

IN RE: ABRAMS
November 1992



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LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

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INDUSTRIAL HYGIENE FOUNDATION

MELLON INSTITUTE

4400 FIFTH AVENUE -- PITTSBURGH, PA. 15213

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IN RE: ABRAMS

The periodic evaluation of outpatients is discussed in Abst. No. 847.

See Abst. No. 850 for the natural history of coronary atherosclerosis.

Abst. No. 852 discusses the occurrence of oral cancer.

Abst. No. 861 is concerned with the etiology of bronchogenic carcinoma.

See Abst. No. 866 for serologic surveys for selected zoonoses in Ohio veterinarians.

Information on dermatitis caused by Saran Wrap is given in Abst. No. 869.

Abst. No. 871 reviews dermatitis from epoxy resins.

Abst. No. 878 presents criteria for the evaluation of chemical toxicity.

Oxygen therapy in cyanide poisoning is the title of Abst. No. 880.

Fluorosis in cattle is investigated in Abst. No. 881.

Clinical and therapeutic aspects of kerosene poisoning are studied in Abst. No. 888.

Data on the successful treatment of malathion poisoning are given in Abst. No. 890.

A case of benign asbestos pleurisy is described in Abst. No. 895.

Abst. No. 909 reports on air sampling in plastic bags.

A code of safe practices for industrial scuba diving is given in Abst. No. 916.

Abst. No. 926 gives information on the employment of the mentally subnormal.

FOUNDATION FACTS

NEW MEMBER. The Foundation is pleased to add the name of Gypsum Association to its list of members.

Invitational programs for the 29th Annual Meeting have been mailed to the membership of the Foundation. Of particular interest to our members should be the following:

The 1st Management Session - Chronic Disease in Industry - which will explain the importance of preventive programs related to health.

The 2nd Management Session - Application of Toxicological Thresholds - will indicate the importance of competent industrial health consultation in the application of threshold and maximum standards.

The 3rd Management Session - concerned with an industrial emphysema claim will incorporate some of the findings of the Emphysema Symposium held at the Foundation on September 15 and 16 (see August Foundation Facts).

The Joint Professional-Technical Conference on Thursday morning includes the presentations on practical aspects of waste disposal, air conservation, beryllium toxicity, and legal papers on the current status of compensation legislation, hearing loss, and Walsh-Healey Act Standards.

The Concurrent Professional-Technical Conferences include many important and timely subjects which have been suggested by the membership and which relate to many fields of occupational health and safety.

The Business Meeting of the Foundation Membership at 11:20 a.m., October 21, will review past progress and outline future research and educational plans for Foundation activities. Members should plan to attend and to participate in our planning to the fullest extent possible.

Phosgene Meeting. As a result of a small exploratory discussion on Phosgene, September 17, consideration is being given to several industry-wide research projects under the guidance of the Chemical-Toxicological, Medical, and Engineering Committees. If sufficient interest develops, a Symposium may be held later in order to allow presentation of our findings.

Threshold Limit Values. A limited number of tear sheets from this issue of the Industrial Hygiene Digest will be available to Foundation member companies represented at the Annual Meeting. If you should need extra copies, therefore, please let us hear from you—while the supply lasts.

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THRESHOLD LIMIT VALUES FOR 1964*

Adopted at the 26th Annual Meeting of the American Conference of Governmental Industrial Hygienists
Philadelphia, Pa., April 25-28, 1964

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 a "C" listing. 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 of 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. On what basis a limit is developed is given separately for each listed substance in "Documentation of Threshold Limit Values," a publication of the Threshold Limits Committee of the ACGIH.

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 grab 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 value. 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 judgment whether to include or exclude a substance for a "C" listing.

"Skin" Notation. Listed substances followed by the designation "Skin" refer to the potential con-

tribution to the over-all exposure by the cutaneous route including mucous membranes and eye. 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, cel-lulose); 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 rapidly 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 15 mg m^{-3} or 50 mppcf , whichever is less, is recommended for substances 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.

Physical Factors. It is recognized that such physical factors as heat, ultraviolet and ionizing radia-

tion, 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 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°F or over-time, extending the work-week more than 50%, might be considered gross deviations. In such instances judgment must be exercised in the proper adjustments of the threshold limit values.

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 carte blanche adoption by foreign countries.

These values are reviewed annually by the Committee on Threshold Limits for revisions 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.

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RECOMMENDED VALUES

(In Alphabetical Order)

Substance	ppm*	Mg/M ³ **	Substance	ppm*	Mg/M ³ **
Acetaldehyde	200	360	C Boron trifluoride	1	3
Acetic acid	10	25	Bromine	0.1	0.7
Acetic anhydride	5	20	Butadiene (1, 3-butadiene)	1,000	2,200
Acetone	1,000	2,400	2-Butanone (methyl ethyl ketone)	200	590
Acetonitrile	40	70	2-Butoxy ethanol (Butyl Cellosolve) - Skin	50	240
Acetylene tetrabromide	1	14	Butyl acetate (n-butyl acetate)	200	950
Acrolein	0.1	0.25	Butyl alcohol	100	300
Acrylonitrile - Skin	20	45	tert. Butyl alcohol	100	300
Aldrin (1, 2, 3, 4, 10, 10-hexachloro-1, 4, 4a, 5, 8, 8-a-hexahydro-1, 4, 5, 8-dimethano-naphthalene) Skin	-	0.25	C Butylamine	5	15
Allyl alcohol - Skin	2	5	C tert. Butyl chromate (as CrO ₃) - Skin	-	0.1
Allyl chloride	1	3	n-Butyl glycidyl ether (BGE)	50	270
C Allyl glycidyl ether (AGE)	10	45	Butyl mercaptan	10	35
Allyl propyl disulfide	2	12	p-tert. Butyltoluene	10	60
Ammonia	50	35	Cadmium oxide fume	-	0.1
Ammonium sulfamate (Ammate)	-	15	Calcium arsenate	-	1
Amyl acetate	100	525	Canphor	-	2
Amyl alcohol (isoamyl alcohol)	100	360	Carbon dioxide	5,000	9,000
Aniline - Skin	5	19	Carbon disulfide - Skin	20	60
Antimony & compounds (as Sb)	-	0.5	Carbon monoxide	100	110
ANTU (alpha naphthyl thiourea)	-	0.3	Carbon tetrachloride - Skin	10	65
Arsenic & Compounds (as As)	-	0.5	Chlordane (1, 2, 4, 5, 6, 7, 8, 8-octachloro-3a, 4, 7, 7a-tetrahydro-4, 7-methanonidane)	-	0.5
Arsine	0.05	0.2	Chlorinated camphene, 60%	-	0.5
Barium (soluble compounds)	-	0.5	Chlorinated diphenyl oxide	-	0.5
C Benzene (benzol) - Skin	25	80	Chlorine	1	3
Benzidine	-	Al	Chlorine dioxide	0.1	0.3
Benzyl chloride	1	5	Chlorine trifluoride	0.1	0.4
Beryllium	-	0.002	C Chloroacetaldehyde	1	3
Boron oxide	-	15	Chlorobenzene	-	-
			(monochlorobenzene)	75	350
			Chlorobromomethane	200	1,050
			Chlorodiphenyl (42% chlorine) - Skin	-	1
			Chlorodiphenyl (54% chlorine) - Skin	-	0.5
			C Chloroform (trichloromethane)	50	240
			1-Chloro-1-nitropropane	20	100
			Chloropicrin	0.1	0.7
			Chloroprene	-	-
			(2-chloro-1, 3-butadiene)	25	90

* Parts of vapor 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

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Substance	ppm*	Mg/M ³ **	Substance	ppm*	Mg/M ³ **	Substance	ppm*	Mg/M ³ **
Chromic acid and chromates (as CrO ₃)	—	0.1	Diisobutyl ketone	100	860	Feibam (ferriic dimethyl dithiocarbamate)	—	15
Cobalt	—	0.5	Dimethyl acetamide - Skin	50	290	Ferrocyanide dust	—	1
Crags (R) herbicide [sodium 2-(2,4-dichlorophenoxy) ethanol hydrogen sulfate]	—	15	Dimethylamine (N-dimethyl-aniline) - Skin	10	35	Fluoride (as F)	—	2.5
Cresol (all isomers) - Skin	5	22	† Dimethylformamide - Skin	5	25	Fluorine	0.1	0.2
Cyanide (as CN) - Skin	—	5	1,1-Dimethylhydrazine - Skin	—	—	Fluorotrichloromethane	1,000	5,600
Cyclohexane	400	1,400	1,1-Dimethylhydrazine - Skin	0.5	1	C Formaldehyde	5	6
Cyclohexanol	50	200	Dimethylsulfate - Skin	1	5	Furfural	5	20
Cyclohexanone	50	200	Dinitrobenzene - Skin	—	1	Furfuryl alcohol	50	200
Cyclohexene	400	1,350	Dinitrotoluene - Skin	—	1.5	Gasoline	500	2,000
2,4-D (2,4-dichlorophenoxy-acetic acid)	—	10	Dinitro-o-cresol - Skin	—	0.2	Glycidol (2,3-Epoxy-1-propanol)	50	150
DDT [2,2-bis (p-chlorophenyl)-1,1,1-trichloroethane] - Skin	—	1	Dioxane (diethylene dioxide)	100	360	Heptachlor (1,4,5,6,7,8,8a-heptachloro-3a,4,7,7a-tetrahydro-4,7-methanindane)	—	0.5
DDVP (O, O-Dimethyl-2,2-dichlorovinyl phosphate)	—	0.05	Dipropylene glycol methyl ether - Skin	100	600	Heptane (n-heptane)	500	2,000
Decaborane - Skin	—	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	Hexane (n-hexane)	500	1,800
Diacebanol alcohol (4-hydroxy-4-methyl-2-pentanone)	50	240	EPN (O-ethyl O-p-nitrophenyl thionobenzenephosphonate) Skin	—	0.5	Hexanone (methyl butyl ketone)	100	410
Diborane	0.1	0.1	Ethyl acetate	400	1,400	sec-Hexyl acetate	50	295
1,2-Dibromoethane (ethylene dibromide)	25	190	Ethyl acrylate - Skin	25	100	Hexone (methyl isobutyl ketone)	100	410
1,2-Dichlorobenzene	50	300	Ethyl alcohol (ethanol)	1,000	1,900	+ Hydrazine - Skin	1	1.3
p-Dichlorobenzene	75	450	Ethylamine	25	45	Hydrogen bromide	3	10
Dichlorodifluoromethane	1,000	4,950	C Ethylbenzene	200	870	C Hydrogen chloride	5	7
1,1-Dichloroethane	100	400	Ethyl bromide	200	890	Hydrogen cyanide - Skin	10	11
1,2-Dichloroethane (ethylene dichloride)	50	200	Ethyl chloride	1,000	2,600	Hydrogen fluoride	3	2
1,2-Dichloroethylene	200	790	Ethyl ether	400	1,200	Hydrogen peroxide, 90%	1	1.4
Dichloroethyl ether	15	90	Ethyl formate	100	300	Hydrogen selenide	0.05	0.2
Dichloromono-fluoromethane	1,000	4,200	C Ethyl mercaptan	20	52	† Hydrogen sulfide	—	—
C 1,1-Dichloro-1-nitroethane	10	60	Ethyl silicate	100	850	Hydroquinone	—	2
Dichlorotetrafluoroethane	1,000	7,000	Ethylene chlorohydrin - Skin	5	16	C Iodine	0.1	1
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	Ethylenediamine	10	30	Iron oxide fume	—	15
Diethylamine	25	75	+ C Ethylene glycol dinitrate - Skin	0.2	1.2	Isophorone	25	140
			Ethylene imine - Skin	5	9	Isopropylamine	5	12
			Ethylene oxide	50	90	Isopropyl glycidyl ether (IGE)	50	240
			2-Ethoxyethanol (Cellosolve) - Skin	200	740	Ketene	0.5	0.9
			2-Ethoxyethylacetate (Cellosolve acetate) - Skin	100	540	Lead	—	0.2
						Lead arsenate	—	0.15
						Lindane (hexachlorocyclohexane, gamma isomer)	—	0.5
						Lithium hydride	—	0.025

†1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

†1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

iii.

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HWBB-0019708

Substance	ppm*	Mg/M ³ **	Substance	ppm*	Mg/M ³ **	Substance	ppm*	Mg/M ³ **
Magnesium oxide fume	—	15	Naphtha (coal tar)	200	800	† Phosgene (carbonyl chloride)	—	—
Malathion (O, O-dimethyl dithiophosphate of diethyl mercaptosuccinate) - Skin	—	15	Naphtha (petroleum)	500	2,000	Phosphine	0.3	0.4
C Manganese	—	5	β - Naphthylamine	—	A2	Phosphoric acid	—	1
Mercury - Skin	—	0.1	Nickel carbonyl	0.001	0.007	Phosphorus (yellow)	—	0.1
Mercury (organic compounds) - Skin	—	0.01	Nicotine - Skin	—	0.5	Phosphorus pentachloride	—	1
Mesityl oxide	25	100	† Nitric acid	—	—	Phosphorus pentasulfide	—	1
Methoxychlor (2, 2-di-p-methoxy-phenyl-1, 1, 1-trichloroethane)	—	15	p-Nitroaniline - Skin	1	6	Phosphorus trichloride	0.5	3
Methyl acetate	200	610	Nitrobenzene - Skin	1	5	Picric acid - Skin	—	0.1
Methyl acetylene	1,000	1,650	Nitroethane	100	310	Platinum (Soluble Salts)	—	0.002
Methyl acrylate - Skin	10	35	C Nitrogen dioxide	5	9	Propyl acetate	200	840
Methylal (dimethoxymethane)	1,000	3,100	C Nitroglycerin + EGDN - Skin	0.2	2	Propyl alcohol (isopropyl alcohol)	400	980
Methyl alcohol (methanol)	200	260	Nitromethane	100	250	Propyl ether (isopropyl ether)	500	2,100
C Methyl bromide - Skin	20	80	1-Nitropropane	25	90	n-Propyl nitrate	25	110
Methyl cellosolve (2-methoxy-ethanol) - Skin	25	80	2-Nitropropane	25	90	Propylene dichloride (1, 2-dichloropropane)	75	350
Methyl cellosolve acetate (ethylene glycol monomethyl ether acetate) - Skin	25	120	N - Nitrosodimethylamine (Dimethylnitrosamine) - Skin	A3	—	Propylene imine - Skin	25	60
C Methyl chloride	100	210	Nitrotoluene - Skin	5	30	Propylene oxide	100	240
Methyl chloroform (1, 1, 1-trichloroethane)	350	1,900	Octane	500	2,350	Pyrethrum	—	5
Methylcyclohexane	500	2,000	Oil mist (mineral)	—	5	Pyridine	5	15
Methylcyclohexanol	100	470	Osmium tetroxide	—	0.002	Quinone	0.1	0.4
Methylcyclohexanone	100	460	Ozone	0.1	0.2	Rotenone (commercial)	—	5
Methyl formate	100	250	Parathion (O, O-diethyl O-p-nitrophenyl thiophosphate) - Skin	—	0.1	† Selenium compounds (as Se)	—	—
Methyl isobutyl carbinol (methyl amyl alcohol)	25	100	Pentaborane	0.005	0.1	Sodium fluoracetate (1080)	—	—
† Methyl mercaptan	—	—	Pentachloronaphthalene - Skin	—	0.01	- Skin	—	0.05
† α Methyl styrene	100	480	Pentachlorophenol - Skin	—	0.5	Sodium hydroxide	—	2
Methylene chloride (dichloromethane)	500	1,750	Pentane	1,000	2,950	Stibine	0.1	0.5
Monomethyl aniline - Skin	2	9	Pentanone (methyl propyl ketone)	200	700	Standard solvent	500	2,900
Molybdenum (soluble compounds)	—	5	Perchloroethylene (tetra-chloroethylene)	100	670	Strychnine	—	0.15
(insoluble compounds)	—	15	Perchloromethyl mercaptan	0.1	0.8	+ C Styrene monomer (phenylethylene)	100	420
			Perchloryl fluoride	3	13.5	Sulfur dioxide	5	13
			Phenol - Skin	5	19	Sulfur hexafluoride	1,000	6,000
			Phenyl glycidyl ether (PGE)	50	310	Sulfuric acid	—	1
			Phenyldiazine - Skin	5	22	Sulfur monochloride	1	6
			Phosdrin (2-carbomethoxy-1-methyl vinyl dimethyl phosphate)	—	0.1	Sulfur pentafluoride	0.025	0.25
						Sulfuryl fluoride	5	20
						2, 4, 5T (2, 4, 5 trichlorophenoxyacetic acid)	—	10
						TEDP (tetraethyl dithionopyrophosphate) - Skin	—	0.2

†1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

†1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

†1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

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Substance	ppm*	Mg. M ³ **
Teflon (R) decomposition products	-	A4
TEPP (tetraethyl pyrophosphate) - Skin	-	0.05
Tellurium	-	0.1
1, 1, 2, 2-Tetrachloroethane - Skin	5	35
Tetrahydrofuran	200	590
Tetramethane	1	8
Tetryl (2, 4, 6-trinitrophenylmethyl)nitramine - Skin	-	1.5
Thallium (soluble compounds) - Skin	-	0.1
Thiram (tetramethyl thiuram disulfide)	-	5
Titanium dioxide	-	15
Toluene (toluol)	200	750
o-Toluidine - Skin	5	22
C Toluene-2, 4-dithiocyanate	0.02	0.14
Trichloroethylene	100	520
Trichloronaphthalene - Skin	-	5
1, 2, 3-Trichloropropane	50	300
1, 1, 2-Trichloro 1, 2, 2-trifluoroethane	1,000	7,600
Triethylamine	25	100
Trifluoromonomeromethane	1,000	6,100
Trinitrotoluene - Skin	-	1.5
Triorthocresyl phosphate	-	0.1
Triphenyl phosphate	-	3
Turpentine	100	560
Uranium (soluble compounds) (insoluble compounds)	-	0.05
C Vanadium (V 20 s dust)	-	0.25
(V 20 s fume)	-	0.5
C Vinyl chloride (chloroethylene)	500	0.1
Vinyl toluene	100	1,300
Warfarin (3- α acetylbenzyl-4-hydroxycoumarin)	-	480
C Xylene (xylol)	200	0.1
Xylidine - Skin	5	870
		25

*1964 Addition or deletion of "C"

†1964 Revision - see Tentative Values

Substance	ppm*	Mg/M ³ **
† Yttrium	-	-
Zinc oxide fume	-	5
Zirconium compounds (as Zr)	-	5

Radioactivity For permissible concentrations of radio-isotopes in air, see U. S. Department of Commerce, National Bureau of Standards, Handbook 69, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radioisotopes in Air and in Water for Occupational Exposure," June 5, 1959. Also, see U. S. Department of Commerce, National Bureau of Standards, Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," September 24, 1954, and addendum of April 15, 1958.

* Parts of vapor 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

†1964 Revision - see Tentative Values

MINERAL DUSTS

Substance	m.p.p.c.f.*
SILICA	
Crystalline	
Quartz, Threshold Limit calculated from the formula	250 **
Cristobalite	%SiO ₂ $\pm$ 5
Amorphous, including natural diatomaceous earth	20
SILICATES (less than 1% crystalline silica)	
Asbestos	5
Mica	20
Soapstone	20
Talc	20
Portland Cement	50
"Inert" or Nuisance Particulates	50 (or 15 mg/m ³ whichever is the smaller)

Conversion factors
mppcf x 35.3 = million particles per cubic meter
= particles per c.c.

* Millions of particles per cubic foot of air, based on impinger samples counted by light field techniques.
** The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

TENTATIVE VALUES

Substance	ppm*	Mg. M ³ **
† Anisidine (o, p-isomers)	-	0.5
† Benzoyl peroxide	-	5
Calcium oxide	-	5
† Carbaryl (Sevin) (R)	-	5
Copper Fume	-	0.1
Dusts & Mists	-	1.0
† Cotton Dust (raw)	-	1
† Cyclopentadiene	-	200
Demeton (Systox) (R)	-	75
† 1, 3-Dichloro-5, 5-dimethylhydantoin	-	0.1
† Dimethyl 1, 2-dibromo-2, 2-dichloroethyl phosphate, (Dibrom) (R)	-	0.2
† Dimethylamine	-	3
† Dimethylformamide - Skin	-	10
† Di sec. octyl phthalate (Di-2-ethylhexyl-phthalate)	-	10
Epichlorohydrin	-	5
Ethanolamine	-	19
Graphite	-	6
Hafnium	-	15mppcf
† Hexachloroethane - Skin	-	0.5
Hydrogen Sulfide	-	9.7
† L. P. G. (Low pressure gas) (Liquid petroleum gas)	-	10
† Maleic anhydride	-	1,000
† Methane	-	8
† Methyl acetylene - propadiene mixture, (MAPP)	-	1,000
Methylamine	-	1,000
† Methyl mercaptan	-	25
Methyl methacrylate	-	31
C Methylene bis phenylisocyanate	-	10
Mineral wool, fibrous glass	-	20
† Monomethyl hydrazine - Skin	-	410
† Morpholine - Skin	-	0.02
	-	2
	-	0.2
	-	0.35
	-	70

* Parts of vapor 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.

†1964 Revision.

††1964 Additions.

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Substance	ppm*	Mg/M ³ **
Naphthalene.....	10	50
††Nickel, metal and soluble compounds.....	—	1
†Nitric Acid.....	2	5
††p-Nitrochlorobenzene.....	—	1
††Nitrogen trifluoride.....	10	29
C††Oxygen difluoride.....	0.05	0.1
††p-Phenylene diamine - Skin.....	—	0.1
†Phosgene.....	0.1	0.4
††Phthalic anhydride.....	2	12
††Propane.....	1,000	1,800
††Propiolactone.....	—	A5
†Selenium compounds.....	—	0.2
†Silver, metal and soluble compounds.....	—	0.01
Tantalum.....	—	5
††1, 1, 1, 2-Tetrachloro-2, 2-difluoroethane.....	500	4,170
††1, 1, 2, 2-Tetrachloro-1, 2-difluoroethane.....	500	4,170
Tetraethyl lead - Skin.....	—	0.075
Tin (inorganic compounds).....	—	2
(organic compounds as Sn)	—	—
- Skin.....	—	0.1
†Yttrium.....	—	1

* Parts of vapor 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

† 1964 Revisions.

†† 1964 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' Teflon ® decomposition products. At least one identified component of Teflon 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.

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,

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

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

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 (C_i or T_i , 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. imbibed 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, 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: welding, 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

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1$$

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.

b. INDEPENDENT EFFECTS

Air contains 0.15 mg/m³ of lead (TLV, 0.2) and 0.7 mg/m³ of sulfuric acid (TLV, 1).

$$\frac{0.15}{0.20} + \frac{0.7}{1} = 0.75 + 0.7 = 1.45$$

Threshold limit is not exceeded.

1B. 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 as the observed temperature

a ADDITIVE EFFECTS, approximate solution

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

$$\frac{C_1}{100} + \frac{C_2}{350} = \frac{C_m}{T_m}$$

Solution applicable to "spot" solvent mixture usage where all or nearly all solvent evaporates

$$C_1 + \frac{C_2}{350} = \frac{C_m}{T_m}$$

$$7C_1 + \frac{7C_2}{350} = \frac{7C_m}{T_m}$$

$$7C_1 + \frac{7C_2}{350} = \frac{7C_m}{T_m}$$

$$T_m = 700 \times \frac{2}{9} = 155 \text{ ppm}$$

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

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

$$(2) C_1 + C_2 + \dots + C_n = T;$$

$$(2.1) \frac{C_1}{T} + \frac{C_2}{T} + \dots + \frac{C_n}{T} = 1.$$

By the Law of Partial Pressures,

$$(3) C_1 = ap_1$$

And by Raoult's Law,

$$(4) p_1 = f_1 p_1^o$$

Combine (3) and (4) to obtain

$$(5) C_1 = af_1 p_1^o$$

Combining (1), (2.1), and (5), we obtain

$$(6) \frac{f_1 p_1^o}{T} + \frac{f_2 p_2^o}{T} + \dots + \frac{f_n p_n^o}{T} = \frac{f_1 p_1^o}{T_1} + \frac{f_2 p_2^o}{T_2} + \dots + \frac{f_n p_n^o}{T_n}$$

$$+ \dots + \frac{f_n p_n^o}{T_n} \text{ and solving for } T,$$

$$(6.1) T = \frac{f_1 p_1^o + f_2 p_2^o + \dots + f_n p_n^o}{\frac{f_1 p_1^o}{T_1} + \frac{f_2 p_2^o}{T_2} + \dots + \frac{f_n p_n^o}{T_n}}$$

$$\text{or } T = \frac{\sum_{i=1}^n f_i p_i^o}{\sum_{i=1}^n \frac{f_i p_i^o}{T_i}}$$

$$(6.2) T = \frac{\sum_{i=1}^n f_i p_i^o}{\sum_{i=1}^n \frac{f_i p_i^o}{T_i}}$$

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

p^o = Vapor pressure of pure component

f = 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	350	125mm Hg	0.473

$$f_1 p_1^o = (0.527)(73) = 38.2$$

$$f_2 p_2^o = (0.473)(125) = 59.2$$

$$T = \frac{38.2 + 59.2}{\frac{38.2}{100} + \frac{59.2}{350}} = \frac{(97.4)(350)}{133.8 + 59.2} = 177$$

$T = 177 \text{ ppm}$
 (Note difference in T.L.V. 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).

$$\frac{C_1}{0.1} + \frac{C_2}{0.5} = \frac{C_m}{T_m}$$

$$C_m = 3C_1$$

$$\frac{C_1}{0.1} + \frac{2C_1}{0.5} = \frac{3C_1}{T_m}$$

$$\frac{7C_1}{0.5} = \frac{3C_1}{T_m}$$

$$T_m = \frac{1.5}{7} = 0.21 \text{ mg/m}^3$$

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:

$$\frac{C}{TLV} = \frac{0.8}{20} + \frac{0.2}{2.5}$$

$$TLV = \frac{20}{2.4} = 8.4 \text{ mppcf}$$

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 mppcf.

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

$$\frac{0.25}{2.5} + \frac{0.25}{20} + \frac{0.5}{20} = 7.3 \text{ mppcf}$$

The limit for 25% quartz approximates 8 mppcf.

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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. Moreover, larger factors at the lower T. L. V.'s are consistent with the difficulties in analyzing and controlling trace quantities.

T.L.V. RANGE ppm* or mg/m ³	Test T.L.V. Factor	Examples
0 to 1	3	Toluene diisocyanate-T. L. V., 0.02 ppm, if permitted to rise above 0.06 ppm may result in sensitization in a single subsequent exposure. "C" listing recommended on category b.
1 + to 10	2	Magnesium-T. L. V., 5mg m ³ , contains little or no safety factor. All values should fluctuate below 5mg m ³ . "C" listing recommended on category b.

T.L.V. RANGE ppm* or mg/m ³	Test T.L.V. Factor	Examples
10 + to 100	1.5	Methyl styrene-T. L. V. 100 if encountered at levels of 150 ppm will prove intensely irritating. "C" listing recommended on category a.
100 + to 1000	1.25	Methyl chloroform-T. L. V. 350ppm, at 438 ppm for periods not exceeding 15 minutes is not expected to result in untoward effects relating to category c. No "C" listing recommended.

* 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

831 Seminar on Contamination Control.

An engineering approach to the control of contamination is the subject of a 5-day seminar to be given October 19 to 24 at the Rochester Institute of Technology in cooperation with the American Association for Contamination Control. The program is designed for administrators, engineers, and supervisors representing organizations where control of contamination of surfaces, gases, and liquids in closed systems is a requirement for protection of product, processes, or persons. For further details write, Harold M. Kentner, Director, Extended Services Division, Rochester Institute of Technology, Rochester, New York.

-- Chem. Eng. News 42, 107 (July 13, 1964)

832 American Association of Poison Control Centers.

The 7th Annual Meeting of the American Association of Poison Control Centers will be held October 26, 1964 at the New York Hilton, New York City. The program will include papers on clinical and public health aspects of acute poisoning. For information about the meeting address Arthur S. Blank, Connecticut State Department of Health, Hartford 15, Connecticut.

-- Am. Ind. Hyg. Assn. J. 25, 327 (May-June, 1964)

833 Clinical Scientists Meet.

The Association of Clinical Scientists will hold its annual meeting and applied seminar at the Statler-Hilton Hotel and Washington Hospital Center, Washington, D.C., November 13 to 15. The subject of the meeting will be the clinical pathology of the Serum Electrolytes. The spring meeting will be held April 29 to May 6, 1965, at the Statler-Hilton in New York and the U.S. Naval Hospital, St. Albans, Long Island. -- Chem. Eng. News 42, 90 (Aug. 3, 1964)

834 Health Insurance Payments.

In 1963, insurance companies paid out nearly \$700 million in benefits to insured persons to help them pay for the cost of surgery the Health Insurance Institute reported.

-- J. Am. Med. Assn. 189, adv. p. 16 (Sept. 14, 1964)

835 Smog Alerts for Industrial Region of West Germany.

An alert system, effective November 1, 1963, and graded for three degrees of urgency, has been introduced as the so-called "Smog-Plan" by the authorities of the Ruhr, the industrial region of West Germany, according to Med. Monatsschr. 18, 29 (March, 1964). This alert system may result in drastic measures, even the shut-down of industries. The first-degree alert demands that all establishments, including hospitals, must take certain precautions in the event that smog waves are forming over the region; they must use low sulfur fuel. When the

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second-degree alert is given, delay involves acute danger. The industrial establishments in the regions affected must at once and without exception use low sulfur fuels. The third-degree alert is reserved for catastrophic fog density, which so far has never been experienced in the Ruhr region. In this event all industrial establishments, the fuel wastes of which contain sulfur, would have to shut down. The alerts will be given by the meteorological stations who ascertain air currents and precipitation and are constantly in contact with governmental agencies.

-- J. Am. Med. Assn. 189, 73 (July 6, 1964)

836 Study Force Formed on Diesel Emissions.

The formation of a new cooperating task force to study the problem of diesel engine smoke emissions and to make recommendations to manufacturers and operators has been announced by the Automobile Manufacturers Association. The task force, established by the AMA Motor Truck Committee, will be composed of engineers from three domestic truck manufacturers. Serving as consultants will be representatives of the four leading domestic diesel engine manufacturers and one foreign manufacturer whose engine is being used extensively in domestic trucks. Four other consultants from various diesel fuel manufacturing companies will represent the American Petroleum Institute. The AMA said the task force will study the problem of diesel emissions with the goal of reducing the smoke content to a minimum consistent with efficient operating practices.

-- Cond. from J. Air Poll. Control Assn. 14, 184 (May, 1964)

837 Hygienic Guide Series.

The following additional Hygienic Guide Series are now available: Phosphine (Hydrogen Phosphide, Phosphoretted Hydrogen), Methyl Acetate, o-Dichlorobenzene (1,2-Dichlorobenzene), and p-Dichlorobenzene (1,4-Dichlorobenzene). They are given in the May-June AIHA Journal (pp. 314-325) and can be obtained from the American Industrial Hygiene Association, 14125 Prevost, Detroit, Michigan 48227, at 25 cents each. -- Am. Ind. Hyg. Assn. J. 25, 314-326 (May-June, 1964)

COMING EVENTS

- 838 Sept. 29-Oct. 1 Fourth Annual Bio-Environmental Engineering Symposium, Brooks Air Force Base, Texas.
- Oct. 5-7 Association of Life Insurance Medical Directors of America, New York, N. Y.
- Oct. 5-8 Clay Mineral Society, University of Wisconsin, Madison, Wis.
- Oct. 5-9 American College of Surgeons, Chicago, Ill.
- Oct. 5-9 American Public Health Association, 92nd Annual Meeting, New York, N. Y.
- Oct. 6-8 Oak Ridge National Laboratory, Annual Analytical Chemistry Conference, Gatlinburg, Tenn.
- Oct. 11-14 American Gas Association, Annual Convention, Atlantic City, N. J.
- Oct. 11-14 American Oil Chemists' Society, National Meeting, Chicago, Ill.
- Oct. 12-14 Oak Ridge National Laboratory, 2nd Symposium on Space Radiation, Gatlinburg, Tenn.
- Oct. 14-16 ASTM Committee E-19 on Gas Chromatography, 3rd Annual Gas Chromatography Symposium, Houston, Tex.
- Oct. 15-16 Chemical Institute of Canada, Symposium on Bioenergetics, London, Ontario.
- Oct. 18-22 National Pest Control Association, Annual Convention, New York, N. Y.
- Oct. 19-20 American Coke and Coal Chemicals Institute, Annual Meeting, White Sulphur Springs, West Virginia.
- Oct. 19-22 Association of Official Agricultural Chemists, Washington, D. C.
- Oct. 20-22 Association of Military Surgeons of the United States, Washington, D. C.
- Oct. 20-22 18th Tobacco Chemists' Research Conference, Raleigh, N. C.
- Oct. 21-22 Industrial Hygiene Foundation, 29th Annual Meeting, Mellon Institute, Pittsburgh, Pa.

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Oct. 22-25	Association of Clinical Scientists, Seminar on Serum Electrolytes, Washington, D. C.
Oct. 22-30	American Occupational Therapy Association, Denver, Colo.
Oct. 23-27	American Heart Association, Atlantic City, N. J.
Oct. 25-27	California Fertilizer Association, 41st Annual Convention, Coronado, Calif.
Oct. 26	American Association of Poison Control Centers, 7th Annual Meeting, New York, N.Y.
Oct. 26	American Society of Safety Engineers, Conference, Chicago, Ill.
Oct. 26-28	4th Interscience Conference on Antimicrobial Agents and Chemotherapy, American Society of Microbiology, New York, N. Y.
Oct. 26-29	National Safety Council, Annual Convention, Chicago, Ill.
Oct. 29-31	Gerontological Society, Minneapolis, Minn.

OCCUPATIONAL DISEASE STATISTICS

839 Occupational Disease Statistics. (Cases reported to the Respective Health Departments.)

	Conn. June	Ind. July	Tenn. July	Total
Carbon disulfide poisoning			1	1
Chemical burns		7 ⁽²⁾		7
Chlorine poisoning	1			1
Conjunctivitis (smoke)		1		1
Dermatitis	22 ⁽¹⁾	21 ⁽³⁾	4	47
Eye burns		9 ⁽⁴⁾		9
Heat exhaustion		3		3
Hydrogen sulfide poisoning (bronchitis)			1	1
Lead poisoning			1	1
Poison ivy		1		1
Pneumoconiosis			1	1
Pneumonitis (carbon dust)			1	1
Silicosis	1	2		3
Silicotuberculosis	1			1
Solvents (poisoning)	3			3
Solvents (throat irritation)		1		1
Total	28	45	9	82

Causes are listed as follows:

(1) Connecticut: Occupational dermatitis due to plants; poison ivy, 1; occupational dermatitis due to oils and greases (and metal cutting compounds) 4; occupational dermatitis due to solvents 2; occupational dermatitis due to other chemicals: miscellaneous 3, nickel and nickel compounds 1, rubber chemicals 1, synthetic resins or resin (plastic) compounds 2, multiple chemicals 2; occupational dermatitis—other: infection 1, miscellaneous 1, protective clothing 1, soaps or detergents 1, undetermined 2.

(2) Indiana: Isobutyl phenone 1, tar 1, plating solution 1, ammonia 1, solvents 1, acids 1, ultraviolet radiation 1.

(3) Detergents 4, glue 3, cause not stated 3, oil 2, solvents 2, chemicals 1, duradine 1, lacquer 1, tar 1, gasoline 1, insecticides 1, chemical developer 1.

(4) Alkali 2, ammonia 2, welding flash 2, ketones 1, degreasing solvent 1, solvents 1.

LEGAL DEVELOPMENTS

840 House Passes Nursing Bill.

The house passed by voice vote and sent to the Senate a \$287.6 million measure aimed at increasing the supply of nurses. The bill provides grants for construction and rehabilitation of nursing schools; student loans, traineeships for advanced training; and grants to help schools defray the costs of increased enrollment. Also cleared by the House was a \$67 million program extending for 5 years the program of project grants to cover the cost of traineeships for graduate or specialized training in public health for physicians, engineers, nurses, and other professional health personnel. The bill would authorize an increase in appropriations used for project grants to public health and other schools for strengthening public health training programs. Appropriations would be increased from \$2 million in fiscal 1964 to \$2.5 million in fiscal 1965, \$4 million in fiscal 1966, \$5 million in fiscal 1967, \$7 million in fiscal 1968, and \$9 million in fiscal 1969. Further, after 1965 project grants would be made to public or nonprofit private institutions providing graduate or specialized training in public health.

J. Am. Med. Assn. 189, adv. p. 18 (Aug. 3, 1964)

841 Safety Glasses Required in Maryland Public Schools.

The use of safety glasses is now required by law in Maryland in any public school with courses in vocational or industrial art shops or laboratories. Chemical or combined chemical-physical laboratories using "caustic or explosive chemical or hot liquids or solids" are also covered by the law. Until the law was passed, local school superintendents were given the option covering use or nonuse of safety glasses. The law (Senate Bill 76) now requires that both students and teachers wear safety glasses meeting the standards of the American safety code for head, eye, and respiratory protection (Z2.1-1959) of the American Standards Association, Inc.

Chem. Eng. News 42, 35 (July 20, 1964)

842 Petroleum Waxes and Food Products.

Petroleum waxes which meet specifications may be safely used in or on food and in food packaging materials, the Food and Drug Administration concluded on the basis of extensive studies. The regulations prescribe testing methods which eliminate from food-use waxes that contain polynuclear compounds. Only waxes clearly shown to be safe can pass the FDA tests.

J. Am. Med. Assn. 189, adv. p. 18 (Aug. 3, 1964)

BOOKS, PAMPHLETS AND NOTICES

- 843 Heat and Cold Effects and Their Control. D. H. K. Lee. U. S. Department of Health, Education, and Welfare, Public Health Service, Public Health Monograph No. 72, PHS Publication No. 1084. 35 pp. (1964). Available From: Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Price: 30 cents. Single copies are available from the Public Inquiries Branch Office of Information and Publications or from the Division of Occupational Health, U. S. Public Health Service, Washington, D. C. 20201.

Health problems created by heat and cold in the occupational environment are frequently encountered by the industrial physician and others responsible for the health, safety, and pro-

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ductivity of the worker. Unlike most other environmental factors, heat and cold do not affect just one or two specific tissues or functions of the exposed person. The present publication was designed to provide an understanding of the physiological responses of the human body to exposures of heat or cold, to point out the possible consequences of such responses, and to permit the reader to draw his own conclusions on the probable outcome or practical significance of the environmental conditions with which he is concerned. Of particular interest is the final section on applications, which concisely presents a fairly wide range of guides for the solution of practical problems.

- 844 A Look at the Division of Occupational Health. U.S. Department of Health, Education, and Welfare, Public Health Service, PHS Publication No. 1118. 31 pp. (1964). Available From: The Division of Occupational Health, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20201. Price: Not given.

This publication is designed for personnel with responsibilities for conducting programs of worker health protection. The booklet outlines the functions and organization of the Division of Occupational Health. In addition, current studies and projects of interest to all concerned with occupational health are described briefly.

- 845 Smoking—The Great Dilemma. Ruth and Edward Brecher. Public Affairs Pamphlet No. 361. 28 pp. (June, 1964). Available From: Public Affairs Committee, 22 East 38th Street, New York, N.Y. 10016. Price: 25 cents.

The pamphlet's major concern is children: how to save the next generation from this health hazard. As long as adults smoke, the authors feel, bans and prohibitions simply reinforce the attractiveness of smoking. Because evidence points to a strong addictive element in smoking, the authors call for more research on the how-to-stop-smoking problem. The grave danger of addiction, they stress, should be pointed out to children and teen-agers; for without that knowledge as a possible deterrent, it is unlikely that young people will be seriously concerned about diseases like lung cancer which do not usually strike before middle age. Adults who recognize the danger but still cannot stop smoking are reminded by the authors that "being a smoker does not obligate you to defend smoking." A number of specific suggestions are given for reducing the amount of adult smoking and changing the "climate of opinion" about smoking. The authors are sensitive to the problems of the cigarette industry, and recommend measures, such as cash incentives, to help these companies diversify their manufacture and convert to other products in the interest of public health.

INDUSTRIAL MEDICAL PRACTICE

- 846 Changes—Stress or Benefit? Cummings Memorial Lecture. Anna M. Baetjer. Am. Ind. Hyg. Assn. J. 25, 207-212 (May-June, 1964).

In this lecture the author has tried to point out the importance of changes in the environment. On the one hand, changes in the environment furnish the necessary stimuli for normal physiological reactions. In the course of evolution, man has developed truly marvelous mechanisms to maintain the internal environment of the tissues within comparatively narrow limits in the face of wide changes which may be produced by the external environment or the work. The body responds to acute changes with immediate readjustments and to repeated changes with adaptation. The continual use of these adjustments maintains the body responses active. The lack of use may lead to their deterioration. Today modern technicological advances have made it possible to keep the environment constant and to eliminate many of the changes in work which formerly were necessary. Homes, offices, industries, wherever economically feasible, and even automobiles and buses are air conditioned the year around. Practically

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no one walks if they can ride. Many operations which formerly required skilled neuromuscular activity of various types and changes in posture are replaced by monotonous jobs lacking any type of stimulating change. Are these new technological advances producing a generation of people so protected from environmental changes that they will be less able to meet such stresses? On the other hand, there is no doubt that many changes are harmful. If the changes in the environment are too great, too rapid, or repeated too often, the limits of man's compensatory reactions may be exceeded, and discomfort, inefficiency, or damage to health may occur. Although man has learned to adapt, modern technology is presenting him with changes of new dimensions and type for which he has had no previous pattern of compensation, such as weightlessness, new chemicals, new forms of ionizing radiation, and new speeds. The problem is further complicated by the multiple factors in the working situation which may be subject to repeated changes at the same time, thus giving a synergistic effect. Furthermore, the ability of the body to respond differs greatly between different individuals and in any one individual from one time to another. Even if the body can adjust at the moment of change, current scientific knowledge is not sufficient to predict whether such repeated stresses may produce cumulative harmful effects which only become manifest at a much later period. Thus, it appears that the line between the beneficial and harmful effects of environmental changes may be very fine. To determine the significance of repeated environmental changes and to distinguish between normal and hazard changes offers a most difficult and challenging problem in the field of industrial hygiene.

-- Author's summary

- 847 Periodic Evaluation of Outpatients. Joyce C. Lashof and Irene R. Turner.
Arch. Environmental Health 8, 531-538 (April, 1964).

Two hundred patients over the age of 40 who had been attending outpatient medicine clinics for 2 years or longer at Presbyterian-St. Luke's Hospital in Chicago had a repeat history and physical examination and the following tests: complete blood cell count, serologic test for syphilis, urinalysis, 2-hour postprandial blood sugar, chest x-ray, electrocardiogram, proctoscopy, and Papanicolaou smear on female patients. Data on new diagnoses and laboratory procedures are presented. The problems of such programs as part of routine clinic care are discussed. There were a significant number of new diagnoses made and several of the diagnostic procedures proved to be of value. Review of clinic function resulted from the study and methods of quality control are being instituted to enhance the quality of medical care in an outpatient clinic.

-- Authors' summary

- 848 Effectiveness of Polyvalent Influenza Vaccine in Pregnancy. J. F. Hulka.
Obstet. Gynecol. 23, 830 (June, 1964).

Three-hundred and sixty-three pregnant and 138 nonpregnant women were immunized with influenza vaccine. Control groups received saline placebos or no injection. An outbreak of Asian influenza occurred after the immunization program. Pregnant women responded to immunization both serologically and clinically in the same manner as nonpregnant patients; no unusual fetal wastage or anomalies resulted in first-trimester immunization, and pregnant women obtained the same benefits as did nonpregnant women. When epidemics due to new strains of viral influenza are anticipated, it may be advisable to give pregnant women priority ratings in vaccination. In anticipation of subsequent cyclic outbreaks due to recurrences of these viral agents, however, the indications for vaccinating pregnant women should probably be the same as those for the nonpregnant, since pregnant women appear to tolerate the endemic virus infections as well as do nonpregnant women.

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

- 849 A Predictive Study of Coronary Heart Disease. The Western Collaborative Group Study.
R. H. Rosenman, et al. J. Am. Med. Assn. 189, 15-22 (July 6, 1964).

The recent vast number of experimental, clinical, and epidemiological studies leads the observer to believe that occlusive coronary artery disease results from the interaction of multiple factors operating within the framework of time. It seems increasingly foolhardy to

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envision this complex problem as the simple result of any single factor, despite the attractiveness of a single cause-and-effect relationship. Further enhancement of our knowledge will require comprehensive investigation of all factors of possible pathogenic importance, despite problems of methodology, since omission from study of any such factors may lead to serious interpretative errors. A primary aim of the present study was to evaluate and intercorrelate the importance of possible pathogenic factors in the development of clinical coronary heart disease (CHD). Accordingly it was formulated to permit prospective gathering of data repetitively from a large population of 39- to 59-year-old men, initially free of manifest disease. Inspection of the initial data indicates wide individual differences in most of the factors under study, a dispersion which suggests that the present comprehensive approach may permit eventual formulation of a profile of the candidate for future CHD which has individual as well as group specificity.

-- Cond. from authors' comment

- 850 The Natural History of Coronary Atherosclerosis. K. S. Mathur, V. Kumar, and S. K. Kashyap. Diseases of Chest 46, 70-77 (July, 1964).

The natural history of coronary atherosclerosis has been reconstructed from data gathered from 200 consecutive medicolegal necropsies. Coronary atherosclerosis in men commences in the second decade in the form of fatty spots which are most frequent in the anterior descending branch of the left coronary artery. The earliest evidence of atherosclerosis in women was seen in the third decade. The atherosclerotic process does not progress beyond grade I in the second decade. The extent and severity of atherosclerosis increases progressively with age, without a terminal decline in the mean atherosclerotic index. Atherosclerosis is present in all cases above 40 years. Fibrous plaques are first noticed in the fourth decade. Complicated lesions are seen for the first time in the fifth decade. The narrowing index of the coronary arteries also progresses with age from the fourth decade onwards, no significant narrowing being detectable earlier. The process of atherosclerosis is consistently more advanced in the anterior descending branch of the left coronary artery than in the circumflex branch or the right coronary artery. The extent and severity of atherosclerosis is less in women than in men in each decade and the process commences a decade later. Fourteen references are cited.

-- Authors' summary

- 851 Blood Pepsin as Marker of Susceptibility to Duodenal Ulcer Disease. J. C. Niederman, H. M. Spiro, and W. H. Sheldon. Arch. Environmental Health 8, 540-546 (April, 1964).

In terms of the objectives of this study, the authors' results indicate the following: In a normal young adult male population, there was no significant difference in pepsin values among persons having different blood group phenotypes and secretor characteristics. This finding supports those of Ventzke and Grossman who studied 100 male patients with duodenal ulcer and found no differences in the rate of acid secretion between secretors and non-secretors of different phenotypes. The levels of blood pepsin in persons who developed ulcer disease in this young age group were significantly higher than in subjects without the disease, even though the actual number of recognized cases was small. It was also observed that approximately two thirds of these persons had blood group O. In no instance did an individual with ulcer disease have a low blood pepsin value. This situation supports earlier investigations that blood pepsin measurements may be useful as a marker of susceptibility to ulcer disease in population studies. Although the predictions were accurate in 11 of 14 subjects with ulcer disease, it was not possible within the limits of this study to determine specifically why only those particular men with high or high normal pepsin values reacted as they did. Parameters other than those of blood group and gastric secretory potential as measured by blood pepsin require further evaluation.

-- Cond. from authors' summary

- 852 The Occurrence of Oral Cancer. V. H. Handy. Health News 41, 5-9 (April, 1964).

It is estimated that 16,000 new cases of cancer of the oral cavity and lip will be diagnosed in the United States this year. Of this group, less than half will be in an "early" stage—the stage for optimal survivorship. Oral cancer detection can be improved by the establishment

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of oral cancer detection programs which should include: (1) Education sessions for instructing the dentist as to what constitutes a complete oral examination, including the use of cytology where indicated. (2) Adequate cytology and pathology services for the interpretation of specimens. (3) Consultation service for referring cases for definitive diagnoses and recommendations for treatment. Six references are given. -- Author's summary

- 853 An Oral Cancer Detection Center. S. J. Shackner. Health News 41, 10-13 (April, 1964).

This paper has attempted to show how an Oral Cancer Detection Center can be set up, how it operates and how it functions. The Center provides a central facility in a rural area for case finding, case referral, and professional and public education in oral cancer detection and control. Through the establishment and operation of similar centers, it is hoped that the profession will be motivated and oriented to utilize the diagnostic aids at its disposal. The private practitioner will become more aware of cancer control and realize the advantages of early detection by doing an oral cancer detection examination whenever a patient visits his office. This will eventually make every office an oral cancer detection center which is the one and only way to conquer the problem of oral cancer. There are 10 references.

-- Author's summary

- 854 The Educational Program for Dentists and Physicians (For Detection of Oral Cancer). M. A. Engelman. Health News 41, 16-19 (April, 1964).

The primary objective of an Oral Cancer Detection Center is the early detection of oral lesions so that the cure rate is increased, the need for disfiguring surgery decreased, and the number of deaths from cancer of this site reduced. A secondary objective of the Center is professional education for dentists and physicians, including residents and internes, stressing thorough oral examinations and exfoliative cytology. A final objective is the education of the general public in the prevention, detection, and treatment of oral cancer. There are 15 references.

-- Author's summary

- 855 Epidemiological Consequences of an Arsenic-Lung Cancer Theory. R. W. Buechley. Am. J. Public Health 53, 1229-1232 (Aug. 1963).

The world-wide lung cancer epidemic associated with cigarette smoking may be explained by an epidemiological chain showing excess lung cancer at each step leading from arsenic-high mines and smelters through arsenical insecticides, to lead arsenate spray residues on cigarette tobacco. If arsenic is a major causative carcinogen, the reported situations are only the known examples of many other situations consequent on the predicted by an arsenic-lung cancer theory. These consequences fall into two classes: (1) Predicted high lung cancer rates should appear in those persons whose work, or residence, is in arsenic-high situations. This list includes miners, smelters, smeltermen's wives and children, insecticide workers, agriculturists using arsenic sprays and processors and users of sprayed products—including cigarette smokers. (2) Lung cancer rates should be lower than one would expect among those whose work, or residence, is in arsenic-low situations no matter what the other pollutants. This list includes all the populations listed above, given that the mine, smelter, or insecticide is arsenic-free. It also includes cigarette smokers whose smoking is, and has been, confined to arsenic-free tobacco, such as is used in South Africa. -- APCA Absts.

- 856 A Review of 995 Cases of Primary Carcinoma of the Lung. R. W. Haber. Med. J. Australia 1, 551 (April 11, 1964).

Of 995 cases of carcinoma of the lung reviewed, the anaplastic type was present in nearly 50% and the squamous variety in 38%; 88% of all cases occurred in men. The peak incidence was in the 51 to 70 years age group. More cancers occurred in the right lung than in the left, and more occurred in the upper than in the lower lobes. The prognosis was worse in women and in the aged. It was better for lower lobe cancers in the right lung than for those

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rising in other lobes. The histological type did not appear to alter the prognosis significantly. The operability rate of asymptomatic localized lesions was encouraging, but the final results were still disappointing. Resection gave the best 5-year results. A two-year survival for lung cancer is adequate for evaluation of any new form of therapy. Lobectomy carries much smaller surgical mortality, offers a better quality of life and, in selected cases, offers a better prognosis. Results from chromotherapy were disappointing. The relative values of radical surgery (compared with the conservative resection) and of radiotherapy (compared with supervoltage therapy) for operable cases remain to be assessed.

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

- 857 Mortality in Relation to Smoking: Ten Years' Observations of British Doctors.
R. Doll and A. B. Hill. *Brit. Med. J.* 1, 1399 (May 30, 1964).

The mortality of nearly 41,000 doctors in the United Kingdom was observed for 10 years and analyzed in relation to their smoking habits and reported in reply to questionnaires sent out in 1951 and again some years later. The relationship was examined separately for individual causes of death, for men and for women, for men smoking tobacco in different ways and different amounts, for men who have given up for different periods, and for inhalers and noninhalers.

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

- 858 Studies on Tracheal Ciliary Activity: Special Reference to the Effect of Cigarette Smoke in Living Animals. T. Dalhamn. *Am. Rev. Resp. Dis.* 89, 870 (June, 1964).

The ciliary activity in the trachea of live animals was registered with the aid of a movie camera, the speed of which was increased from 120 to 220 frames per second. In this way, the error of method was reduced from 140 beats per minute to about 40 beats per minute. This method was used to study the effect of tobacco smoke on the ciliary frequency. A smoke dosage machine was constructed which allows exposure under relatively physiological conditions. Preliminary short-term studies show that smoke from non-filter cigarettes is more ciliastatic than smoke from filter-tipped cigarettes.

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

- 859 Glucose Blockage of the Increase in Stroke Volume Produced by Smoking.
D. C. Moses, D. Powers, and L. A. Soloff. *Circulation* 29, 820 (June, 1964).

A previous work showed that smoking increased the plasma free fatty acid (FFA) and the cardiac output, and also that glucose can block the plasma FFA response to smoking. This study showed that glucose can also inhibit the cardiac output as a response to smoking by blocking the increase in the stroke volume induced by smoking. The cardiac output and stroke volume response to smoking, to glucose, and to smoking preceded by glucose were determined in 7 additional smokers. The initial tachycardia produced by smoking was not blocked by glucose, but the stroke volume and cardiac output were. The results are discussed in the light of the present knowledge of lipid metabolism.

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

- 860 Significance of Carcinoma Cells in the Blood Relative to Surgery of Pulmonary Carcinoma.
Y. Hayata, et al. *Diseases of Chest* 46, 51-60 (July, 1964).

The authors studied 160 cases of lung cancer with respect to circulating cancer cells and obtained the following results: (1) In order to obtain accurate data, blood samples should be examined repeatedly during the patient's hospitalization. Arterial blood samples are more suitable for cancer cell detection. (2) The positive rate is higher in cases with central than peripheral tumor, and the larger the tumor, the higher the positive rate. (3) Circulating cancer cells are seldom found in coin lesions and silent phase cases. (4) Cases with hemoptysis show a higher rate. The rate is also high for cases with lymphatic metastasis, as well as with hematogenous metastasis. (5) There is a close connection between histologic malignancy and the positive rate. (6) There are close connections between operability, survival

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rate and the preoperative positive rate. (7) Surgical manipulation during the operation is liable to isolate cancer cells and the latter migrate into the draining vein. Even in cases undergoing radical operation, cancer cells in the blood increase during the operation and are found for 40 days or longer after the resection. (8) Exploratory thoracotomy for inoperable cases should not be employed excessively, as it might accelerate migration of cancer cells into the blood. (9) Radiotherapy also tends to accelerate the isolation and migration of cancer cells. (10) Almost all cancer cells in the blood are considered ineffective as metastatic matrices, but a few circulating cancer cells still present an important problem in lung cancer therapy. There are 27 references. -- Authors' summary

- 861 The Etiology of Bronchogenic Carcinoma. A. Ochsner.
Diseases of Chest 45, 586 (June, 1964).

Bronchogenic carcinomas, an extremely rare disease 25 years ago, has become the most common of all visceral carcinomas, exceeding in frequency cancer of the breast and female genital tract. The unprecedented increase in the incidence of bronchogenic cancer began in the United States approximately 20 years after the First World War, when men began to smoke cigarettes excessively. The increased incidence of bronchogenic cancer definitely parallels the increased sale of cigarettes. Prospective studies involving slightly less than 2 million people show that the more cigarettes smoked the greater the incidence of cancer of the lung. Although influenzal infection was once thought to be the cause of bronchogenic carcinoma, this has been disproved. Studies have shown that air pollution is of no etiological significance. -- J. Am. Med. Assn. References & Reviews

- 862 Health Education and Cigarette Smoking. A Report on a Three-Year Program in the Winnipeg School Division, 1960-1963. J. B. Morison, H. Medovy, and G. T. MacDonell.
Can. Med. Assn. J. 91, 49-56 (July 11, 1964).

The smoking habits of Winnipeg school students were surveyed before and after a 3-year program of health education on the hazards of smoking, directed to 8,300 out of 48,000 students. The program consisted of informal approaches to students in elementary schools and a formal program of talks, lectures, films, and student participation for older students. There were fewer students at all ages who had never smoked a cigarette at the time of the second survey. There was a slight decrease in the number of regular smokers in high school, most marked in the school where the program was enthusiastically received and student participation was most active. A direct relationship between parental smoking and that of the student, and an inverse relationship between academic achievement and student smoking, were shown in both surveys. The majority of students believed that smoking caused lung cancer and other hazards to health, although this was less marked among smokers. The results indicated that an intensive program of health education directed to the teenagers in school was a potentially useful approach to the problem of cigarette smoking. -- Authors' abst.

- 863 Japanese Encephalitis. P. V. Davis. Military Med. 128, 1091-1097 (Nov. 1963).

Japanese Encephalitis Virus is transmitted by an arthropod vector from an animal or bird host reservoir. In the Far East the arthropod that has been most strongly implicated is Culex tritaeniorhynchus, which has demonstrated a remarkable efficiency in transmitting the virus from animal to animal and from animal to man. The recommended methods of control of the disease are the elimination of the breeding places of mosquitoes, destruction of the larvae of the vector, elimination of adults by use of insecticides in quarters, screening of quarters, use of repellants by night workers, and use of adequate clothing. There are 18 references. -- Public Health Eng. Absts.

- 864 Rabies. Anon. Illinois Health Messenger 34, 22 (June, 1964).

Rabies in Illinois showed an increase in 1963. There were 157 laboratory-confirmed cases of animal rabies, compared to 133 cases in 1962. Of the total positive heads, 77 were confirmed in the laboratories of the Illinois Department of Public Health, and the remainder in the laboratories of the Department of Agriculture and the University of Illinois, College of

Veterinary Medicine. In addition, there were 13 cases of rabies based on clinical diagnosis of symptoms reported by the Department of Agriculture, bringing the total for 1963 to 170 cases. During 1962, there were 25 clinically confirmed cases making a total of 158 cases for that year. As usual, skunks far outnumbered all other animals involved in rabies cases last year. There were 102 skunks, 23 cattle, 14 dogs, 13 cats, 7 foxes, 3 raccoons, 2 horses, 2 squirrels, 2 bats, 1 sheep, and 1 coyote. During 1963, the health department distributed 760 Pasteur treatments, each consisting of 14 doses of rabies vaccine. This treatment is used for the prevention of rabies in man when known exposure has occurred or when exposure is suspected if the involved animal cannot be caught for examination. Because the reservoir of rabies is in wild life and particularly in skunks, it is advisable to keep a safe distance from any wild animal. Periodic immunization of pets should never be neglected. Without this safeguard, no animal is protected against the threat of rabies.

- 865 Rat-Bite Fever—An Occupational Hazard. F.A. Holden and J.C. MacKay. Can. Med. Assn. J. 91, 78-81 (July 11, 1964).

A case of rat bit fever due to Streptobacillus moniliformis in a 28-year-old female graduate laboratory worker is described. The organism was isolated from the patient's blood. This condition was acquired in Saskatchewan, and a brief review of the literature regarding this disease is presented. The case, in which a dramatic response to combined tetracycline and penicillin therapy was obtained, has also been considered in a Canadian context. There are 21 references.

-- Authors' summary

- 866 Serologic Surveys for Selected Zoonoses in Ohio Veterinarians. P.R. Schnurrenberger, et al. J. Am. Vet. Med. Assn. 144, 381-383 (Feb. 15, 1964).

A serologic survey for evidence of infection with Q fever, brucellosis, psittacosis, and leptospirosis was performed on 452 veterinary students and 409 veterinary practitioners in Ohio. For each disease, the reaction rate as determined serologically, was higher for practitioners. From 1955 to 1961, the percentage of titers against Q fever and brucellosis increased; the psittacosis rate declined. This corresponds with data from other surveillance techniques for Q fever and psittacosis but not brucellosis. Leptospirosis was uncommon over the entire period, Q fever titers were the most common, followed by brucellosis, psittacosis and leptospirosis.

-- Public Health Eng. Absts.

- 867 The Incidence of Zoonotic Infections in Veterinary Students. P.R. Schnurrenberger, et al. J. Am. Vet. Med. Assn. 144, 384-386 (Feb. 15, 1964).

Serologic surveillance was maintained on a class of veterinary students throughout their 4 years at a professional college. A clinical case of brucellosis was identified by the program. During the 4 years, based on serologic data, 3 students were infected with psittacosis, 8 with brucellosis, and 14 with Q fever; none were infected with leptospirosis.

-- Public Health Eng. Absts.

SKIN DISEASES AND BURNS

- 868 Industrially Acquired Porphyria. J. Bleiberg, et al. Arch. Dermatol. 89, 793-797 (June, 1964).

The authors report an outbreak of chloracne and porphyria cutanea tarda (PCT) among workers in a factory which manufactures herbicides. Of 29 patients exhibiting features of

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chloracne, 11 were excreting increased amounts of urinary porphyrins. Never before has PCT been described as related to chloracne, nor has it been ascribed to industrial exposure in the United States. The patients all had contact with chemicals used in the synthesis of 2, 4-dichlorophenol and 2,4,5-trichlorophenol, which are closely related to hexachlorobenzene and are widely used as herbicides. One intermediate chemical in the manufacturing process, a highly volatile ether containing 6 chlorine atoms, is suspect in the production of PCT, possibly as a result of its fumes. On the basis of liver biopsies and repeated serum transaminase determinations from two patients, it was obvious that some reversible liver damage had been done. In an increasingly complex chemical environment, PCT may become more common. Evidence now exists that it may result from ingestion or inhalation of a variety of chlorine-containing compounds; it is probable that exposure to more than one hepatotoxin may precipitate more frequent and more severe disturbances of hepatic function. Thus, individuals exposed to chemicals known to precipitate porphyria should avoid alcohol and barbiturates. Overt cases are readily diagnosed clinically, and by examination of the urine with Wood's light, under which brilliant pink fluorescence is observed. In subclinical cases, the very simple Watson-Schwartz test is a most important diagnostic aid. The test may be employed routinely in patients who manifest excessive photosensitivity, in the presence of unexplained abdominal symptoms, and for a wide spectrum of nervous and mental disturbances which may indicate other types of porphyrin abnormalities. -- Cond. from J. Am. Med. Assn. Editorial

- 869 Contact Dermatitis Caused by Saran Wrap. R.A. Osbourn.
J. Am. Med. Assn. 188, 1159 (June 29, 1964).

Recently, the use of thin plastic films as covering or occlusive dressings in therapy with ointments and creams, especially hydrocortisone derivatives, has been advocated for treatment of several dermatoses. This form of therapy is often very beneficial and is becoming increasingly popular. Only a few complications have been reported from the use of such films. Among them were discomfort from perspiration under the film, a miliaria-like eruption, and folliculitis. Where hydrocortisone derivatives were used, atrophy has also been reported. A rare complication, i.e., contact dermatitis, from the use of a film (Saran Wrap) itself is reported. Saran Wrap is a copolymer of vinylidene chloride and vinylchloride. Generally, it is considered to be relatively inert. The manufacturers advised that not a single positive reaction occurred in all the skin testing on Saran Wrap as commercially available, nor have any skin reactions been reported over the years the product has been on the market. There is a report of skin reactions to epoxy resins used as plasticizers and stabilizers in polyvinylchloride films, but these substances, according to information received from the manufacturer, are not used in Saran Wrap film. Furthermore, no literature reference on reactions to the pure polyvinylchloride or to the copolymer of it with vinylidene was found. In view of the large amount of Saran Wrap in past and present daily use, it is obvious that skin sensitivity to it must indeed be rare. However, because the dermatitis in this patient was limited to the area of its application and because of the positive patch test reaction to the product itself, the possibility of skin reactions to Saran Wrap must be kept in mind when it is used as an occlusive dressing for therapy.

- 870 The Chemistry and Uses of Epoxide Resins. W.G. Potter.
Trans. Assn. Ind. Med. Officers 13, 42-47 (July, 1963).

Epoxide resins are very important and versatile materials which are used in most countries of the world. A measure of their importance is that outside the Soviet and Chinese areas of influence some 40-50,000 tons of epoxide resins are manufactured and sold each year. This large amount of resin finds its way into many different industries, the most important one being the paint (surface coating) industry. This probably consumes at least two-thirds of the total resin manufactured, the other important industries using significant amounts being the electrical, aircraft, engineering and constructional industries. The chemistry of the epoxide resins is discussed in detail and illustrated with numerous graphical formulae.

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- 871 Dermatitis From Epoxy Resin Systems. C.D. Calnan.
Trans. Assn. Ind. Med. Officers 13, 38-41 (July, 1963).

Clinically, contact dermatitis from epoxy resin systems tends to affect the exposed parts of the skin, namely the hands and forearms, and the head and neck area. The genitalia are sometimes involved by finger contact. The dermatitis occasionally spreads beyond the exposed parts in severe cases, and may involve an exceptional site, such as the foot, by accidental contact. In the author's experience the eyelids and the face are most frequently affected and the hands and forearms less commonly. The occupations in which epoxy resins are used are legion. For various reasons, dermatitis from them tends to be most often encountered in small factories or in "small part jobs" necessitating the use of small amounts of potted resins by hand, followed by baking in an oven, as found in the radio, electronics, television and similar industries. Opportunity for exposure must also be considered; the chemical mixer, who may be largely or solely employed on measuring and mixing resin and hardener will be particularly vulnerable. Protection methods for him are of paramount importance. It has been suggested that, because many epoxy resins and hardeners have little or no vapor pressure at room temperature, dermatitis of the face and eyelids must result from finger contact. However, the author believes that the explanation is to be found in the fact that the resin-hardener reaction is an exothermic one. Both constituents are vaporized when the temperature rises, as a consequence either of mixing in a pot or heating in an oven. Furthermore, persons have become sensitized without handling resin systems, but merely by working in the vicinity of such materials. Theoretically, all components of the resin system should be fully reacted when the hardening process is complete. Experience shows that this is usually so, but it may not always be. Rarely, a patient will develop dermatitis from sand-papering a "cured" resin. Patch tests and methods for preventing epoxy dermatitis are described.

- 872 Epoxy Resins—Control of the Hazard in Factories. R. Owen.
Trans. Assn. Ind. Med. Officers 13, 48-56 (July, 1963).

Epoxy resin handling may include receipt, storage, dispensing, mixing, pouring, heating, unjigging, reheating, trimming (that is, sawing, filing, drilling) and assembling; occasionally for recovery of expensive components from a faulty resin cast or adhesive joint, breaking, dissolving or grinding are necessary. A severe case of dermatitis occurred in an instrument maker who had joined small brass bellows to aluminum end discs with resin; during oven curing some of the resin joints had distorted, and as the brass bellows were costly imports he recovered them by dissolving resin off in a mixture of solvents. Apart from severe effects on the hands and arms which might have been attributable to the solvent, he had gross edema of the face. Personnel at risk include storemen, process workers, machine operators, assemblers and maintenance men; in some small factories these are one and the same man. Much work has been reported on the relative hazards from the basic ingredients, the partially cured and the fully reacted systems. From the point of view of handling, although the majority of effects recorded have been on the skin, it should not be forgotten that acute respiratory irritation has also been described, nor that some of the components, the aromatic amines, are known to possess another type of toxicity. Some such compounds are solids, incorporated into the resin mix by melting. Vapor pressures and sublimation of these materials deserve study from the health aspect. Even more sinister is the prospect of components which might be carcinogenic, although the common compounds now used are not suspect in this connection. The author further discusses protection, inspection, cleanliness, and education in the handling of epoxy resins.

CHEMICAL HAZARDS

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- 873 Separation and Identification of the Steam Volatile Phenols Present in Cigarette Smoke Condensate by Capillary Column Gas Liquid Chromatography. G.A.L. Smith and D.A. King.
Chem. Ind. (London) 13, 540-541 (March, 1964).

Test mixtures containing phenol, cresols, ethyl phenols, and xylenols were methylated

with dimethyl sulfate and analyzed. In preliminary experimental work on cigarette smoke condensate the phenols were removed by steam distillation from an acidified solution of the smoke condensate. The separation of o- and m- cresols was important because they were two of the major phenolic components found in cigarette smoke condensate. By conversion of m- and p- cresols to their acetates, an excellent separation was achieved using a stainless steel capillary column coated with 2:4 xylenyl phosphate. The retention characteristics of phenol, cresols, ethyl phenols, and all the xylenols were evaluated by acetylating synthetic mixtures of the phenols in alkaline solution with excess acetic anhydride. -- APCA Absts.

- 874 Some Hydrocarbons of the Gas Phase of Cigarette Smoke. R. J. Philippe, et al.
Anal. Chem. 36, 859-865 (April, 1964).

Gas chromatographic analysis on alumina of the liquid air condensable fraction of cigarette smoke showed the presence of 37 compounds, mainly hydrocarbons. Twenty of these hydrocarbons have not been previously reported in cigarette smoke. Retention times on two different packing materials and infrared and mass spectrometric techniques were used as identification criteria. Semiquantitative analytical data, obtained by gas chromatographic techniques are given for most of the identified compounds. Preferential occurrence, in cigarette smoke gases, of some hydrocarbons over others in relation to their structural configurations are discussed. -- APCA Absts.

- 875 Thin-Layer Chromatographic Separation of Benzo(a)pyrene and Benzo(k)fluoranthene From Airborne Particulates. E. Sawicki, T.R. Stanley, J.D. Pfaff, and W.C. Elbert.
Chemist-Analyst 53, 6-8 (Jan. 1964).

Benzo(a)pyrene and benzo(k)fluoranthene have been separated from airborne particulates by column and thin-layer chromatography and have been characterized by chromatographic and spectral methods. The benzene-soluble fraction of airborne particulates was chromatographed with alumina as absorbent and 19:1 pentane-ether as the developer. The benzpyrene fraction obtained by this procedure was separated further on a thin-layer plate with cellulose acetate as the absorbent and ethanol-toluene-water (17:4:4) as the developer. This separation into 5 spots is shown in a figure. The following R_f values were obtained: benzo(a)pyrene, 0.16; benzo(k)fluoranthene, 0.38; perylene, 0.46; and benzo(e)pyrene, 0.47. Since benzo(k)fluoranthene brings about strong interference in nonseparative methods of estimation of benzo(a)pyrene in airborne particulates, any simple method, to be deemed worthwhile for application studies, must be highly selective for benzo(a)pyrene and must not react with benzo(k)fluoranthene. Cond. from Public Health Eng. Absts.

- 876 The Separation and Analysis of Polynuclear Aromatic Hydrocarbons Present in the Human Environment. Part I. E. Sawicki. Chemist-Analyst 53, 24-30 (Jan. 1964).

This first part of the review gives the background of research into the separation and analysis of polynuclear, aromatic hydrocarbons and presents a few of the different types of separation procedures. Over 40 polycyclic hydrocarbons that have been reported to be carcinogenic to animals are listed. Also listed are a few natural mixtures that are carcinogenic to human beings. Furthermore, many different materials that are present in the human environment and that contain polycyclic aromatic hydrocarbons are listed. References to research on the separation and analyses of these materials are presented also. Special attention is given to the presence of these contaminants in the atmosphere and in air pollution sources. The separation procedures discussed are sublimation, distillation, and solid-liquid extraction, liquid-liquid extraction, and column chromatography. There are 127 references. -- Public Health Eng. Absts.

- 877 Toxicity of Fourteen Volatile Chemicals as Measured By the Chick Embryo Method. J. McLaughlin, Jr., et al. Am. Ind. Hyg. Assn. J. 25, 282-284 (May-June, 1964).

The toxicity of each of the following 14 volatile chemicals was tested by use of a technique of injecting the chemicals into chick embryos: acetone, allyl alcohol, benzene,

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butyl acetate, n-butyl alcohol, carbon tetrachloride, dimethylformamide, ethyl acetate, ethyl alcohol, isoamyl alcohol, isopropyl alcohol, methyl alcohol, styrene monomer, and toluene. A comparison of the toxicity of the volatile solvents as determined by the chick embryo technique with the Threshold Limit Values indicates that there is a correlation of the data in general, although some of the solvents show a greater or lesser toxicity by the chick embryo technique. These discrepancies may be partially explained by the fact that, apart from toxicity, the undesirable properties of a chemical such as odor and irritating effects, which necessitate a lowering of the Threshold Limit Values, have no influence on the chick embryo technique. Similarly, teratogenic effects result in a relatively high toxicity by the chick embryo technique, but have not been considered in establishment of the Threshold Limit Values. The injection of chemicals into the yolk sac of fertile eggs prior to incubation is a method which can be advantageously used as an element in the evaluation of the toxicity of volatile solvents, and in addition can provide information on the teratogenic effects of these chemicals as an additional factor to be considered in the determination of safe levels in their use.

- 878 Criteria for the Evaluation of Chemical Toxicity. F. Princi.
J. Air Poll. Control Assn. 14, 154-157 (May, 1964).

The understanding of the effects of long and continued exposure to and absorption of chemical agents depends on useful criteria of physiological response. These standards, in turn, are only useful as the understanding of physiological mechanisms can make them. Although many new explorations of physiologic activity are now under way and newer ones will be developed, there is already a sufficient amount of knowledge and understanding to protect and safeguard the public. However, both the old and the new must be applied thoughtfully and coherently. Seven criteria for the determination of the toxicity of chemical agents have been proposed. These have been related specifically to biologic considerations and do not eliminate the need for standard concepts of chemical toxicology. -- Author's summary

- 879 Cyanide Poisoning. F.G. Hirsch.
Arch. Environmental Health 8, 622-624 (April, 1964).

The case reported here concerns a 23-year-old white female technician who was beset by psychiatric problems. One day while alone in the chemical laboratory she scooped up a spoonful (about 5.2g.) of sodium cyanide, placed it in a coffee cup containing 60-80 cc. of water and drank the solution. Almost immediately she had misgivings about what she had done and ran out into the hall of the building and told a coworker she had taken cyanide. Emergency measures were immediately applied and these are described in detail. One of these measures was the intravenous injection of 0.9 g. of sodium nitrite followed by 12.5 g. of sodium thiosulfate also intravenous. No attempt was made to lavage the stomach. The patient was taken to the hospital where she recovered 18 hours later. There were no detectable sequelae at the time of her discharge. When it is considered that 0.2 g. of sodium cyanide constitutes a probable median lethal dose (MLD), it can be concluded that the woman ingested approximately 26 times the MLD. There is good evidence to indicate that the MLD of either sodium or potassium cyanide is somewhat higher than 0.2 g. This factor is probably low by a factor of ten. There is sufficient difference between the lethal inhaled cyanide dose and the ingested cyanide dose to justify an attitude which suggests that poisoning by ingested cyanide is not apt to be quickly fatal and, further, that the specific treatment of it is almost always successful. Up to now enough cases have been reported to warrant the conclusion that cyanide poisoning can almost always be successfully treated by the nitrite-thiosulfate technique. Dr. K. K. Chen, of the Indiana University Medical Center now has records of 55 cases being thus treated with 54 successes.

- 880 Oxygen Therapy in Cyanide Poisoning. J. L. C. Dall and W. M. Hannah.
Brit. Med. J. 2, 33-34 (July 4, 1964).

Cyanide owes its extreme toxicity to chelation of the metallic moiety of cytochrome oxidase and other intracellular enzymes concerned in the utilization of oxygen in the tissues.

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This results in cellular asphyxia, and because of this feature of the poison the blood remains oxygenated until respiration fails. The bulbar centers are rapidly paralyzed after a period of excitation manifest by hypopnoea and alternating tachycardia and bradycardia. Vomiting and convulsions are terminal events. The work of Chen and Rose (J. Am. Med. Assn. 149, 113 (1952)) established sodium nitrite and thiosulfate as effective agents in treatment, the former to bind as much cyanide as possible as cyanmethemoglobin and thus minimize the effect on tissues, and the latter to promote natural detoxication by the enzyme rhodanase. Arising from the experimental work of Cope (J. Am. Med. Assn. 175, 1061 (1961)), which showed that hyperventilation with oxygen before a dose of cyanide had a protective effect, the suggestion was made that oxygen therapy might be of value in treatment. In the present case oxygen therapy was started after the "terminal events" of convulsions and apparent failure of vital functions. Despite this, it was possible to reverse the terminal stages and obtain recovery. Though it would appear from the timing that improvement was related more closely to the hydrocortisone injections, these were given primarily as supportive therapy and it seems more reasonable to suppose that resuscitation was chiefly due to continued administration of oxygen and artificial hyperventilation at the critical early stages. While no conclusions can be drawn from a single experience the authors have been left with the impression that, though potassium cyanide is a rapidly active tissue poison, the effect on cellular metabolism may be more transient than has been appreciated, and if vital functions are maintained even in the face of apparent death recovery may be possible. -- Cond. from authors' comment

- 881 A Field Investigation of Fluorosis in Cattle. H.C. Wohlers and G.W. Newell.
J. Air Poll. Control Assn. 14, 139-148 (May, 1964).

A comparison has been made of the results of a detailed field investigation of the effects of fluoride on cattle with research results from controlled feeding experiments. Specifically, the comparison was made on the basis of the fluoride content in the feed, the fluoride content of the ribs, the fluoride content of the urine, and the fluoride effect on incisor teeth. Under the conditions prevailing at the time of this practical field study, it has been shown that fluorosis in cattle might be expected within a 2-mile distance of these industrial plants. At this distance the following conditions were determined: (1) The forage contained more than 40 to 50 ppm F—approximately 2 mg. F/kg. of body weight per day. (2) The fluoride content of rib exceeded 4,000 ppm. (3) The fluoride content of the urine exceeded 15 ppm, and (4) Almost 50% of the incisor teeth examined were in Grades 4 and 5. Correlation of the results of a field experiment with the results of controlled feeding experiments was excellent. With these comparison data, the authors have shown that it is possible to delineate herds or areas in which damaging or nondamaging effects of fluoride might be expected. -- Authors' summary

- 882 Altered Function in Animals Inhaling Low Concentrations of Ozone and Nitrogen Dioxide.
S. D. Murphy, et al. Am. Ind. Hyg. Assn. J. 25, 246-253 (May-June, 1964).

Quantitative measurements of respiratory function of guinea pigs were made before, during, and after exposure to low concentrations of ozone and nitrogen dioxide. The earliest effects detected during exposure to either of the gases were increased respiratory frequency and decreased tidal volume. These effects were noted during 2-hour exposures to concentrations of ozone as low as 0.34 ppm or within 4 hours of exposure to nitrogen dioxide at a concentration of 5.2 ppm. Previous exposure to ozone did not result in tolerance to the respiratory function changes produced during exposure to a 1.5-ppm concentration of the gas. Voluntary running activity of mice was depressed during exposure to concentrations of ozone between 0.2 and 0.7 ppm and to nitrogen dioxide concentrations of 7.7 to 20.9 ppm.---Authors' abst.

- 883 A Comparison of the Acute Effects of SO₂ Administered Alone or in Combination With NaCl Particles on the Respiratory Mechanics of Healthy Adults.
N.R. Frank, M.O. Amdur, and J.L. Whittenberger.
Intern. J. Air and Water Poll. 8, 125-133 (Feb. 1964).

Changes in the pulmonary flow resistance (RI) of healthy male adults, induced by 3 levels of SO₂: 1-2, 4-6, and 14-17 ppm were compared when the gas was administered alone

or in combination with submicronic sodium chloride aerosol. The subjects were seated in a volume-displacement-body plethysmograph, breathing by mouth. At least one month transpired between exposures. No systematic differences were found between the responses to the gas alone and to the gas-aerosol mixture. Essentially the same dose-response relations occurred in both circumstances; that is, the group showed no change in RI during exposure to 1-2 ppm of SO₂ and showed a smaller increase to 4-6 ppm than to 14-17 ppm. In a second type of experiment the gas and gas-aerosol mixture were administered one after the other, separated by a 15-minute period of room-air breathing. The response to the second exposure whether it was gas alone or the mixture, was smaller than the response to the first exposure.

-- APCA Absts.

- 884 Comparative Toxicity of Stable Rare Earth Compounds. III. Acute Toxicity of Intravenous Injections of Chlorides and Chelates in Dogs. J.G. Graca, F.C. Davison, and Joyce B. Feavel. Arch. Environmental Health 8, 555-564 (April, 1964).

Stable rare earth chlorides, citrate, and edetate complexes were injected into a total of 135 anesthetized dogs. All rare earths, except promethium, were included. Yttrium was also included in the series. An amount of 100 mg/kg doses were administered intravenously as 5% solutions, in 10 mg/kg increments at ten-minute intervals. Observations were made on heart rate, blood pressure, and respiration. Blood samples were taken preanesthetically, and at 0, 10, 30, 60, 100, and 160 minutes for RBC, WBC, and differential counts, hemoglobin, hematocrit, sedimentation rate, prothrombin time, and coagulation time. No distinctive physiological response was found with any of the rare earths. Specific effects on blood constituents were an increase in prothrombin and coagulation times. The other constituents were not specifically affected by the rare earths. The chlorides were most toxic and the edetate complexes the least. Acute toxicity was of a low order; however, latent symptoms and pathology were found in single-injection preliminary studies. There also was a gradation of decreasing effects from the lower to the higher members of the atomic series. Gross and histopathological examinations were essentially negative. There are 15 references.

-- Authors' summary

- 885 Electrocardiographic Changes in Experimental Thallium Poisoning. O. Grunfeld, et al. Am. J. Vet. Res. 24, 1291-1296 (Nov. 1963).

Thallium, a heavy metal discovered by Crookes in 1861, is characterized by its green line in the spectrum. The thallos salts have been extensively studied. Thallos sulfate, an excellent rodenticide, contains approximately 80% of the metal; it is the only form of the poison used as a pesticide. Its use as an internal medicament and depilatory has been abandoned because of its toxicity, and today the principal use of thallium is in the control of rats, mice, ground ants, roaches, and other insects. Thallos sulfate (40 mg.) was given orally to 15 rabbits; 5 control rabbits were given none. Serial electrocardiograms were obtained before and after administration of the heavy metal. Clinical, radiographic, chemical, and histologic examinations were made. Many electrocardiographic changes were found. There were no instances of myocardial infarction at necropsy. The main histologic findings were generalized congestion of the tissues including the heart, in all cases and bronchopneumonia in 7 cases. Gross enlargement of the heart was not observed radiographically. Thallium was found in higher concentrations in the liver, kidney, and skin than it was in the heart and brain. Changes were not observed in the controls. There are 31 references.

-- Public Health Eng. Absts.

- 886 Milk Supplementation as a Prophylactic in Industry—Its Use and Misuse. R. Lockhart. Trans. Assn. Ind. Med. Officers 13, 65-66 (July, 1963).

It is well known that workers in the lead and paint industry are subject to the risk of lead poisoning. The systemic absorption of inorganic lead and its deposition in the tissues as well as its predilection for bone marrow followed by mobilization, excretion and consequent damage to the cardiovascular and renal systems are likewise well known. In 1939, Tompsett, in experimental work on mice, found that on high calcium diets the absorption of lead was low, while on low calcium diets it was high; later, in 1956, Backup, et al. fed rabbits suffering from lead poisoning with a variety of food components including milk. In 1954, an experiment on the

prophylactic value of milk on rats suffering from lead poisoning was carried out by Wittgens and Neederstadt. Both Backup and Wittgens came to the conclusion that milk had no protective effect, rather the reverse, and deduced from their findings that the consumption of additional milk by lead workers should not be recommended. The result of these and similar experiments do not appear to be generally known and it is significant that the supply of milk to lead workers in England has never been suggested at any time. In view of these findings, it was thought it might be of interest to carry out a small pilot study into the extent to which additional milk is given to workers engaged in paint spraying in Dundee. Of 19 firms engaged in paint spraying or a similar process, 12 supplied free milk daily to certain of their employees. The reasons for giving it were investigated, and it appears that some firms considered it a statutory requirement, which it is not, while others were following established custom. It would be interesting to know how widespread is this practice of supplying free milk in industry, as revealed by this small pilot study.

- 887 Roentgenographic Changes in the Lungs of Children With Kerosene Poisoning.
S. Brunner, H. Rovsing, and H. Wulf. Am. Rev. Resp. Dis. 89, 250 (Feb., 1964).

Of 92 children with kerosene poisoning, pulmonary changes were found in 87% of the children examined roentgenographically. Only 4 children had auscultatory changes, all 4 of whom had pulmonary changes as seen on chest radiographs. It is emphasized that 37 children with negative auscultatory findings were shown to have distinct lesions when examined roentgenographically, a fact which underlines the importance of roentgenographic examination. A characteristic of the pulmonary changes is that they occur very soon after intake of the poison. The rapid development of pulmonary changes and the unmistakable preponderance of lesions of the aspiration type suggest that the pulmonary changes are due to direct aspiration of the poison. According to the authors, gastric lavage should be performed after the ingestion of large quantities of kerosene, since the consequence of absorption of the poison is a relatively important factor. Follow-up observation on 60% of the patients showed, however, that the long-term prognosis of kerosene poisoning in children is favorable. The importance of early and repeated roentgenography is stressed. -- Can. Med. Assn. J. Absts.

- 888 Clinical and Therapeutic Aspects of Kerosene Poisoning: A Series of 200 Cases.
B.J. Baldachin and R.N. Melmed. Brit. Med. J. 2, 28-30 (July 4, 1964).

A series of 200 cases of kerosene ingestion is reviewed. Clinical and radiological findings suggest that the most significant complication is pulmonary damage following aspiration. Systemic effects of kerosene absorption appeared to be of little practical importance. A standard conservative regime of prophylactic penicillin, without gastric lavage, was employed. The mortality rate was 0.5%. A review of experimental reports and clinical findings indicate that treatment should be conservative, and that gastric lavage is contraindicated in the management of this condition. There are 9 references. -- Authors' summary

- 889 Exposure to Guthion During Spraying and Formulating. Z. Jegier.
Arch. Environmental Health 8, 565-569 (April, 1964).

During the formulation of Guthion (O, O-dimethyl-S-(4-oxobenzotriazino-3-methyl) phosphorodithioate) 25% wettable powder and the spraying of apple orchards with sprays containing 0.5 to 6.0 lb. of 25% wettable powder per 100 gallons of water the following air concentrations and exposures were found: Average air concentrations in the operators' breathing zone during spraying, tank filling, and formulating were found to be 0.64, 2.76, and 4.24 mg. per cubic meter of air, respectively. In the absence of chemical cartridge type respirators, the average daily respiratory exposures during spraying, tank filling, and formulating were found to be 1.12, 0.95, and 4.48 mg. when determined by the direct method using the filter pad technique. In the absence of protective clothing, average dermal exposures during spraying, tank filling, and formulating were found to be 49.5, 39.6, and 80.9 mg. per day when determined by the direct method using the absorbent pad technique. The results of measured respiratory and dermal exposures indicate that, under conditions such as obtained during the above survey, workers in apple orchards and formulating plants are unlikely to exhibit symptoms of acute Guthion poisoning. -- Author's summary

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- 890 Malathion Poisoning Successfully Treated With Large Doses of Atropine. A. G. Richards. Can. Med. Assn. J. 91, 82-83 (July 11, 1964).

A woman who was moribund after drinking malathion in an apparent suicide attempt was treated with very large intravenous doses of atropine (850 mg. over a period of seven and a half days) and artificial respiration. She survived and was restored to good health. It is concluded that the prompt and continued use of generous amounts of atropine may save a patient from what at first appears to be fatal poisoning with an organic phosphorus insecticide. -- Author's summary

- 891 Effect of Iron Loading Upon the Formation of Collagen in the Hepatic Injury Induced by Carbon Tetrachloride. G. Kent, et al. Am. J. Pathol. 45, 129 (July, 1964).

The effect of massive doses of iron dextran upon the formation of hepatic collagen was studied in rats exposed to carbon tetrachloride. In the animals receiving iron dextran, fibrous septums developed earlier and to a significantly greater extent than in the carbon tetrachloride-treated controls. The degree of cirrhosis, moreover, was considerably enhanced. A close topographic relationship existed between the developing septums and the iron-laden macrophages, collagen formation being particularly pronounced in areas rich in these cells. The septums also contained much extracellular iron, often identifiable as ferritin. The findings suggest that iron-laden macrophages and extracellular iron may be important factors in the observed effects of iron loading. They may represent one of the mechanisms responsible for the increased fiber formation in human iron storage diseases.

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

INDUSTRIAL DUSTS

- 892 Pneumoconiosis: The Morphology of the Inert Dust Reaction. P. Gross. Beitr. Silikose-Forsch. Sonderband. Grundfragen Silikoseforsch. Vol. 5, 273-283 (1963). Hauptverwaltung der Bergbau-Berufsgenossenschaft, Bochum, Germany. Reprints Available from Industrial Hygiene Foundation Upon Request.

A study of lung sections of guinea pigs exposed for one year in inhalation chambers to kaolin, aluminum oxide, and silicon carbide dust respectively; and pastured for an additional year has provided evidence which indicates that intrapulmonary deposits of inert dusts are primarily intra-alveolar and not interstitial. Many dust foci, as seen in the sections, were composed of 20 to 60 or more alveoli filled with dust-laden cells around which the alveolar walls were contracted and tightly applied. All three dusts were intracellular and evoked a relatively mild alveolar reaction characterized by proliferation of alveolar cells and reticulin stroma. Because the stroma does not tend to collagenize the reaction is classified as inert. Possible reasons for the contracture and tight application of alveolar walls about dust-filled cell masses are discussed. The cellular thickening of alveolar walls which characterized the dust deposits extended beyond the latter for reasons which are not clear at present. Some of the intra-alveolar dust-laden cells were supported by reticulin fibers extending from neighboring alveolar walls, whereas other such cell masses contained no supporting reticulin fibers. The reasons for this difference are not known. Because many intra-alveolar dust cell masses are unsupported by stroma and because reticulin stroma is labile, intrapulmonary deposits of inert dust are fragile and may be broken up by pulmonary edema. Perivascular lymphatics were demonstrated to be wide-open and free of dust. It is pointed out that the concept of pneumoconiotic lymphatic obstruction in lung tissue is probably based on a failure to discriminate between lymphatic vessels and alveolar lumens. -- Author's summary

03121558

- 893 Evaluation of Inhalation Hazards Based Upon the Respirable Dust Concept and the Philosophy and Application of Selective Sampling. P.E. Morrow.
Am. Ind. Hyg. Assn. J. 25, 213-236 (May-June, 1964).

The genesis and evolution of the respirable dust and selective sampling concepts are described. The background material includes a resume of current ideas on dust deposition and retention in the human respiratory tract and a brief but critical examination of modern dust sampling instruments and methods. Theoretical and practical developments in selective sampling for the respirable or hazardous dust fraction(s) are reviewed. There are 126 references.
-- Author's abstr.

- 894 Biochemistry of Lungs in Relation to Silicosis. II. The Effect of Quartz Dust on the Protein Amino Acids of Guinea Pig Lung Tissue. P. Bailly, et al.
Arch. Environmental Health 8, 547-554 (April, 1964).

A study of the individual amino acids in the lung tissue of guinea pigs exposed to quartz dust has been made. The results have been compared with those from normal healthy animals, and 5 amino acids (hydroxyproline, alpha-alanine, glycine, lysine, and proline) have shown statistically significant changes from normal. The results indicate that (a) the amino acid content of normal lungs does not vary with age; (b) the increase in lung weight in dusted animals is not due to collagen alone, or edema, but to tissue low in collagen-like proteins; (c) intra-tracheal injection of quartz dust into guinea pigs gives completely different results from exposure to quartz dust inhalation; (d) histological staining for collagen and reticulin does not agree with the chemical analysis for this type of protein. This requires further investigation.
-- Authors' summary

- 895 Asbestos Pleurisy. H.B. Eisenstadt. Diseases of Chest 46, 78-81 (July, 1964).

A case of benign asbestos pleurisy has been described. This disease differs greatly from the classic picture of pulmonary asbestosis. It is probably not as uncommon as it would appear from the sparsity of reports in the literature. Asbestos pleurisy is usually not recognized because it has a benign, self-limited course requiring no specific therapy. It can be suspected in a person having been exposed to this substance for a prolonged period of time. Such contact may have taken place recently or a number of years ago. The correct diagnosis requires not only pleural, but also lung biopsy for the demonstration of asbestos bodies. Asbestosis must be considered in the differential diagnosis of any form of idiopathic pleurisy.

-- Author's summary

- 896 Asbestos Exposure During Naval Vessel Overhaul. W.T. Marr.
Am. Ind. Hyg. Assn. J. 25, 264-268 (May-June, 1964).

The Long Beach Naval Shipyard has several men on disability compensation and one death due to asbestosis. Many of these employees have more than 20 years' experience as pipecoverers and insulators working primarily aboard ship. Asbestos exposure during ship overhaul and repair varies extensively giving an entirely different problem from exposure in mining and manufacturing operations. The maximum allowable concentration for pipe covering operations or for short duration massive exposures is unknown. There still remains a difference of opinion among medical authorities on a MAC and the effects of long-fiber and short-fiber asbestos. Chest x-ray examinations of employees exposed to asbestos can be misleading as it usually takes a minimum of 7 years for cases of asbestosis to develop. Shipboard pipecovering and insulating during overhaul and repair is a hazardous trade. Employees in this trade should wear respirators when exposed to dry insulation material containing asbestos.

-- Author's summary

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- 897 Is There an Endemic Asbestosis? F. Wagler, H. Müller, and M. Anspach.
Z. ges. Hyg. u. ihre Grenzgebiete 8, 246-255 (April, 1962).

The observations made by Kiviluoto in Finland which revealed that people living in the neighborhood of an open-cast asbestos mine got asbestosis with bilateral calcareous degeneration of the pleura without having ever worked in these dust-laden enterprises can be confirmed. Asbestos pneumoconiosis was also found in the neighborhood of an asbestos-processing plant in Dresden. The question of obligatory indemnification is discussed. The necessity of installing cyclones is pointed out.

-- APCA Absts.

- 898 Radiological Aspect of Silicosis by Pumice (Liparosi). G. Pancheri and E. Zanetti.
Rass. med. ind. 32, 432-446 (Sept.-Oct. 1963). Italian.

The radiological features of liparosis, a particular type of silicosis due to pumice stone dust, are described. Since tuberculosis is nearly always absent, it has been possible to study and follow several cases of (pure) liparosis. Its evolution follows a fixed pattern. First, an overspread emphysema appears, followed by a generally pin-headed reticulation. Later, small zones of opacity develop in the middle basal regions. This stage promptly turns into the massive form, characterized by very wide zones of opacity. This is thought to be the characteristic evolution of liparosis.

-- Public Health Eng. Absts.

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 899 Studies on Dysbarism. I. Development of Decompression Syndrome in Genetically Obese Mice. W. Antopol, et al. Am. J. Pathol. 45, 115 (July, 1964).

The decompression syndrome was produced regularly in genetically obese mice exposed to 75 pounds per square inch (gauge) air pressure for 6 hours and rapidly decompressed. The syndrome did not develop in thin siblings or other nonobese mice exposed to the same conditions. Mice succumbing to decompression illness showed bubble accumulation in the spleen, bone marrow, adipose tissue, adrenal, and pituitary. The intestines were markedly distended with gas; this was minimal in thin mice. It was postulated that the intestine might be an organ for gaseous exchange. The spleen seemed to act as a reservoir for bubbles, thus preventing their entrance into the circulation. There was a direct correlation between degree of obesity and susceptibility to decompression illness. Bone alterations seen in both obese and nonobese mice, long after decompression, are discussed. Genetically, obese mice are satisfactory subjects for studying decompression illness. -- J. Am. Med. Assn. References & Reviews

- 900 Current Concepts of the Mechanism of Occupational Hearing Loss. M. Lawrence.
Am. Ind. Hyg. Assn. J. 25, 269-273 (May-June, 1964).

Environmental sound exerts its effect upon those structures that are vibrated mechanically, and essentially, the damage that occurs as the result of vibrations of excessive amplitude depends upon the characteristics of the impinging sound and upon the condition of the aural structures. A blast may damage the middle-ear structures. The long-term steady, loud sounds more often encountered are more subtle in their effect and produce changes in the inner-ear structures. The process is purely a mechanical one and appears to have several stages, the extent of which depends considerably upon the state of the human organism at the time of insult.

-- Author's abst.

03121560

- 901 Changes in the Hearing of Personnel Exposed to High Intensity Continuous Noise.
J.L. Fletcher and M. Loeb. *Military Med.* 128, 1137-1141 (Nov. 1963).

Preexposure and postexposure thresholds were obtained for 23 persons acutely exposed to a loud, continuous noise. Reasonably completed data were secured regarding type and duration of exposure. Correlations between noise exposure and hearing loss were not statistically significant. The correlation between reference threshold and initial shift was negative and statistically significant, as was the correlation between reference threshold and permanent loss. The correlation between initial shift and permanent loss was positive and significant.

-- Public Health Eng. Absts.

- 902 Permanent Threshold Shift Changes Produced by Noise Exposure and Aging.
R. Gallo and A. Glorig. *Am. Ind. Hyg. Assn. J.* 25, 237-245 (May-June, 1964).

A study of audiometric data indicates that for long-term exposure to industrial noise of approximately 90 dB octave-band sound pressure level (SPL): (1) Most hearing level changes at 3,000, 4,000, and 6,000 cps occur in the initial 15 years, whereas at 500, 1,000, and 2,000 cps, hearing level change is approximately linear with exposure time. (2) Large individual differences in the amount of hearing level change are evident; these differences increase with audiometric frequency. (3) Men have greater hearing level changes than women. (4) Hearing level changes produced by noise-exposure and by aging may not be differentiable.

-- Authors' abst.

RADIOACTIVITY AND X-RADIATION

- 903 Application and Measurement of Ultraviolet Radiation. R. Nagy.
Am. Ind. Hyg. Assn. J. 25, 274-281 (May-June, 1964).

Commercially available ultraviolet lamps are mostly mercury vapor lamps, either low-pressure or high-pressure. Low-pressure lamps are used extensively to destroy bacteria. High-pressure lamps are used more for lighting. The power, properties and effectiveness of each type are discussed with precautions for safe use. Methods of measuring the intensity of ultraviolet radiation are reviewed, but there is no simple, inexpensive meter available. There are 16 references.

-- Author's abst.

- 904 Cardiovascular System Condition in Persons Dealing With Radioactive Paints.
L. G. Tsenterova. *Gigiena i Sanit.* No. 12, 42-46 (1963). Russian.

The health of painters exposed to the chronic action of radioactive paints in their work was studied for 9 years. In some of the painters, examinations revealed labile pulse; disturbed or inert oculocardiac reflex; changes in rhythmograms; a tendency toward gradual fall of arterial pressure; a decrease of amplitude on electrocardiogram, especially that of the T-wave; and a slight slowing of conductivity. In certain cases a vasopathy syndrome was present. The functional changes of the cardiovascular system may develop even in the first state of chronic action of radioactive paints, and may be detected by means of functional tests. The incidence and the extent of these disturbances are definitely correlated with length of service and sanitary working conditions.

-- Public Health Eng. Absts.

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- 905 Measuring and Monitoring Fallout Radioactivity. J. H. Harley.
Arch. Environmental Health 8, 598-605 (April, 1964).

A general description of the measurements and equipment required for estimating hazard to man from radioactive fallout has been given. Emphasis has been placed on the peacetime situation where we have experience, but a few points have been made regarding nuclear warfare. In general, the high levels of radioactivity resulting from a nuclear war would allow hazard assessment with simple instruments, while low levels existing in peacetime require more complex instrumentation and detailed measurements. -- Author's summary

- 906 Radioactive Fallout in Peace and War. H. Hollister.
Arch. Environmental Health 8, 590-597 (April, 1964).

It should be evident to persons professionally engaged in environmental health that the sheer size of any radiation hazard depends upon how the hazardous situation comes about and upon conditions in the environment, especially weather. Orders of magnitude (factors of ten) separate nuclear war on the one hand from peacetime activities, both normal and accidental. There are scientific aspects of these hazards that turn on the phenomenology of fallout, as discussed in this paper. Particles fall, radioactive materials by definition emit radiation and decay (reduce in quantity). There are, of course, no data on large-scale nuclear war, nor even on the probability of occurrence. Nuclear weapons have been fired, of course, and most of our solid information about fallout is associated with such firings. Information also exists concerning gaseous or particulate release from atomic energy plants in normal operations. Information has been developed on the behavior of reactor components such as fuel elements when these have deliberately been stressed in the laboratory to conditions far exceeding design levels for normal operation (temperature, corrosion, etc.). Reactor accidents have been few. There has yet to occur a major radioactivity contamination accident from a reactor in any nation, so far as we know. An abundant literature exists on the technology of fallout. The references listed may be used for further reading on the problems discussed above. More extensive discussion of particular topics such as measurements of radioactivity, the transport of radioactive materials up the food web to man, and fallout shelter will be given in subsequent articles. Seventeen references are given. -- Author's summary

- 907 Radioactive Fallout Problems in Food, Water, and Clothing. M. Eisenbud.
Arch. Environmental Health 8, 606-612 (April, 1964).

The problems of food and water and clothing in the postattack period would be dominated by the influences of blast and fire with radioactivity contributing in a lesser way. The principal effect of radioactivity on food supplies would probably result from lethal radiation effects on livestock. Major losses of food supplies would also result from the extensive fires which would occur on a national scale following a major nuclear attack. Fresh foods that survive the initial effects and which can be delivered to the consumer before rotting, would probably be heavily contaminated with I-131 for a few weeks after the attack. The dose to the thyroid from ingested I-131 is likely to be a limiting factor on the amount of radioactive contamination the population can tolerate. Exposure of the intestinal lining to intensively radioactive particles ingested with food may also be a limiting factor. Compared to these sources of exposure, Sr-90 would be far less of a threat. Radioiodine would also be the limiting factor in determining the amount of radioactive contamination that is permissible in water. -- Author's summary

- 908 The Current Fallout Picture. J.H. Harley.
Am. Ind. Hyg. Assn. J. 25, 304-308 (May-June, 1964).

A general picture of the subject of fallout of strontium-90 from weapons testing is presented. The data as of May, 1963, on this nuclide in human bone are discussed. Indications of the techniques of predicting this level by calculation from diet levels and from fallout levels are given. -- Author's abst.

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ENVIRONMENTAL MEASUREMENTS

- 909 Air Sampling With Plastic Bags. W.D. Conner and J.S. Nader.
Am. Ind. Hyg. Assn. J. 25, 291-297 (May-June, 1964).

An inexpensive sampler has been developed whereby air samples can be collected in plastic bags without pump contamination and shipped to a laboratory for analysis. Data are presented to illustrate how well these bags contain (1) sulfur dioxide, nitrogen dioxide, and ozone in samples collected from synthetically prepared mixtures, and (2) hydrocarbons in samples collected from an auto exhaust irradiation chamber. The inorganic samples were in the concentration range of 0.5 to 1.5 ppm, and the hydrocarbon samples were in the concentration range of 7 to 20 ppm. The samples were stored for periods of several days.

-- Authors' abst.

- 910 A Water Cooled Probe for Sampling Gases from Shaft Furnaces. D.G. Evans.
J. Inst. Fuel 37, 108-112 (March, 1964).

A probe is described which is suitable for sampling gases from shaft furnaces. The design requirements of a probe system for drawing samples of gas from shaft furnaces are: Coverage of the whole firebed, non-interference with firebed reactions, quenching of gas reactions in probe, resistance to blockage, mechanical strength. The composition of a typical set of gas samples drawn from an iron melting cupola with the probe are given.

-- APCA Absts.

- 911 A Personal Measuring Instrument for Atmospheric Sulphur Dioxide. T. Nash.
Intern. J. Air and Water Poll. 8, 121-124 (Feb. 1964).

The instrument was developed for the measurement of sulfur dioxide concentrations within the range 0.1-5 ppm. It weighs about 1 kg. complete with battery and solution. Readings are taken by squeezing and releasing a flexible bottle, which aspirates air into a small conductivity cell containing dilute hydrogen peroxide solution. Fifty or more readings can be taken on one charge of solution, each reading taking about one minute. Calibration was done on outside air during periods of high pollution continuously monitored by the recording instrument and linearly assumed.

-- APCA Absts.

- 912 A New Analytical Technique for Sulfur Dioxide in Air.
K. J. Leong, G.F. Dowd, and H.N. MacFarland.
Am. Ind. Hyg. Assn. J. 25, 309-313 (May-June, 1964).

An analytical system capable of recording continuously and practically instantaneously changes in sulfur dioxide concentration in air has been developed. The method requires relatively small volume of gas samples for analysis. Contaminated air reacts with acidified hydrogen peroxide solution in a counter-current absorber to form sulfuric acid. The impedance of the effluent bears an inverse relationship to the amount of sulfur dioxide being absorbed ranging from 0-500 ppm. Changes in impedance are detected by two parallel electrodes when the predetermined, high frequency voltage across them is disturbed. The applicability of this technique for other gases and studies is discussed.

-- Authors' abst.

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- 913 Spectrochemical Determination of Beryllium in Air, Biological Materials, and Ores Using the Sustaining A.C. Arc. R.G. Keenan and J. L. Holtz.
Am. Ind. Hyg. Assn. J. 25, 254-263 (May-June, 1964).

A spectrographic method has been developed, using a sustaining a.c. arc, for the quantitative determination of beryllium in amounts as low as 0.001 microgram. The method is based upon the excitation of beryllium volatilized from a chloride matrix which is prepared from a lithium chloride-graphite buffer, liver ash, and the ashed or fused sample. Experiments with Be-7 have provided quantitative recoveries of the radioactive tracer from urine samples and from bertrandite and beryl ores. Application of the method to samples of beryllium ores provided, in 6 out of 8 cases, less than 10% deviations from the results of the chemical analyses reported by the U.S. Bureau of Mines. -- Authors' abst.

- 914 Methane Composition of Urban Atmospheres. A. P. Altshuller, et al.
Intern. J. Air and Water Poll. 8, 29-35 (Jan. 1964).

Methane levels have been determined in Los Angeles, Cincinnati, Chicago, and Washington, D.C., by analysis with flame ionization gas solid chromatography. Samples were analyzed directly from the atmosphere and after collection in a variety of flexible containers. Most of the concentrations of methane measured in urban atmospheres are in the range between 1.5 and 2.5 ppm. However, values ranging from slightly below 1.2 to 6 ppm are observed. The geophysical methane level appears to be in the 1.0 to 1.2 ppm range. -- APCA Absts.

- 915 Recent Isocyanate-in-Air Analysis Studies. K. E. Grim and A. L. Linch.
Am. Ind. Hyg. Assn. J. 25, 285-290 (May-June, 1964).

The reagent and sample volumes for the Marcali method for the determination of toluene diisocyanate (TDI) in air have been modified to accommodate the 1961 revision of the Threshold Limit Value (TLV= 0.02 ppm). A lightweight, easily portable assembly which includes the "Uni-Jet" Constant Rate Air Sampler, reagents, and a compact set of permanent liquid color standards for the range 0.01 to 0.08 ppm was developed for field surveys. A similar unit, modified to provide permanent liquid color standards in a visual comparator adapted to the required 10-cm. light path, was completed for the Ranta determination of combined TDI and TDI urea. A satisfactory laboratory test, based on the Marcali method for TDI, has been developed for traces of MDI (methylene-bis-(4-phenylisocyanate)) in air. The method easily detects 0.01 ppm MDI in a one cubic foot air sample. -- Authors' abst.

PREVENTIVE ENGINEERING

- 916 Code of Safe Practices for Industrial Scuba Diving. P. A. Breysse.
J. Am. Soc. Safety Eng. 9, 15-18 (July, 1964).

It is safe to state that SCUBA (Self-Contained Underwater Breathing Apparatus) diving has become a popular sport, practiced by well in excess of 3 million devotees. Scuba diving involves heavy exertion. Even if a diver only goes down for observation purposes and does not perform any other function, he will sooner or later find himself in positions that tax his strength and endurance. It is therefore of utmost importance that the diver be physically qualified to perform this function. Persons with certain physical defects should not be permitted to dive or should be strictly limited. These defects include the ability of middle ear and sinuses to equalize pressure changes, lung disorders, alcoholism, chronic gastrointestinal disorders, cardiovascular system abnormalities, certain diseases, active venereal disease, and any organic or neurologic disorders, or a history of epileptic episodes or loss of consciousness.

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Since physical condition is important to diving whenever any question arises regarding a diver's capabilities for diving the advice of a physician versed in diving hazards should be sought. A psychological examination may also be in order since claustrophobia, recklessness, or emotional instability and other such manifestations may seriously endanger a diver underwater. A diver, therefore, must be physically and mentally competent to function effectively and safely underwater. The author discusses equipment, air supply, underwater environment and presents a case history of a patient who was subject to the bends.

COMMUNITY AIR HYGIENE

- 917 Air Pollution in South America. E. T. Wilkins.
Smokeless Air (London) 34, 217-222 (1964).

The scientific study of air pollution is in an early state of development in South America, and there is a special interest in techniques for determining its nature and extent. Methods which should be used by local authorities for the control of air pollution based on maximum allowable concentrations are discussed. The chief value of maximum allowable concentrations is in the planning of new developments particularly for estimation on the basis of certain diffusion formulas and general experience, suitable heights for chimneys, and changes in wind direction and atmospheric turbulence. The lack of information on developments in other parts of the world is due to insufficient scientific literature on the subject. Air pollution in Argentina and Brazil are discussed.

-- APCA Absts.

- 918 The Secular Increase of the World-Wide Fine Particle Pollution. R. Gunn.
J. Atmospheric Sci. 21, 168-181 (March, 1964).

The increase in the world-wide fine particle pollution of the atmosphere between 1914 and 1962 is inferred from measurements of the electrical conductivity of the atmosphere over the surface of the North Atlantic. Systematic instrumental errors have been discovered in some of the early measurements of conductivity made by the research ship Carnegie which have long been considered as standard. Measurements for the 7th cruise of the Carnegie should be multiplied by 1.39 to correct for errors introduced by eddy diffusion. Notable improvements in the design of the electrical conductivity apparatus and an electric field meter permit the continuous collection and recording of data at sea even under adverse conditions such as heavy fog and light rain. More than 12 days of continuous new measurements in all kinds of weather during May-June 1962 are summarized. A comparison of the new measurements with the corrected values of the early Carnegie observations suggests that the electrical conductivity of the atmosphere over the North Atlantic has decreased by about 5% between 1929 and 1962. This implies a measurable and parallel increase in the average fine particle pollution of the atmosphere that is doubtless world-wide and represents an increasing hazard to the health of all terrestrial life. Measurements fail to confirm Wait's 1946 forecast of a very great and alarming increase in world-wide air pollution.

-- APCA Absts.

- 919 Air Pollution Potential Over the Salt Lake Valley of Utah as Related to Stability and Wind Speed.
P. Williams, Jr. J. Appl. Meteorol. 3, 92-97 (Feb. 1964).

Synoptic situations associated with strong air pollution potential in the Salt Lake Valley of northwest Utah are described. The trend of low visibilities in smoke during the past 30 years at the Salt Lake airport is shown. A smoke index was developed to indicate the amount of restriction to visibility due to smoke. Day to day changes in the smoke index are associated with stability and wind parameters. The effect of precipitation on the smoke index is also discussed.

-- APCA Absts.

03121565

- 920 Status Report: Study of Vision Obscuration by Nonblack Plumes. W. L. Crider and J. A. Tash. J. Air Poll. Control Assn. 14, 161-167 (May, 1964).

Plume emissions both black and nonblack, cause visibility reduction as well as economic damage. Both economic and visibility effects are considered in air pollution control regulations. Plume effects on vision obscuration are of primary interest in this research study. Present methods of inspecting a nonblack plume generally involve visual observation of the degree of opacity of the plume as it leaves the source and mentally equating this to the opacity of a reference shade of a black plume of equivalent opacity. Because of the growing interest in particulate emissions as a source of air pollution and because there is some question as to the accuracy with which an observer can use subjectively a chart of various shades of blackness to determine the opacity of nonblack plumes, an objective instrumental method is being sought. The Edison Electric Institute and the U. S. Public Health Service are cooperating in this study, which has as its objectives the investigation of the fundamental aspects of vision obscuration by nonblack plumes, the development of an objective instrumental out-of-stack method of measuring obscuration by plumes, and the determination of the relationship of subjective measurement to instrumental techniques of evaluation. The subject is discussed under the following subheadings: Light transmittance of plumes, experimental plume transmittance measurements, visual appearance and vision obscuration effects of plumes, and pilot field study. Because the research study described in this paper will continue for some time, the conclusions from the work presented are necessarily tentative. Also, the conclusions are limited in scope because most of the work to date has been concerned with plume transmittance rather than with vision obscuration, which is influenced by many factors other than plume transmittance.

- 921 Personal Air-Pollution Monitoring Devices. W. T. Ingram. Am. Ind. Hyg. Assn. J. 25, 298-303 (May-June, 1964).

The development of monitoring devices that can be operated while attached to an ambulatory individual is discussed. Two have been selected for more detailed study and development. A preliminary report of tests performed with one instrument equipped with impregnated silica-gel tubes and controlled air flow for collecting and measuring nitrogen dioxide, sulfur dioxide, total hydrocarbons, and carbon monoxide, together with a filter disc to capture particulates, is offered for discussion. The first phase of development of a second device using silica-gel pack from which the gases could be desorbed and analyzed by gas chromatography is also presented. The schematic assembly of components is described for each of these devices.

-- Author's abst.

- 922 Local Circulation Around an Industrial Area. F. H. Schmidt. Intern. J. Air and Water Poll. 7, 925-926 (Dec. 1963).

The hypothesis that waste gases from an industrial area arise over the heat source and sink nearby was investigated. The distribution of divergence and convergence in horizontal winds, as measured conventionally, was used to draw conclusions about vertical motions; these motions were also measured directly with pilot balloons. The results indicate that the diffusion theory must be applied with caution where factories produce much heat. Meteorological observations to be made in a proposed study of pollutant concentrations in Vlaardingen, The Netherlands, are described.

-- Public Health Eng. Absts.

- 923 How to Get the Most From Air Pollution Control Systems. J. E. Yocom and D. H. Wheeler. Chem. Eng. 70, 126, 128, 130, 132, 134, 136 (June 24, 1963).

This is a review of the factors that enter into the operation and maintenance of an air pollution control system and a short discussion of the main components and elements of different types of collectors. Trouble can be forestalled or solved to obtain maximum efficiency for even the best designed and selected dust control equipment, which must be considered in the same light as processing equipment. Increasing demands for good control necessitate greater attention to more efficient performance of equipment. The authors discuss the dust-handling operating conditions of ducts, fans, cyclone collectors, scrubbers,

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electrostatic precipitators, and cloth filters, and give many practical suggestions obtained from experience. An electrostatic device developed in England for the continuous-stack dust-emission monitoring of coal-burning plants is briefly discussed; the device could be applied to other monitoring uses.

-- Cond. from Public Health Eng. Absts.

- 924 Effects of Hydrocarbon to Oxides of Nitrogen Ratios on Irradiated Auto Exhaust. Part I. M.W. Korth, A.H. Rose, Jr., and R.C. Stahman.
J. Air Poll. Control Assn. 14, 168-175 (May, 1964).

The effects of changes in initial hydrocarbon concentration, initial oxides of nitrogen concentration, and HC/NO_x ratio are summarized in terms of the individual response variables. In general, increasing average irradiation time showed no effect except on the NO₂ formation rate, which indicated a somewhat lower level for the exploratory 180-minute average irradiation time. Three distinct types of plant injuries were produced by the irradiated exhaust gases. The under-surface glazing type and the total phytotoxic injury were related to HC/NO_x ratio, decreasing with decrease in ratio. No injury of these types was observed at ratios of 3:1 or lower. The other type of injury increased with total oxidant in the system. No plant damage was observed at total oxidant concentrations below 30 ppm.

-- Cond. from authors' summary

- 925 Effects of HC/NO_x Ratios on Irradiated Auto Exhaust. Part II. P.W. Leach, et al.
J. Air Poll. Control Assn. 14, 176-183 (May, 1964).

The relative concentrations of individual hydrocarbons have been shown to be independent of auto exhaust concentration in dynamic irradiation experiments. The absolute concentrations of the individual hydrocarbons are linearly related to total hydrocarbon concentration. The decrease in the concentration of reactive hydrocarbons during irradiation is found to be independent of whether a 120-or a 180-minute average irradiation time is used. A fourfold reduction in initial hydrocarbon concentration at constant hydrocarbon to nitrogen oxide level causes a slight increase in the relative amounts (per cent) of hydrocarbon consumed during irradiation. The same fourfold reduction in initial hydrocarbon concentration at constant nitric oxide level results in a decrease in the per cent of olefins reacted, but does not affect the per cent of aromatics reacted. If the hydrocarbon level is kept constant, while the nitrogen oxide level is varied, an increase in nitrogen oxides caused a marked reduction in the per cent of olefinic and aromatic hydrocarbons reacted during irradiation. The aldehyde yields are linearly related to the total hydrocarbon level. No significant effect on aldehyde yields was found when the average irradiation time was varied from 120 to 180 minutes. The aldehyde yields did vary with a decrease in yield both at very high and very low ratios of hydrocarbon to nitrogen oxide. The individual hydrocarbon and aldehyde concentrations are shown to fall well within the range of atmospheric concentrations. Although the aldehydes may be responsible in part for the eye irritation, the presence of other eye-irritating species must be postulated to explain the shape of the eye-irritation response curves when plotted against nitrogen oxide concentration.

-- Authors' conclusions

MANAGEMENT ASPECTS

- 926 Employment of the Mentally Subnormal. H.C. Gunzburg.
Trans. Assn. Ind. Med. Officers 13, 57-61 (July, 1963).

It has been estimated that there are approximately 8 million people in Great Britain who have intelligence quotients below 85, and at least one million have IQs below 70. Conversely, there are about 145,000 registered mental defectives, 44,000 are in hospitals for the subnormal and 16,000 are cared for in local authority centers, leaving a very large number unaccounted for. The problem of mental deficiency or mental subnormality has for a long time

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been bedevilled by a quite unjustified overemphasis on intellectual defect, conveniently expressed in the IQ. The IQ is quite useful for the purpose for which it was originally devised—educational classification, but a device which applies fairly well for purposes of schooling has much less justification in the work situation. We are not so much interested in whether a simple-minded man could benefit from formal education grounding, as in whether he can adjust reasonably well to an ordinary work and life situation, without requiring constant supervision. The IQ will not tell us this, and it is unfair to the simpleton, and unfair to the makers of the test, to dispose of a "case" by simply quoting the ready-made excuse of a low IQ. The problem of the subnormal is not one that can be avoided by containing him behind institution walls. He is, and will always be, a liability, yet under favorable conditions he is to some extent an asset to society, because he can work. One has to be realistic and not entertain hopes of bringing up to standard what always has been sub-standard. On the other hand, society in its total effect on the subnormal has often been responsible for making things worse than they need be, and has probably a moral obligation to undo the damage it has unwittingly caused.

- 927 Why Penalize Firms Hiring Handicapped Workers? H. B. Burr.
Harvard Bus. Rev. 41, 56-58 (July-Aug. 1963).

As is frequently pointed out, workmen's compensation statutes are now so broad (for types of disabilities covered), and interpretation of the laws is so liberal (for occupational causation), that practically all disabilities are now indemnified under these acts. In addition, the disability charged to an employer frequently includes not only the degree of incapacitation resulting from a particular misfortune occurring while the worker is in his employ but also previous incapacities which may be bound up with it! Clearly, the effect of these statutes is to discourage employment of those with handicaps, since existing handicaps are a potential source of future loss to the employer. To reduce such discouragement, a number of the states have established second-injury funds. Here disabilities which existed prior to an occupational accident or disease, but were aggravated by the subsequent misfortune, are covered from a fund contributed to by all employers participating in the state's compensation program. When such a second-injury fund exists, an individual employer is responsible for no greater liability in any case than if no handicap had existed before employment. Such funds, however, do not change the over-all employer compensation burden since, as a group, employers actually pay all second-injury fund costs, as well as other compensation costs. Thus, pre-existing defects of handicapped workers continue to pose an excess cost risk for employers even in states with second-injury funds. There are three other costs which occur when employing seriously handicapped personnel: (1) The excess group insurance costs needed for handicaps such as heart disease, hypertension, and diabetes which predispose to future impairment and death prior to the normal retirement age. (2) The increased capital costs required to adapt jobs to fit individual handicaps. (3) The excess costs imposed by extra employees and overtime payments needed to offset the inability of handicapped workers to move from one job to another, plus the additional administrative costs caused by this limitation in work-force flexibility. Taken together, the barrier to employment of the handicapped imposed by these burdens appears to be even higher than that put up by excess compensation risk. Business organizations should be allowed to reduce their respective yearly federal taxes by standard amounts, to be applied as credits against the excess costs of employing seriously handicapped individuals. Medical evaluation and certification of handicaps might be carried out through the nationwide system of federal-state vocational rehabilitation centers. By this means, certification would be independent both of those whose handicaps it would evaluate and of employers—the two parties standing to benefit most directly from the evaluation.

- 928 Ageing and Employment. A. Heron. Trans. Assn. Ind. Med. Officers 13, 62-64 (July, 1963).

The success with which industrialized societies provide for the successful adaptation of their members to the internal changes with age and to the external changes with economic and technical development will depend in the long run on the way in which the findings of relevant scientific research are applied. In this application the warm and close cooperation of research workers, general practitioners and industrial medical officers is absolutely vital.

-- Author's conclusion

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- 929 The Human Relations Committee—A Breakthrough in Collective Bargaining?
W.B. Owen, et al. Conference Board Record 1, 22-31 (May, 1964).

Designed to help solve complex and potentially explosive labor-management problems, the human relations committee or joint study approach to collective bargaining has gained widespread attention. All appear to agree that a basic prerequisite to the success of this approach is a genuine desire by both sides to solve problems. The relationship of this key factor, and others, to the accomplishments of the steel industry's human relations committee was analyzed at a round table discussion at a recent management conference of The Conference Board. Some of the variations, implications, problems and limitations of the HRC or joint study approach in general were also discussed by the panelists. Their observations, edited for space but substantially intact, are presented. The panelists were: Malcolm L. Denise, Vice President-Labor Relations, Ford Motor Company; John S. Harrison, Executive Vice President, Aluminum Company of America; James J. Healy, Professor of Industrial Relations, Harvard Business School; R. Heath Larry, Administrative Vice President, Personnel Services, United States Steel Corporation; Marvin J. Miller, Assistant to the President, United Steelworkers of America, AFL-CIO; W. Boyd Owen, Vice President-Personnel Administration, Owens-Illinois Glass Company, chairman. -- Cond. from Conference Board Record

ACCIDENTS AND PREVENTION

- 930 Study on Use of Safety Belts in Sweden. Claes-Göran Bäckström.
Acta Chir. Scand. Suppl. 208, 5-98 (1963).

The summary of this monograph emphasizes that fatal injuries were significantly more frequent among those persons ejected from cars than among those not ejected. Comparing injuries sustained by 424 persons using safety belts with those in 228 persons not using such belts, it was found that the overall frequency of injuries was reduced by more than 50% in the belt-wearing group. There were 8 fatal injuries in those not using belts and none in those using belts. In head-on collisions the rate of injury was about 50% less in belt wearers than in nonbelt wearers, and in accidents in which cars were overturned, the difference was still greater, chiefly due to the fact that ejection was prevented. The belts significantly reduced injuries even at speeds of 50 miles per hour. Injuries to the head, face and upper extremities were greatly reduced by safety belts; reduction in injuries to the lower extremities was almost statistically significant. The occurrence and location of rib fractures in some motorists wearing diagonal shoulder belts suggest that it might be advantageous to combine this type of belt with a lap strap. The investigation also revealed that safety belts are not as effective in small as in large cars. The limited space particularly in the front caused by impact of persons against the front wall of the vehicle, and the seats were sometimes torn from their floor attachments, thereby increasing the possibility of injury to belt wearers.

-- Cond. from J. Am. Med. Assn. International Comments

- 931 Damage Control—New Horizon in Accident Prevention. F.E. Bird, Jr.
Iron Steel Engr. 40, 83-85 (Sept. 1963).

This paper presents a discussion of an accident damage control program initiated 7 years ago by the Lukens Steel Company whose goals were reduced injury rate and cost improvement. Various aspects of the second point are considered. Four basic control methods described are reporting, investigation, analysis and remedy. Typical accidents are reviewed to show importance of remedial action resulting from investigations. Accident rates for several years are compared and cost savings indicated. -- After J. Am. Soc. Safety Eng. Absts.

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MISCELLANEOUS

- 932 A Study of Responses to a Questionnaire on Fluoridation. G. Masterton.
Am. J. Public Health 53, 1243-1251 (Aug. 1963).

The residents of 5 communities in Camden County in southern New Jersey returned over 4,400 questionnaires relating to their attitudes on fluoridation and their socio-economic levels. There was no consistent relationship between their response on the fluoridation question and their age, education, and size of family. The majority of residents in each community favored fluoridation whereas only 13.4% opposed it. The most common reasons for opposing it were lack of effectiveness and safety and infringement of individual rights.

-- Public Health Eng. Absts.

- 933 Sulfur Dioxide. Properties, Methods of Handling and Applications of Sulfur Dioxide in Water and Waste Treatment. E.J. Laubusch.
Public Works 94, 117-121 (Aug. 1963).

Methods of manufacture, physical and chemical properties, transportation, handling, storage, and use of sulfur dioxide are discussed in their application to the fields of water and waste-water treatment. Tabulated relevant chemical reactions indicate the amounts of sulfur dioxide required to accomplish the desired reactions. Precautions to be observed in the exposure of personnel to gaseous and liquid phases of the chemical are presented. Transportation, labeling, and storage in transit fall under the purview of the Interstate Commerce Commission. Classes of containers designated by the ICC and the physical properties of sulfur dioxide that affect the utilization of the gas from these containers are outlined. The author lists piping materials for several categories of use within water and waste-water treatment plants. Piping layouts and a listing of recent prices for commercial and refrigerant grades of the chemical are indicated.

-- Public Health Eng. Absts.

- 934 Suds Control and Transfer. Anon. Public Works 94, 107 (Nov. 1963).

A final sewage treatment process that removes detergents more completely than any previous process and delivers a better effluent has been announced. It is designed as a complete package that provides apparatus for concentrating detergents into a foam which has many other organic pollutants suspended in it. After creating the foam, the apparatus collapses it and recycles it back through the sewage treatment process for further biodegradation. It is claimed that the process will not only end the foam problem in plant effluents but will make the foaming detergent an important partner in sewage treatment operations.

-- Public Health Eng. Absts.

- 935 Degradation of Aromatic Compounds by Phenol-Adapted Bacteria.
C.W. Chambers, H.H. Tabak, and P. W. Kabler.
J. Water Pollution Control Fed. 35, 1517-1528 (Dec. 1963).

A bacterial culture adapted to metabolize phenol as the sole source of carbon had the ability to degrade a variety of phenols, benzoic acids, benzaldehydes, and benzenes. In general, the following trends were observed: (1) Dihydric phenols were oxidized; most amino and chlorophenols were degraded to a lesser degree; trihydric phenols were not oxidized; and nitro and chloronitrophenols were difficult to oxidize. (2) Ortho-, m-, and p-cresol and most dimethylphenols were oxidized; chloromethylphenols were more resistant. (3) Oxidation of some classes of compounds was markedly affected by the position of substitution on the benzene ring. (4) Benzoic and hydroxybenzoic acids were oxidized, but sulfonated benzenes and methoxylated, nitro, and chlorobenzoic acids were not, m-toluic acid was oxidized whereas the o- and p-forms were not. (5) Benzaldehyde and p-hydrobenzaldehyde were oxidized, but the nitrobenzaldehyde were not. (6) Benzenes were oxidized with difficulty or not at all. There are 28 references.

-- Public Health Eng. Absts.

936 Health Effects of Detergents in Water.

R. L. Woodward, H.E. Stokinger, and D.L. Birmingham.
Arch. Environmental Health 8, 584-588 (April, 1964).

Concern over detergents as water pollutants is widespread in this country as well as in other countries. In England and in Germany efforts are being made to bring about a substitution of more easily biodegradable surfactants for the currently dominant tetrapropylene derived alkyl benzene sulfonate (ABS). In Germany, legislation adopted in 1961 requires that this be accomplished by 1964. There is some indication that other industrialized western European countries will take similar action. A number of states in the United States have proposed legislation aimed at reducing water pollution by detergents. During 1963, several bills have been introduced in Congress patterned after the German law. Although present day household synthetic detergents cannot be considered as significant hazards to health, they have contributed significantly to water pollution and waste water treatment problems. Substitution of more readily biodegradable surfactants for the currently dominant ABS would help to solve some of these problems. The detergent manufacturers and their present and prospective suppliers are working toward development of such materials. The status of these developments is cloaked in commercial secrecy, but it is believed that such products are approaching commercial production at prices which would make the change feasible in view of the benefits which the change should achieve. It should be emphasized, however, that ABS is only one contributor to the problem of water pollution. ABS is generally associated with sewage and sewage contains whatever our affluent society chooses to flush down the drain. These wastes change with our standard of living, our social habits and our technology. Detergents have been blamed for effects due to other materials which they accompany in our wastes. This is not to minimize the desirability of solving the problems caused by detergents, but to warn against overestimating their contribution to the water pollution problem.

-- Authors' comment

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