrofilter. A New Electrofilter with Automatic Cleaning of Collecting and Discharge Electrodes. W. Seidel and W. Kaufmann. Staub 24, 405-407 (Oct. 1964).

A new electrofilter which has automatic cleaning of the collecting and discharge electrodes is reported. This enables a constant precipitation efficiency to be achieved. With its success in perfect precipitation of difficult dusts such as dolomite and ceramic dusts, metal oxide smokes, soot, and salts, even in very low concentrations, high precipitation efficiency remains constant with time.

-- APCA Absts.

- 389 An Analysis of Multiple X-Ray Readings in the Diagnosis of Silicosis. H. B. Ashe, D. E. Bergstrom, and E. B. Perrin. Ind. Med. & Surg. 34, 545-551 (July, 1965).

This report presents information on the reliability of chest x-ray survey diagnoses, analyzes intra- and inter-reader variation and assesses the advantages and disadvantages of six different multiple reading systems. Chest x-rays were taken on 1,478 granite workers, using 14x17-inch film read by three physicians, each making two independent readings. From these data the report shows that on the average a single reader will correctly identify 87% of the positive silicosis cases and at the same time will over-read as false positive 3% of the true negatives. When various multiple reading systems were tested, it was found that one system would increase the yield of true positives to almost 100%, but at the same time 8% of true negatives would be falsely called positive. Another system, aimed at minimizing the false positives reduced these to less than 1% but found only 77% of the true positives. Another system seemed to offer a good compromise by correctly identifying 91% of the true positives and falsely classifying 2% of the true negatives as positive. -- Authors' synopsis

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 890 Respiratory Hazards in Welding. A. T. Doig and P. J. R. Challen.
Ann. Occ. Hyg. (London) 7, 223 (Sept. 1964).

Available statistical information and morbidity and mortality data on the health of welders suggests a slightly higher than normal incidence of acute respiratory illness for the group studied. The hazards associated with nitrogen oxides, ozone, phosgene, metal fume, and the coatings used on welding rods are reviewed. It is concluded that most gas and fume problems in welding can be controlled by efficient ventilation. The potential risk from new materials and new methods of welding are evaluated, and the possibility of chronic and subacute respiratory disease arising from uncontrolled exposure to welding fumes is noted.

-- J. Occ. Med. Absts

- 891 Health and Safety Hazards and Their Control. D. E. Hickish.
Ann. Occ. Hyg. (London) 7, 235 (Sept. 1964).

Safety and health hazards from welding are discussed in relation to eye injuries, burns, explosions, electric shock, gases, fumes, noise, and ionizing radiation. Indicated as possible sources of ionizing radiation hazard are the plasma jet and the electron beam process (when the potential used is over 30 kv) and radioisotopes used for inspection of welds.

-- J. Occ. Med. Absts.

- 892 Carbon Monoxide Hazard in the CO₂ Arc-Welding Process. A. J. DeKretser, W. D. Evans and H. A. Waldron. Ann. Occ. Hyg. (London) 7, 253 (Sept. 1964).

A higher incidence of respiratory disease was observed among a group of eight welders than among their coworkers in the same work environment. Measurement of carbon monoxide concentrations in the environment indicated the possibility of exposure to carbon monoxide from this process. The finding of slightly elevated blood carboxy-hemoglobin levels which returned to normal after the general ventilation in the area had been improved confirmed that personnel had been exposed. Concentrations for the same individual before and after improvement in ventilation showed a definite decrease in almost every instance. It is unusual even in smokers to find concentrations above 5%. At the MAC of 100 ppm, blood concentrations may be as high as 10% carboxy-hemoglobin.

-- J. Occ. Med. Absts.

- 893 Health Hazard from Flux Used in Joining Aluminum Electricity Cables. J. K. McCann.
Ann. Occ. Hyg. (London) 7, 261 (Sept. 1964).

The active constituents of a flux used in joining aluminum electricity cables are believed to be ammonium fluoroborate, aminoethylethanolamine, and zinc oxide. The fume generated by the process using the flux contains ammonia, amine vapor, and fluoride. The complaint elicited most frequently from exposed workers was skin trouble in the form of an eczematous reaction on the hands or face. In addition, chest symptoms occurred in men having asthma or chronic bronchitis. Three men developed bronchitis after working for a prolonged period in a manhole where the presence of high concentrations of fumes were suspected. Air samples from laboratory tests showed that high value of soluble chloride may exist in the breathing zone of the jointers (cable splicers). It was noted also that the use of paraffin in the flux is thought to be an important factor in the production of skin trouble.

-- J. Occ. Med. Absts.

- 894 Audiometry in Industry. (East Range Symposium). A. J. Heffler.
J. Occ. Med. 7, 217-221 (May, 1965).

An audiometer is deceptively easy to operate, and this has led to a completely erroneous belief that a couple of hours of instruction are adequate to train an industrial audiometrist. The records of the Veterans Administration bear sorrowful testimony to the cost of unsophisticated audiometry. The introduction of trained audiologists to the Veterans Administration saved well over \$1 million per year in inflated compensation payments due to poor testing, and this does not consider the savings realized by the identification and accurate measurement of claimants who were consciously or unconsciously exaggerating hearing loss. This is not to demand that audiologists trained to the master's or doctorate level be required to serve industry, but it does demonstrate that those charged with the responsibility of performing the tests be trained to the point that they understand what they are doing and why. It also requires that highly competent consultants be used periodically to monitor the efficiency of the program. The cost of a hearing-conservation program need not be high, but the cost of an inefficient hearing-conservation program is an extravagance that no company can afford.

-- Author's conclusion

- 895 Principles of Noise Control (East Range Symposium). R. Donley.
J. Occ. Med. 7, 222-226 (May, 1965).

A common problem facing acousticians is the widespread impression that noise control is synonymous with noise reduction. This erroneous impression is strongly reinforced by the general advertising of acoustical-tile manufacturers and by the technical advertising of manufacturers of ear protection devices. To the acoustician, however, noise control is no more synonymous with noise reduction than temperature control is synonymous with temperature reduction. Several general methods are used in noise control. These are briefly described with illustrations. Among these control procedures are: (1) Change in distance. (2) Mufflers. (3) Vibration isolation. (4) Damping. (5) Enclosures. (6) Absorption.

- 896 Noise in Hydraulic Systems. S. J. Skaistis, D. E. Kennamer, and J. F. Walrad.
Machine Design 36, 197, 200, 202, 205-206 (Nov. 19, 1964).

Sources of noise in hydraulic equipment are identified and their nature is discussed; noise-reduction research was directed toward reduction of such forms of noise energy as sound, vibration, and fluid pulsations; control of noise should start in specification stage of design by selecting favorable pump and motor operating conditions; data for selection are presented in diagrams.

-- J. Am. Soc. Safety Eng. Absts.

RADIOACTIVITY AND X-RADIATION

- 897 Radiation as the Cause of Lung Cancer Among Uranium Miners. J. K. Wagoner, et al.
New Engl. J. Med. 273, 181-188 (July 22, 1965).

A study of mortality experience was conducted among 3,415 white underground uranium miners, and cause-specific comparisons were made with the general white male population of the Colorado Plateau. A higher total mortality was observed among this group of miners. This excess mortality was attributed to respiratory neoplasms (22 observed as compared with 5.7 expected), violent deaths, particularly in mines and "all other causes"—a reflection of pulmonary fibrosis and its sequelae. A study of the quantitative relation between airborne radiation and respiratory cancer showed that the age-standardized incidence increased from 3.10 per 10,000 miners per year at the lowest to 116.12 at the highest cumulative-exposure category. An evaluation was also made of the evidence for a causal relation between airborne radiation and respiratory cancer among uranium miners in the United States. Six circumstances support

such a conclusion: An excessive occurrence of respiratory cancer was observed, a dose-response relation between airborne radiation and respiratory neoplasms was demonstrated; the excess and the dose-response relation persisted when known confounding variables are taken into account, among them being time since onset of exposure and cigarette consumption; the results were consistent with observations made in the animal laboratory and among other mining populations with substantial exposure to radioactive materials; the carcinogenic effect of airborne radiation was specific for the respiratory tract; the pathology of respiratory cancers among uranium miners was unlike that observed among an age-smoking-resident matched control group but was similar to that observed among factory workers exposed to a radiomimetic agent, mustard gas. The implications of the quantitative model are discussed. There are 51 references.

-- Authors' summary

- 898 Amino Acid Excretion in Human Patients Accidentally Exposed to Large Doses of Partial-Body Ionizing Radiation. F. M. Ganis, M. W. Hendrickson, and J. W. Howland. Radiation Res. 24, 278-291 (Feb. 1965).

Six technicians accidentally exposed to partial-body radiation while servicing a Klystron tube at a radar installation were hospitalized for medical observations. Serial 24-hour urine samples were collected and frozen. After thawing, the samples were desalted and analyzed for amino acids by paper chromatography. A qualitative and semiquantitative analysis revealed an increased aminoaciduria with particular abnormality in the excretion of cystine, proline, and tryptophan in four of the six technicians. There are 47 references.

-- Public Health Eng. Absts.

- 899 Chromosome Aberrations in Radiation Workers. A. Norman, et al. Radiation Res. 23, 282 (Oct. 1964).

Chromosomes of leukocytes cultured from peripheral blood of 36 radiation workers were studied for aberrations. The workers had cumulative exposures from 1.8 to 97.5 r, with all but 3 over 10 r. The frequency of aneuploid cells, quasidiploid cells, dicentrics, and other exchanges was significantly higher in the radiation workers than in a control group. The medical implications of this increase are still unknown.

-- J. Occ. Med. Absts

- 900 A Miniature Warning Dosimeter. A. R. Jones. Health Physics 11, 363-367 (May, 1965).

A warning dosimeter which is small enough to fit inside a pocket is described. The dosimeter provides an audible alarm when a predetermined exposure to gamma-rays has occurred. This level is 0.2 R in a low range version and 0.6 r in a high one. In addition an audible indication of exposure rate is given. The performance of the instrument is described and limitations on its application are discussed. Brief operating instructions are included.

-- APCA Absts.

- 901 Radiation Protection Organizations: The Role of the Health Physicist. D. W. Moeller, F. C. Kloeke, and T. P. Glavin. Health Physics 11, 215-222 (March, 1965).

A review of the published literature shows that there are at least eight international, three national, and a dozen Federal and interstate governmental agencies having active programs in the formulation of rules and regulations pertaining to radiation protection. In addition, over 40 professional societies and other groups within the United States have one or more committees active in this field. For the health physicist, such groups represent a resource in terms of consultation and advice, as well as a challenge from the standpoint of keeping abreast of their many activities. Through the periodic preparation of summary reports on the radiation protection issuances of such groups, the health physicist can do much to coordinate those phases of their programs related to his field. Through the Health Physics Society, health physicists, as a group, might also consider assuming a greater share of the responsibility for offering official guidance to some of the committees of the national advisory organizations. The various sub-committees of the Nuclear Standards Board are cited as one example in which such action might be undertaken.

-- Public Health Eng. Absts.

01 132 2831

- 902 Tests of Potassium Superoxide Canisters in a Small Fallout Shelter. V. L. Brechner, et al. Public Health Repts. 80, 225-232 (March, 1965).

Observations in a fallout shelter under conditions of prolonged occupancy indicate that considerably larger canisters than the 500-g. containers used in rescue units may be preferable for fallout shelters. A canister of 1,250 g. provides a system capable of generating oxygen and absorbing carbon dioxide in large amounts and for sustained periods at flow rates of canister circulation of shelter air compatible with the physical labor of operating a blower. In experiments using the 500 g. KO_2 canister for shelter atmosphere control, concentration of carbon dioxide and of oxygen was not appreciably affected during the period of observation. In experiments with the 1,250 g. KO_2 canister, however, oxygen concentration rose from an initial 18 to 18.75%; carbon dioxide concentration was reduced from 3.55 to 2.5%. Moreover, the operator of the manual blower experienced no syndrome of fatigue; in two experiments with the 500 g. canister such syndromes had occurred. -- Public Health Eng. Absts.

ENVIRONMENTAL MEASUREMENTS

- 903 Polynuclear Hydrocarbon Emissions from Selected Industrial Processes. D. J. von Lehmden, R. P. Hangebrauck, and J. E. Meeker. J. Air Poll. Control Assn. 15, 306-312 (July, 1965).

A number of selected industrial processes considered as potential sources of benzo(a)pyrene and other polynuclear hydrocarbons were surveyed. Polynuclear hydrocarbon emission levels were measured directly for asphalt hot road mix preparations and asphalt air-blowing. Emissions of other pollutants, including particulate matter, carbon monoxide, and total gaseous hydrocarbons were also measured, and are reported together with pertinent data on process design and operation. Results are discussed with reference to the type of process; the type of equipment used, including control devices; and other factors. The significance of some additional processes as contributors of polynuclear hydrocarbons was examined indirectly by collecting atmospheric samples of polynuclear hydrocarbons in residential areas in the vicinity of (1) a carbon black manufacturing area, (2) a steel and coke manufacturing area, (3) an organic chemical industry complex, and (4) a residential and small-industry coal burning area. -- Authors' abst.

- 904 A Method for Checking Instrument Performance at Remote Sampling Sites. G. A. Jutze and R. J. Lewis. J. Air Poll. Control Assn. 15, 323-326 (July, 1965).

This paper describes a quality control technique used by the central headquarters operation of the Continuous Air Monitoring Program in an effort to insure valid data production from instruments located at remote sampling stations. The procedure consists of preparation of 0.10 to 2.00 ppm mixtures of sulfur dioxide or nitrogen dioxide in duplicate Mylar bags, each encased in a corrugated paper box. These mixtures are analyzed during makeup to insure duplication. One box is shipped to the field station where it is analyzed on-site. The control mixture is analyzed in the central lab at the same time. Correlation between measurements indicates the usefulness of this dynamic calibration check. The techniques used are described and results of the program are presented. -- Authors' abst.

- 905 Recommended Standard Method for Continuing Air Monitoring for Hydrogen Sulfide Ultra-microdetermination of Sulfides in the Air. TR-2, Air Pollution Measurement Committee. M. B. Jacobs, Principal Author. J. Air Poll. Control Assn. 15, 314-315 (July, 1965).

Hydrogen sulfide and other sulfides can be determined in the part per billion range in air if the air is bubbled through an absorption mixture of an alkaline suspension of cadmium hydroxide contained in a macro impinger. Rates as high as 1 cubic foot per minute can be used, or 0.1 cubic foot per minute with a midjet impinger. The concentration of the trapped sulfides is then estimated by the methylene blue method. A colorimetric method and a spectrophotometric method are described. -- Authors' abst.

01 132 2832

- 906 Studies on Sulfuric Acid Mist Downwind from a Sulfuric Acid Manufacturing Plant. J.V. Kerrigan and Karel Snajberk. J. Air Poll. Control Assn. 15, 316-319 (July, 1965).

Air pollution downstream from a sulfuric acid manufacturing plant is comprised of two aspects, the amount of acid mist fallout and the concentration in the atmosphere. This investigation shows that it is desirable to determine each of these by an independent method of collection. Pans of distilled water were used to collect and determine the sulfuric acid mist fallout and an electrostatic precipitator was used to determine the sulfuric acid mist concentration in the atmosphere. The use of Stokes' Law to convert the results obtained by one method to those obtained by the other requires a knowledge of the particle size of the sulfuric acid mist droplets. Data presented show that the use of an average particle size can yield a picture of pollution which is in error by many orders of magnitude. The study shows that areas adjacent to a plant may be subjected to fallout of rather large particle size when there are not adequate methods for removal from the emission or byproduct gases. -- Authors' abst.

- 907 A Search for Some Nitro-Olefins in Polluted Air. E.R. Stephens and M.A. Price. J. Air Poll. Control Assn. 15, 320-322 (July, 1965).

An electron capture chromatographic method of detecting nitroethylene and 1-nitro-1-propene was developed and applied to ambient air samples, photolyzed propene/nitrogen dioxide mixtures and auto exhaust. No trace of either compound was found in ambient air or in the photolyzed mixtures. The detection limit was estimated to be 1 ppb. A single sample of auto exhaust showed several small peaks which, if attributed to nitro-olefin, would amount to insignificant traces. -- Authors' abst.

- 908 Remarks About Chemical Methods Used in Aerosol Researches. E. Meszaros. Tellus 16, 469-471 (Nov. 1964).

Measurements were carried out to determine the mass-concentration of sulfate and chloride particles in the atmosphere. The identifications were done partly by the so-called single-particle method (gelatine technique) and partly by bulk analysis. Great differences were found between the results obtained by the two methods, and a possible explanation of the discrepancy is given. -- Public Health Eng. Absts.

PREVENTIVE ENGINEERING

- 909 How to Select Safe Lift Trucks. F.C. Schuster. Welding Engr. 49, 55-57 (Nov. 1964).

Powering stability, frames, brakes, controls and visibility specifications for safe materials handling are discussed briefly as guide to selection of optimum truck; effects of operator comfort, hydraulic system, guards and safety standards on environment and use are included. -- J. Am. Soc. Safety Eng. Absts.

- 910 Safety for Lift Trucks. F.C. Schuster. Modern Concrete 28, 49-53 (Nov. 1964).

Variations in truck design and size are described that enable proper selection, operation, and maintenance of unit for any job; safety considerations in design and operation. -- J. Am. Soc. Safety Eng. Absts.

01 132 2833

- 911 Chemical Plant Safety—Insurance Company Viewpoint. J. E. Collier.
Chem. Eng. 71, 207-212 (Oct. 12, 1964).

Factory Insurance Assn. (FIA) program is developed by giving consideration to guiding principles regarding administration, construction, water supplies, automatic fire protection, drainage, loss minimization, duplication of facilities, equipment and maintenance, process safety, operator training and FIA service.

-- J. Am. Soc. Safety Eng. Absts

- 912 Safety Director's Viewpoint (Chemical Plant). G. F. Korkmas.
Chem. Eng. 71, 143-145 (July 20, 1964).

Top management and engineering contractor must recognize that changes are certain to occur between decision to proceed with project and completion of detailed design; best overall project will result if definite system is established to handle these changes and to provide safety reviews while project is in progress.

-- J. Am. Soc. Safety Eng. Absts

- 913 Design Engineer's Viewpoint (Chemical Plant). A. Gilbert.
Chem. Eng. 71, 147-150 (July 20, 1964).

Assembling of all pertinent data for one specific chemical into one report can be termed "safety evaluation"; safety evaluation considers physical properties, chemical reaction rates, compatibility with other chemicals and materials, toxicity, explosion hazards, reliability of utilities, instrumentation, materials of construction, pressure, temperatures, manpower, investment, relationship to other production units, locating facility, and flammable liquid volumes.

-- J. Am. Soc. Safety Eng. Absts.

- 914 Responsibility of Top Management to Safety Program. F. A. Walker.
New Engl. Water Works Assn. J. 78, 144-149 (June, 1964).

Presents a discussion of precautions that can be encouraged by management of water companies to reduce accidents to employees, equipment, and general public; poor safety record of water utilities is noted.

-- J. Am. Soc. Safety Eng. Absts

- 915 Body Currents Measured in Live Line Work. H. L. Rorden, et al.
Electrical World 162, 60-63 (Nov. 30, 1964).

Measurements are reported of eventually harmful body currents experienced by maintenance workers, due to electric fields of live 138 kv or 345 kv transmission lines; various protective measures are suggested.

-- J. Am. Soc. Safety Eng. Absts.

- 916 Safety Considerations in Industrial Use of Organic Peroxides. J. B. Armitage and H. W. Strauss.
Ind. Eng. Chem. 56, 28-32 (Dec. 1964).

Most organic peroxides are used industrially to initiate free radical polymerizations; types of hazards associated with peroxides are explosion, fire, and toxicity; Frank-Kamenetsky criticality criterion is a dimensionless number which is a function of physical and chemical properties of materials, concentration of material, and temperature and dimensions of assembly; tests include self-heating test, drop-weight test, bullet impact test, and laboratory thermal stability test.

-- J. Am. Soc. Safety Eng. Absts

COMMUNITY AIR HYGIENE

- 917 How Air Pollution is Detected. M. Clifton. Proc. Roy. Soc. Med. 57, 615-618 (July, 1964)

A description is given of the classification of gaseous and nongaseous constituents of air pollution. Some methods for measuring these pollutants are then given. The National survey embraced 150 towns of all sizes throughout England and Wales and provided data on smoke and sulfur dioxide in relation to climate, topography, industrialization, population density, fuel utilization, and urban development.

-- APCA Absts.

- 918 Bacterial Emissions from Activated Sludge Units. J.O. Ledbetter and C.W. Randall.
Ind. Med. & Surg. 34, 130-133 (Feb. 1965).

The airborne bacterial counts made on 35 different days exhibit conclusive evidence that the bacterial population of air is increased by passage over an activated sludge waste treatment unit. Despite a rapid die-off of bacteria, an increase in the bacterial population persists for a considerable distance and time. The distance is strongly dependent upon wind velocity. No effects of relative humidity and temperature could be noted in this study. The investigation is being continued with future plans to identify serotypes in an effort to evaluate the health hazard involved. There are 17 references.

-- Public Health Eng. Absts.

- 919 Air Pollution and Disease. B.G. Ferris, Jr., and N.R. Frank.
Anesthesiology 25, 470-478 (1964).

Atmospheric pollution can be classified under three headings: general, occupational, and personal. The components are complex and variable so that it is difficult to extrapolate the prevalence of disease in one area to that in another unless the two have similar chemical compositions. Significant exposures can occur at work and may produce impairment of respiratory function. It is emphasized that tobacco smoking, and particularly cigarette smoking, is a most important factor in the causation of chronic nonspecific respiratory disease. Much research has been done to elucidate the mechanism whereby such changes are induced but specific answers concerning the mechanisms have not been forthcoming.

-- Public Health Eng. Absts.

- 920 Environmental Changes. Why a Health Concern? M.M. Merrill.
Military Med. 129, 1025-1030 (Nov. 1964).

While it is somewhat dangerous to attempt to evaluate the relative health significance of the environmental changes occurring today, the author states, that he would guess that the most sizable risks to the population are to be found in air pollution, water pollution, the increasing use of nuclear energy, and the widespread use of chemicals. These are important because the individual has little if any control over that portion of his environment affected by them. Large segments of the population are at risk. The choice will soon have to be made whether the man-made environment of the future is to be a rapidly deteriorating one as a habitat for man or whether, through careful management and orderly planning, the world around can retain its quality of promoting healthful and delightful living. If we are to solve these problems, we will need new organizational patterns, new scales of values, and new relationships between government, private enterprise, and the public. Health today is more and more becoming a matter of community hygiene. We are increasingly at the mercy of the environment. We must control the changes that are occurring in a way that will contribute constructively to the health and welfare of our people.

-- APCA Absts.

- 921 Human Cardiovascular Diseases and Atmospheric Air Pollution in Los Angeles, California. J.W.A. Brant. Intern. J. Air and Water Poll. 9, 219-231 (April, 1965).

Two sets of original source records provided 221,760 measurements from which 66 variables were generated. For both studies a multiple regression technique was used. Atmospheric conditions presented a formidable and potentially catastrophic danger to public health in Los Angeles. Partial correlation coefficients ranged from ± 0.6639 to ± 0.9891 . The system of atmospheric variables explains to a significant degree variation in the cardiovascular incidence, the cardiovascular admissions into the hospital. The system of variables has a linear effect as proved by the F criterion, also the residuals between actual and predicted values of the dependent variable are nonsignificant as proved by the alpha-criterion, meaning that the prediction equation (multiple regression system) is valid. Post-exposure to atmosphere, in this instance 4th week post-exposure, is a significant consideration when evaluating the effects of atmosphere upon human health. There are 38 references.

-- APCA Absts.

- 922 A Dynamic Air Resource Management Program, City of Chicago. J.V. Fitzpatrick and A.N. Heller. *J. Air Poll. Control Assn.* 15, 297-301 (July, 1965).

A review of air pollution control activities since 1881, and the current needs to change from a smoke abatement to an air resource management program are presented. The rapid and dynamic transition made by the City of Chicago since 1962 in its air pollution control activities are explored in terms of organizational changes, training of professional and nonprofessional personnel, ambient air quality measurements, emission inventory of commercial and industrial operations directed toward issuance of certificates of operation, evaluation of health effects and materials damage, modifications to the municipal code, and the interrelationship of air pollution control activities with urban planning and the regional complex. The multidiscipline Public Health Service, Division of Air Pollution, Technical Assistance program initiated in October 1962, and planned for a period of five years is discussed. The achievements, particularly since 1962, in the many faceted Chicago air resource management program together with some of its long-range plans are delineated. -- Authors' abstr.

- 923 Catalytic Combustion of Atmospheric Contaminants Over Hopcalite. J.G. Christian and J.E. Johnson. *Intern. J. Air and Water Poll.* 9, 1-10 (Feb. 1965).

Catalytic combustion studies showed that Hopcalite, an unsupported coprecipitate of copper and manganese oxides, provides substantially complete oxidation of vapors of several types of hydrocarbons, oxygenated compounds, nitrogen compounds, and halogenated compounds at about 300°C. The lower-molecular-weight hydrocarbons proved resistant to oxidation; methane was oxidized only to the extent of 30% even at 400°C. The organic nitrogen compounds produced the theoretical amount of carbon dioxide as well as appreciable amounts of nitrous oxide (N₂O). Ammonia produced 70% nitrous oxide at 315°C, and about 2% nitrogen dioxide (NO₂). The decomposition of organic halogen compounds ranged from slight in the case of Freon-12 to virtually complete for methyl chloroform. In addition, new organic halides were formed by the oxidation of methyl chloroform and Freon-11. There is at least partial retention of halogen on the catalyst when Freon-114 B2 and Freon-11 are decomposed. Aerosols of dioctyl phthalate, a hydrocarbon-type lubricating oil, and a triaryl phosphate ester lubricant were quantitatively oxidized by Hopcalite at 300°C. There are 18 references.

-- Public Health Eng. Abstrs.

- 924 Preventing Air Pollution by the Catalytic Combustion of Industrial Waste Gas. G. Jungst. *Fette, Seifen, Anstrichmittel* 66, 349-352 (1964).

Mercaptans decompose in air at lower temperature (250° instead of 950°) in the presence of palladium, platinum or metallic oxide catalysts. The catalysts are prepared so that they have a large surface area. Their activities at 250°, 300° and 350° with various rates of gas flow have been studied. The critical rate of flow, when practically all the mercaptan burnt away, was similar at all these temperatures. The apparatus consists of a heat exchanger which raises the temperature of the incoming gases, a regulator and heater which raises the gases to the required temperature, and beds of catalyst. The poisoning and regeneration of catalysts has been studied. The method of calculating the cost of purifying gases with this apparatus is given.

-- Public Health Eng. Abstrs.

MANAGEMENT ASPECTS

- 925 The Alcoholic in Industry and the Role of the Personnel Specialist. Cornell University Seminar. New York State School of Industrial and Labor Relations. Conference Notes. *Ind. Med. & Surg.* 34, 571-572 (July, 1965).

In an all day seminar (January 14, 1964) sponsored by Cornell University, 20 Personnel Specialists from diverse government, financial and industrial organizations critically examined some of the issues connected with alcoholism and occupational health. In general, the conference

participants confronted many of the unspoken, but real, problems which plague company-based alcoholism control programs. The conference focussed on the policy aspects of an effective program. There was considerable disagreement over whether an effective program needed the general approval of top management. Management tends to be problem-oriented. Therefore, a policy in this area should aim at solving a management problem. Hence, the major elements of an effective policy include: (1) Realization of the need by top management for some consistent action. (2) Recognition of alcoholism as a disease, with the caveat that the policy is designed only to treat problem drinking not social drinking. (3) Provision for early identification. (4) A stress on rehabilitation—a positive approach and not a witch hunt. (5) Laying of the ground work for constructive coercion. (6) Provisions for periodic reevaluation of results. (7) Modification of other policies such as major medical or sick leave. It was the consensus of the meeting that a unique alcoholic policy was necessary—one that was separate and distinct from the general medical health program of the organization.

- 926 Reaction of Supervisors to Emotionally Disturbed Employees. A Study of Deviation in a Work Environment. H.M. Trice. *J. Occ. Med.* 7, 177-188 (May, 1965).

Despite the advantages of focusing on man-boss relations as a source of data in deviancy studies, it has rarely been done. The current study attempts this by using job supervisors of diagnosed alcoholics, psychotics, and neurotics as subjects. The study included, for comparative purposes, bosses of a representative sample of supervisors of "normals." An exploratory study provided the raw materials for a structured interview. By responding to this, the subjects generated the study data. In addition, company personnel representatives estimated change and visibility aspects of jobs occupied by diagnosed employees. Chi-square-type measures determined whether there was association between types of employees (alcoholic, psychotic, neurotic, and "normal") and variables such as boss and task changes, social visibility, supervisor ratings, definition as a problem, inclination to take action, inclination to use the medical department program, and various "blocks" and "pushes" to use the medical department. In addition, a criterion of response to therapy permitted an assessment of association between boss attitude toward the medical department program and response to therapy.

-- Cond. from author's summary

ACCIDENTS AND PREVENTION

- 927 Traumatic Aneurysm of the Axillary Artery: A Golf Hazard. J. Rosensweig and M.A. Simon. *Can. Med. Assn. J.* 93, 165-167 (July 24, 1965).

A unique case of post-traumatic axillary artery aneurysm following a violent golf stroke is reported and the probable mechanism of injury is described. The lesion was successfully treated by aneurysmectomy and reconstruction of the axillary artery.

-- Authors' summary

- 928 Injury Produced by Seat Belts. Report of Two Cases. P. Fisher. *J. Occ. Med.* 7, 211-212 (May, 1965).

Severe and nearly fatal injuries resulted from the trauma of moderate collision in a person wearing a 3-point combination diagonal and lap belt. It does not reasonably follow that the use of restraining devices should be discarded because they can cause injury. This blanket condemnation is favored by those who are uninformed or do not choose to use seat belts. The prime purpose of a restraining device, to minimize injury, may have been served. Perhaps the case described in this report indicates some flaws in the diagonal-lap belt combination, with which all the forces center themselves at one point of greatest strain. Evidence already considerable and further presented here suggests that abdominal complications occur with wearing of the lap belt too high on the abdomen. The passenger in question, short and obese, did in fact always wear it high. Probably best is the full shoulder harness restraint, which distributes the forces of collision more evenly. We now need better, safer automobile design to enable proper installation of suitable restraining devices.

-- Author's discussion

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