



Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

NOVEMBER, 1970

(Vol. 34, No. 11)

INDUSTRIAL HEALTH FOUNDATION

8231 CENTRE AVENUE -- PITTSBURGH, PA. 15232

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FOUNDATION FACTS

NOVEMBER 1970

NEW MEMBERS: We welcome three new members into the Foundation:

Argonaut Insurance Company (Menlo Park, California)

International Lead Zinc Research Organization (New York, N. Y.)

General Cigar Company, Inc. (New York, N. Y.)

STAFF ACTIVITIES: IHF's Manager of Occupational Medicine Services, Dr. Daniel C. Braun, assisted a member company in Chicago on November 5-6 by providing consultation on a health-related matter.

Dr. Robert T. P. deTreville, President; Mr. John A. Jurgiel, Industrial Hygiene Engineer; and Dr. Braun continued field surveys for the IHF/ATMI Respiratory Study (see *Industrial Hygiene Digest*, January 1970, p. 111). They participated in several research planning meetings held in Charlotte, North Carolina, on November 17-18 and 25 concerning this study. IHF Scientific Advisor, Dr. Ian T. T. Higgins, of the University of Michigan was present for the latter meeting.

Dr. deTreville was invited to speak to the Cone Mills Plant Managers at their meeting in Greensboro, North Carolina, on November 10 on the subject of the study IHF is conducting for the American Textile Manufacturers Institute and also about the Foundation's overall program for employee health conservation.

Dr. deTreville; Mr. Harry M. Bowman, Executive Vice President; and Dr. Paul Gross, Director of IHF Research Laboratory, met with representatives of the Medical University of South Carolina in Charleston, November 12-13, to investigate possibilities of collaborative efforts on research projects of mutual interest.

Dr. Gross spoke to a class of students at the Center of Toxicology of Vanderbilt University in Nashville, Tennessee, on "Pneumoconiosis", November 18. He attended a

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meeting of the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limits Committee in Cincinnati on November 19-20.

Mr. Bowman met with the Chairman of the Committee on Joint Accreditation of Occupational Health Programs in Industry, Dr. Lee B. Grant of PPG Industries, on November 11 to complete details of the final draft of the by-laws for this independent agency. The draft was presented to a meeting of the Committee in Washington, D. C., November 23, which Mr. Bowman attended.

JANUARY 19, 20, & 21, 1971: Circle this date on your calendar to attend the 7th Engineering Discussion sponsored by the Foundation's Engineering Committee.

The program this year is on "Environmental Measurements" and the Discussion is open to representatives from IHF member companies and invited guests from industry. Preliminary programs containing registration forms have been mailed to Foundation members. If you need additional information, please contact Mr. John A. Jurgiel at IHF headquarters.

TLVs: Pages iii - xii of this issue of *Industrial Hygiene Digest* contain the Threshold Limit Values of Airborne Contaminants and Intended Changes adopted by the American Conference of Governmental Industrial Hygienists for 1970 which were reprinted by permission for the convenience of Foundation members.

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INDUSTRIAL HYGIENE FEATURES

RESPIRATORY SYMPTOMS AND PULMONARY FUNCTION IN WELDERS	--	ABST.	1264
TOBACCO AND HEALTH	--	ABST.	1266
EXERCISE AND CARDIAC DEATH	--	ABST.	1268
PHYSICAL ACTIVITY AND CORONARY HEART DISEASE	--	ABST.	1269
POTENTIAL SUBSTITUTE FOR PHOSPHATES IN DETERGENTS	--	ABST.	1280
SUCCESSFUL TREATMENT OF PHOSGENE EXPOSURE	--	ABST.	1282
LOW-FREQUENCY NOISE THRESHOLDS	--	ABST.	1297
NOISE -- FOURTH FORM OF POLLUTION	--	ABST.	1298
INDUSTRY'S ROLE IN THE CLEAN WATER BATTLE	--	ABST.	1315
DEACTIVATION OF AUTOMOBILE EXHAUST CONTROL CATALYST	--	ABST.	1324
GUIDELINES FOR DEVELOPMENT OF NEW HEALTH OCCUPATIONS	--	ABST.	1336
SAFETY OF PETROLEUM HYDROCARBONS IN HOUSEHOLD AEROSOLS	--	ABST.	1343
THE HAZARD DUE TO OUTWARD LEAKAGE OF OXYGEN FROM A FULL FACE MASK	--	ABST.	1344

TABLE OF CONTENTS

THIS ISSUE CONTAINS ABSTRACT NUMBERS 1234 - 1350

In Memoriam - Dr. Alice Hamilton.	i
IHF Membership News and Activities	
Armco Steel Corporation Meets a Challenge.	11
Threshold Limit Values of Airborne Contaminants For 1970.	111
News Items.	1
Coming Events	6
Legal Developments.	6
Books, Pamphlets and Notices.	8
Industrial Medical Practice	12
Chemical Hazards.	16
Industrial Dusts.	18
Physical Aspects of the Environment	21
Radioactivity and X-Radiation	22
Environmental Measurements.	23
Preventive Engineering.	25
Community Air Hygiene	28
Management Aspects.	31
Accidents and Prevention.	34
Index	37
Addresses of Journals Abstracted.	40

**IHF WELCOMES EDITORIAL MATTER FROM ALL
 MEMBER COMPANIES PERTAINING TO INDUSTRIAL
 HYGIENE PROGRAMS, PROBLEMS AND
 DEVELOPMENTS**

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IN MEMORIAM

ALICE HAMILTON — 1869-1970

Alice Hamilton, who has been credited by medical journals with having founded, almost single-handedly, the field of industrial medicine, died on September 22, 1970, in her 102d year. Her solitary yet formidable explorations into the occupational hazards of a newly industrialized America and her commitment to the social reform movements of her time remain impressive to us in this era of multidisciplinary approaches and super-multiple authorship. She was an advocate of reason and compassion in an ailing world whose symptoms had little in common with her epidemiologic studies of lead toxicity and mercury poisoning.

In 1895, after medical studies in Ann Arbor, she went to Europe to study pathology and bacteriology under Hans Buchner and returned to Johns Hopkins after a year abroad for more work, this time with Simon Flexner. But she decided she would never amount to more than a "fourth-rate bacteriologist" and therefore resolved to make for herself "a life full of human interest." She began work at the clinic associated with Jane Addams's Hull-House in a Chicago still shaken by the Haymarket bombing and its associated labor unrest, with streets peopled with strange revolutionaries-in-exile and the immigrant poor.

Dr. Hamilton's unique investigations in industrial hygiene, spanning membership on the 1910 Illinois Occupational Disease Commission to studies of the viscose rayon industry published in 1940, convinced her that the fault of occupational hazards lay with managerial ignorance and indifference, and not in corporate avarice. When the skeptical vice-president of a Chicago lead company once demanded proof of her allegations that many workers in his "model plants" were being poisoned by the white-lead dust that they breathed, she searched through hospital records and the city's Serbian, Bulgarian and Polish quarters and returned to his office with the necessary evidence. The shocked official initiated drastic reforms, which included hiring physicians to examine each lead worker weekly for signs of poisoning.

She was appointed to the faculty of Harvard, the first the University ever granted to a woman and was appointed professor emeritus (sic) upon her retirement from the University in 1935. Dr. Hamilton visited Europe several times between World Wars and documented her misgivings about postrevolutionary Russia and pre-Munich Germany in her fascinating autobiography, *Exploring the Dangerous Trades*, published in 1943.

The vitality of this remarkable figure in American medicine is evident in a remark made to S. J. Woolf, of the *New York Times Magazine*, in 1949; "If you are going to sketch me, I'll take off my hat, for nothing dates one so much as a hat, and I refuse to be dated."

--Cond. from Editorial by J. J. Elia, Jr.
New Eng. J. Med. 283:993-994 (Oct. 29, 1970)

IHF MEMBERSHIP NEWS AND ACTIVITIES

ARMCO STEEL CORPORATION MEETS A CHALLENGE

Armco is taking a real hard look at their policies to see what it is about business that turns off those who should be some of the best candidates for tomorrow's business leaders. They are venturing out of the comfort of the corporate conference room to talk with students and faculty; to listen to what today's young people are saying and thinking and planning.

There are already many points of contact between any large company and the colleges and universities that train the young people that will be needed to run that company in the years ahead. Recruiters are sent to 120 schools each year. Armco takes part in scholarship programs; they use faculty members from nearby schools to conduct evening training programs; they employ as many students as they can during summer months to help out when their vacation schedules are heavy. These things are routine for many companies. But this is no longer enough. Armco believes that in the 1970's they will need to maintain direct contacts with as many good schools as time and manpower permit. They are encouraging management people to keep in touch with their schools. They need to know the outstanding teachers at schools that are important to them. Face-to-face contacts between those who teach and learn on the campus and those in business are perhaps as important to the campus as to management.

Recently Armco has discovered a group of excited young people--extremely intelligent and hard-working young people--who want to spend their summer developing worthwhile contacts between the campus and industry. They have been exploring together the possibilities of developing some kind of on-going program that would be productive for them, for the company and for the communities where they all live and work. Their objective is to create a better rapport between education and business. They want to try to develop ways for students to use business as a live laboratory in which they would receive college credit--and they additionally want to have courses at college about business more in tune with the real world situation--not just theory. Similar programs are underway at both Ohio University and Miami University through the Ohio Fellows Program.

Another way Armco is developing rapport between campus and company is by conducting a variety of programs focused on our environment. They invited groups of students and faculty to come to various plants for a short program describing their air and water pollution efforts and a tour of the facilities that are either installed and operating or being constructed. They had a great response with participants of delegations from 8 universities. Armco is proud of their pollution control work. As a leader in this field they want to share this effort with various publics, but particularly--students--because they care so. Since 1965 \$1.00 out of every \$10 spent to build new steelmaking equipment has gone into new devices to protect our environment. Many of their plants are now approaching the point at which they can honestly tell their neighbors--"the job is done."

--Cond. from "Partners for Progress"
C. William Verity, Jr., President
Armco Steel Corporation

Threshold Limit Values of Airborne Contaminants

AND INTENDED CHANGES

Adopted By ACGIH For 1970



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PREFACE THRESHOLD LIMIT VALUES FOR 1970

Threshold limit values refer to airborne 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, however, a small percentage of workers may experience discomfort from some substances at concentrations at or below the threshold limit, a smaller percentage may be affected more seriously by aggravation of a pre-existing condition or by development of an occupational illness.

Simple tests are now available (*J. Occup. Med.* 9, 537, 1967; *Ann. N.Y. Acad. Sci.*, 151 Art. 2, p. 966, 1966) that may be used to detect those individuals hypersusceptible to a variety of industrial chemicals (respiratory irritants, hemolytic chemicals, organic isocyanates, carbon disulfide). These tests may be used to screen out by appropriate job placement the hyperreactive worker and thus in effect improve this "coverage" of the TLVs.

Threshold limit values refer to time-weighted concentrations for a 1 or 8-hour workday and 40-hour workweek. They should be used as guides in the control of health hazards and should not be used as fine lines between safe and dangerous concentrations. (Exceptions are the substances listed in Appendices A and E and those substances designated with a "C" or Ceiling value, Appendix C.)

Time-weighted averages permit excursions above the limit provided they are compensated by equivalent excursions below the limit during the workday. In some instances it may be permissible to calculate the average concentration for a workweek rather than for a workday. The degree of permissible excursion is related to the magnitude of the threshold limit value of a particular substance as given in Appendix C. The relationship between threshold limit and permissible excursion is a rule of thumb and in certain cases may not apply. The amount by which threshold limits 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 factors must be taken into consideration in arriving at a decision as to whether a hazardous condition exists.

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 a guiding factor for some, whereas reasonable freedom from irritation, narcosis, nuisance or other forms of stress may form 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. There is increasing evidence that physical irritation may initiate, promote or accelerate physical impairment through interaction with other chemical or biologic agents.

In spite of the fact that serious injury is not believed likely as a result of exposure to the threshold limit concentrations, the best practice is to maintain concentrations of all atmospheric contaminants as low as is practical.

These limits are intended for use in the practice of industrial hygiene and should be interpreted and applied only by a person trained in this discipline. They are not intended for use, or for modification for use, (1) as a relative index of hazard or toxicity, (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 or physical conditions, or (5) for adoption by countries whose working conditions differ from those in the United States of America and where substances and processes differ.

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

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Whereas the ceiling limit places a definite boundary which concentrations should not be permitted to exceed, the time-weighted average limit requires an explicit limit to the excursions that are permissible above the listed values. The magnitude of these excursions may be pegged to the magnitude of the threshold limit by an appropriate factor shown in Appendix C. It should be noted that the same factors are used by the Committee in making a 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 contribution to the over-all exposure by the cutaneous route including mucous membranes and eye, either by airborne, or more particularly, by direct contact with the substance. Vehicles can alter skin absorption. This attention-calling designation is intended to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated.

Mixtures. Special consideration should be given also to the application of the TLVs 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.

Nuisance Dusts. In contrast to fibrogenic dusts which cause scar tissue to be formed in lungs when inhaled in excessive amounts, so-called "nuisance" dusts have a long history of little adverse effect on lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. The nuisance dusts have also been called (biologically) "inert" dusts, but the latter term is inappropriate to the extent that there is no dust which does not evoke some cellular response in the lung when inhaled in sufficient amount. However, the lung-tissue reaction caused by inhalation of nuisance dusts has the following characteristics: 1) The architecture of the air spaces remains intact. 2) Collagen (scar tissue) is not formed to a significant extent. 3) The tissue reaction is potentially reversible.

Excessive concentrations of nuisance dusts in the workroom air may seriously reduce visibility (iron oxide), may cause unpleasant deposits in the eyes, ears and nasal passages (Portland Cement dust), or cause injury to the skin or mucous membranes by chemical or mechanical action per se or by the rigorous skin cleansing procedures necessary for their removal.

A threshold limit of $10\text{mg}/\text{M}^3$ or 30 mppcf , of total dust < $1\frac{1}{2}\ \mu\text{m}$, 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 workday, does not apply to brief exposures at higher concentrations. Neither does it apply to those substances which may cause physiologic impairment at lower concentrations but for which a threshold limit has not yet been adopted. Some "inert" particulates are given in Appendix D.

Simple Asphyxiants - "Inert" Gases or Vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The minimal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, $p\text{O}_2$ of 135 mm Hg). Atmospheres deficient in O_2 do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants present an explosion hazard. Account should be taken of this factor in limiting the concentration of the asphyxiant. Specific examples are listed in Appendix E.

Physical Factors. It is recognized that such physical factors as heat, ultraviolet and ionizing radiation, humidity, abnormal pressure (altitude) 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 to 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 workweek more than 25%, might be considered gross deviations. In such instances judgment must be exercised in the proper adjustments of the threshold limit values.

"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. The list of intended changes follows the Adopted Values in the TLV booklet.

As Legislative Code. The Conference recognizes that the TLVs may be adopted in legislative codes and regulations. If so used, the intent of the concepts contained in the Preface

should be maintained and provisions should be made to keep the list current. These values are reviewed annually by the Committee on Threshold Limits for revision or additions, as further information becomes available.

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ADOPTED VALUES (in Alphabetical Order)

Substance	ppm ^{a)}	mg/m ³ b)
Abate	15	15
Acetaldehyde	200	360
Acetic acid	10	25
Acetic anhydride	5	30
Acetone	1,000	2,400
Acetonitrile	40	70
Acetylene	E	--
Acetylene dichloride, see 1, 2-Dichloroethylene	--	--
Acetylene tetrabromide	1	14
Acrolein	0.1	0.25
Acrylamide-Skin	30	0.3
Acrylonitrile-Skin	30	45
Aldrin-Skin	0.25	0.25
Allyl alcohol-Skin	2	5
Allyl chloride	1	3
Allyl glycidyl ether (AGE)	10	45
Allyl propyl disulfide	3	13
Alundum (Al ₂ O ₃)	--	D
3-Ambocetanol, see Ethanolamine	--	--
3-Ambocetridine	0.5	2
Ammonia	50	35
Ammonium sulfamate (Ammate)	--	15
n-Propyl acetate	100	525
Asiline-Skin	135	850
Asulfone	5	15
Azobenzene (p,p'-isomer)-Skin	--	0.5
Antimony & compounds (as Sb)	--	0.5
ANTU (alpha naphthyl thiourea)	E	0.3
Argon	--	--
Arsenic & compounds (as As)	0.05	0.5
Arsine	--	0.2
Asinophen-methyl-Skin	--	0.3
Barium (soluble compounds)	25	80
Benzene (benzol)-Skin	--	Al
p-Benzocoumarone, see Quinone	--	--
Benzyl chloride	1	5
Beryllium	1	5
Biphenyl, see Diphenyl	--	--
Biphenol A, see Diglycidyl ether	--	--
Boron oxide	1	15
Boron tribromide	1	10
Boron trifluoride	1	3
Bromine	0.1	0.7
Bromine pentafluoride	0.1	0.7
Bromodiform-Skin	0.5	5
Butadiene (1, 3-butadiene)	1,000	2,200
Butanediol, see Butyl mercaptan	200	590
3-Butanol	50	240
3-Butoxy ethanol (Butyl Cellosolve)	150	710
Butyl acetate (n-butyl acetate)	--	--

a) Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm. Hg pressure.
b) Approximate milligrams of particulate per cubic meter of air.
** See Notice of Intended Changes
Capital letters refer to Appendixes.

Substance	ppm ^{a)}	mg/m ³ b)
sec-Butyl acetate	200	950
tert-Butyl acetate	300	1,000
Butyl alcohol	100	300
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine-Skin	5	15
C tert-Butyl chromate (as CrO ₃) - Skin	50	270
n-Butyl glycidyl ether (BGE)	0.5	1.5
Butyl mercaptan	10	60
p-tert-Butyltoluene	0.2	0.1
Cadmium (Metal dust and soluble salts)	--	D
Calcium carbonate	--	1
Calcium arsenate	--	5
Calcium oxide	2	5
Camphor (Synthetic)	3	5
Camphor (Sevin ®)	3	5
Carbon black	5,000	9,000
Carbon dioxide	20	60
Carbon disulfide-Skin	50	55
Carbon monoxide	10	65
Carbon tetrachloride-Skin	--	D
Celulose (paper fiber)	--	0.5
Chlorane-Skin	--	0.5
Chlorinated camphene-Skin	--	0.5
Chlorinated diphenyl oxide	1	3
Chlorine dioxide	0.1	0.3
Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
Chloroacetonitrile (phenacyl-chloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malononitrile (OCBM)	0.05	0.4
Chlorobromomethane	200	1,050
2-Chloro-1, 3-butadiene, see Chloroprene	--	--
Chloroethane	--	--
Chlorodiphenyl (42% Chlorine) - Skin	50	240
Chlorodiphenyl (54% Chlorine) - Skin	20	100
1-Chloro-2, 3-epoxypropane, see Epichlorohydrin	0.1	0.7
2-Chloroethanol, see Ethylene chlorohydrin	--	--
Chloroethylene, see Vinyl chloride	--	--
Chloroform (trichloromethane)	50	240
1-Chloro-1-nitropropane	25	90
Chloroplatin	0.1	0.7
Chloroprene (2-chloro-1, 3-butadiene) - Skin	--	--
Chromic acid and chromates (as CrO ₃)	--	--
Chromium, sol. chromic, chromous salts as Cr	--	0.1
Metal & insol. salts	--	0.5
Coal tar pitch volatiles (benzene soluble fraction) anthracene, BaP, phenanthrene, acridine, chrysene, pyrene)	--	0.2

a) 1970 Addition
b) See Notice of Intended Changes

Substance	ppm ^{a)}	mg/m ³ b)
Cobalt, metal fume & dust	--	0.1
Copper fume	--	0.1
Dusts and Mists	--	D
Corundum (Al ₂ O ₃)	--	1
Cotton dust (raw)	--	15
Crag® herbicide	5	25
Cresol (all isomers) - Skin	5	25
Crotonaldehyde	50	245
Cumene-Skin	--	5
Cyanide (as CN)-Skin	10	--
Cyanogen	300	1,050
Cyclohexane	50	200
Cyclohexanol	50	300
Cyclohexanone	300	1,015
Cyclohexene	75	300
Cyclopentadiene	--	10
2, 4-D	--	1
DDVP, see Dichlorvos	--	--
Decaborane-Skin	0.05	0.3
Demeton ® -Skin	--	0.1
Diacetone alcohol (4-hydroxy-4-methyl-3-pentanone)	50	240
1, 2-Diaminoethane, see Ethylene-diamine	--	--
Diazomethane	0.2	0.4
Diborane	0.1	0.1
C 1, 2-Dibromomethane (ethylene dibromide)-Skin	25	190
Dibutyl phosphale	1	5
Dibutylphthalate	--	--
C Dichloroacetylene	50	0.4
C o-Dichlorobenzene	75	450
p-Dichlorobenzene	1,000	4,950
Dichlorodifluoromethane	100	400
1, 2-Dichloroethane	50	300
1, 3-Dichloroethane	200	790
C Dichloroethyl ether-Skin	15	90
Dichloromethane, see Methylene-chloride	--	--
Dichloromono-fluoromethane	1,000	4,200
C 1, 1-Dichloro-1-nitroethane	10	60
1, 2-Dichloropropane, see Propylene-dichloride	1,000	7,000
Dichlorotetrafluoroethane	--	--
Dieldrin-Skin	25	75
Diethylamine	10	42
Diethylamine ethanol-Skin	--	--
Diethyl ether, see Ethyl ether	100	860
Difluorodibromomethane	0.5	2.6
C Diglycidyl ether (DGE)	50	200
Dihydroxybenzene, see Hydroquinone	50	200
Dibutyl ketone	5	30
Dichloropropylamine-Skin	--	--

a) 1970 Addition
b) See Notice of Intended Changes

Substance	ppm ^d	mg/l ^{3 b}	Substance	ppm ^d	mg/l ^{3 b}
Dimethoxymethane, see Methylal	--	--	Indium and compounds, as In	--	0.1
Dimethyl acetamide-Skin	10	35	C Iodine	--	1
Dimethylamine	10	18	Iron oxide fume	--	1
Dimethylaminobenzene, see Xylidene	--	--	Iron salts, soluble, as Fe	--	1
Dimethylamine (N-dimethylamine)-Skin	5	25	Isobutyl acetate	100	525
Dimethylbenzene, see Xylene	--	--	Isobutyl alcohol	100	380
Dimethyl 1, 3-dibromo-2, 3-dichlorobutyl phosphate, (Dibrom)	--	3	Isobutyl acetate	150	700
Dimethylformamide-Skin	10	30	Isobutyl alcohol	100	300
2, 6-Dimethylheptanone, see Diisobutyl ketone	--	--	Isophorone	25	140
Diisobutyl ketone	--	--	Isopropyl acetate	250	950
1, 1-Dimethylhydrazine-Skin	0.5	1	Isopropyl alcohol	400	880
Dimethylphthalate	--	1	Isopropylamine	5	15
Dimethylphthalate-Skin	1	1	Isopropyl ether	500	2,100
Dinitrobenzene (all isomers)-Skin	--	1	Isopropyl glycidyl ether (IGE)	50	340
Dinitro-cresol-Skin	--	0.2	Ketone	--	0.5
Dinitrochlorobenzene-Skin	100	380	Lead	--	0.8
Dioxane (Dioxylene dioxide)-Skin	0.5	1	Lead arsenate	--	0.15
Diphenyl	1	1	Limestone	--	D
Diphenyl amine	10	10	Limestone-Skin	--	0.5
Diphenylmethane diisocyanate (see Methylene bisphenol isocyanate (MDI))	--	--	Lithium hydride	--	0.025
1, 1-Diphenylhydrazine-Skin	100	600	L. P. G. (Liquified petroleum gas)	1,000	1,800
Di-sec, octyl phthalate (Di-2-cylohexylphthalate)	--	--	Magnesium	--	D
Emery	--	5	Magnesium oxide fume	--	15
Endosulfan (Thiodan ϕ)-Skin	0.1	0.1	Malathion-Skin	--	15
Endrin-Skin	0.1	0.1	Maleic anhydride	0.25	1
Epichlorohydrin-Skin	5	10	C Manganese and compounds, as Mn	--	5
EPN-Skin	--	0.5	Mercuric chloride	--	D
1, 2-Epoxypropane, see Propylene oxide	--	--	Mercury-Skin	--	0.1
2, 3-Epoxy-1-propanol, see Glycidol	--	--	Mesityl oxide	25	100
Ethane	E	--	Methane	E	--
Ethanethiol, see Ethyl mercaptan	--	--	Methanethiol, see Methyl mercaptan	--	15
Ethanolamine	3	6	Methoxychlor	--	--
2-Ethoxyethanol-Skin	200	740	2-Methoxyethanol, see Methyl cellosolve	--	--
2-Ethoxyethylacetate (Cellosolve acetate)-Skin	100	540	Methyl acetate	200	910
Ethyl acetate	400	1,400	Methyl acetylene (propyne)	1,000	1,850
Ethyl acrylate-Skin	25	100	Methyl acetylene-propadiene mixture (MAPI)	1,000	1,800
Ethyl alcohol (ethanol)	1,000	1,000	Methyl acrylate-Skin	10	35
Ethylamine	10	10	Methylal (dimethoxymethane)	1,000	3,100
Ethyl sec-amyl ketone (5-methyl-3-heptanone)	25	130	Methyl alcohol (methanol)	200	280
Ethyl benzene	100	435	Methylamine	10	12
Ethyl bromide	200	890	Isobutyl alcohol, see Methyl isobutyl carbinol	--	--
Ethyl butyl ketone (3-Heptanone)	50	230	Methyl isobutyl ketone	100	475
Ethyl chloride	1,000	2,600	Methyl (n-amyl) ketone (3-Heptanone)	100	465
Ethyl ether	400	1,200	C Methyl bromide-Skin	20	80
Ethyl formate	100	300	Methyl butyl ketone, see 3-Heptanone	--	--
Ethyl mercaptan	0.5	1	Methyl cellosolve-Skin	25	80
Ethyl silicate	100	850	Methyl cellosolve acetate-Skin	25	120
Ethylene	E	--	Methyl chloride	100	210
Ethylene dichloride-Skin	5	16	Methyl chloroform	350	1,900
			Methylcyclohexane	500	2,000
			Methylcyclohexanol	100	470

* 1970 Addition
** See Notice of Intended Changes

* 1970 Addition
** See Notice of Intended Changes

d) An atmospheric concentration of not more than 0.02 ppm, or personal protection may be necessary to avoid headache.

vi.

100

Substance		$\frac{mg}{cc} \times 10^6$
SILICA		
Crystalline		
Quartz, Threshold Limit calculated from the formula	250 fl $\frac{38SiO_2}{\%}$	
Amorphous earth	20	
Cristobalite	"	
Anorthoclase, including natural diatomaceous earth	"	
SILICATES (less than 1% crystalline silica)		
Asbestos, all types		
Mica		5
Portland Cement		20
Serpentine		50
Talc (non-asbestiform)		20
Talk (fibrous), use asbestos limit.		20
Tremolite, see asbestos		--
Graphite (natural)		15
See "Inert" or Nuisance Particulates		50 (or 15 mg/m ³ whichever is the smaller) of total dust < 15 SiO ₂
see Appendix D		
Conversion factors		
mg/cc x 35.3 = million particles per cubic meter = particles per c.c.		

• 1878 Additions

"See Notice of Intended Changes for Mineral Dues."

Capital letters refer to Appendices
 μ $< 3.7 \mu$ Diameter. No TLY for $\mu < 3.7 \mu$

g) $< 3.7 \mu$ Diameter. No TLV for coarse fibrous glass has been set.

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Substances	Form	mg./dl.^3
2-Acetylaminofluorene-Salts	--	A ¹
Allyl glycidyl ether	--	23
4-Aminodiphenyl-Salts	5	A ¹
Anisole	23	16
Anisole chloride fume	--	10
Aspart (petroleum) fumes	--	5
Bisyl lactide	1	8
Campher (synthetic)	2	12
Chlorine-Salts	--	0.1
2-N-Dibutyramine ethanol-Salts	2	14
Dichlorobenzene-Salts	--	A ¹
Diethyltetra trimethyl-Salts	1	4
1-Dimethylaminoazobenzene	--	A ¹
Fluorine glass	61	D
C Formaldehyde	2	3
Iron pentacarbonyl	--	0.01
Mercury (Allyl compounds) - Salts	--	0.01
Methyl chloride	100	210
Methyl 3-cyanacrylate	2	8
Methyldiphenylmethyl isocyanate	--	0.1
Tricarbonyl (as Me ₂)	6.1	0.3
Methyl decanoate-Salts	--	0.5
Methyl paraffin-Salts	--	0.2
Phenolbenzidine-Salts	--	5
Rosin Core Solids, pyrolysis products	--	0.1 (as aldehyde)
Syringol	100	420
C. Subtilis (Proteolytic enzymes)	--	0.002 (as tof ⁶) pure crystal-line enzyme)
Vanadium (V ₂ O ₅ fumes) as V	--	0.05
Vinyl acetate	10	30
Vinyl chloride	200	770
Wood dust (non allergenic)	--	5

Capital letters refer to Appendices
 μ $< 3.7 \mu$ Diameter. No TLY for $\mu < 3.7 \mu$

g) $< 3.7 \mu$ Diameter. No TLV for coarse fibrous glass has been set.

NOTICE OF INTENDED CHANGES (Cont'd) MINERAL DUSTS

BUREAU

• Asbestos (All types)
• Coal dust (bituminous)
• Cristobalite

• 'Inert' or Nuisance Particulates

• Quartz

TLV

5 fibers/ml > 5 μ in length
3 mg/m³ (respirable dust)
Use one-half the value calculated from the count or mass formulae for quartz

10 mg/M³ or 30 mpcf (whichever is the smaller) of total dust < 15 μm

TLV in mpcf: $\frac{300}{5107 \times 10}$

TLV for respirable dust in mg/m³

$\frac{10 \text{ mg/M}^3 \text{p}}{5}$ Respirable quartz $\times 2$

TLV for "total dust", respirable and nonrespirable:

$\frac{30 \text{ mg/M}^3}{5}$ quartz $\times 3$

Use quartz formulae
Use one-half the value calculated from formulae for quartz.

**Silica, fused
Tridymite**

• 1970 Revision or Addition

- As determined by the membrane filter method at 420 X magnification phase contrast illumination. Concentrations > 5 fibers/ml, but not to exceed 10, may be permitted for 15-minute periods each hour up to five times daily.
- "Respirable" dust as defined by the British Medical Research Council Criteria (1) and as sampled by a device producing equivalent results (2).
- (1) Hatch, T.E. and Gross, P., Pulmonary Deposition and Retention of Inhaled Aerosols, p. 148, Academic Press, New York, New York, 1964.
- (2) Interim Guide for Respirable Mass Sampling, ADHA Aerosol Technology Committee, ADHA J. 21, 2, 1976, p. 123.
- This administratively reduces all particulate substances in Admired list with TLV at 15 mg/M³ to 10 mg/M³.
- Both concentration and per cent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics.

Aerodynamic Diameter (μm)	5 passing selector
1	90
2	75
3	50
4	25
5	10

APPENDIX A

A1 Because of the high incidence of cancer, either in man or in animals, no exposure or contact by any route, respiratory, oral or skin should be permitted for the compounds:

2-Acetylaminofluorene
4-Aminodiphenyl
Benzidine & its salts
Dichlorobenzidine
4-Dimethylaminobenzene
beta-Naphthylamine
4-Nitrodiphenyl
N-Nitrosodimethylamine
beta-Propiolactone

Because of the extremely high incidence of bladder tumors in workers handling beta-naphthylamine and the potential carcinogenic activity of the other compounds, the State of Pennsylvania prohibits the manufacture, use and other activities that involve human exposure without express approval by the Department of Health.

A2 Polytetrafluoroethylene* decomposition products. Thermal decomposition of the fluorocarbon chain in air leads to the formation of oxidized products containing carbon, fluorine and oxygen. Because these products decompose in part by hydrolysis in alkaline solution, they can be quantitatively determined in air as fluoride to provide an index of exposure. No TLV is recommended pending determination of the toxicity of the products, but air concentrations should be minimal.

A3 Gasoline and/or Petroleum Distillates. The composition of these materials varies greatly and thus a single TLV for all types of these materials is no longer applicable. In general, the aromatic hydrocarbon content will determine what TLV applies. Consequently the content of benzene, other aromatics and additives should be determined to arrive at the appropriate TLV (Elkins, et al. A.I.H.A.J. 24, 90, 1983).

* Trade Names: Alquolon, Fluon, Halon, Teflon, Teflon

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 ($\frac{C_1}{T_1}$ or $\frac{C_2}{T_2}$ 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.)

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THRESHOLD LIMIT VALUES FOR MIXTURES EXAMPLES

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

- a. Additive effects. (note: It is essential that the atmosphere be analyzed both qualitatively and quantitatively for each component present, in order to evaluate compliance or noncompliance with this calculated TLV.)

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} + \dots = 1$$

Example No. 1: Air contains 5 ppm of carbon tetrachloride (TLV = 10 ppm) 20 ppm of ethylene dichloride (TLV = 50 ppm) and 10 ppm of ethylene dibromide (TLV = 25 ppm)

Atmospheric concentration of mixture =

$$5 + 20 + 10 = 35 \text{ ppm of mixture}$$

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

Threshold Limit is exceeded. Furthermore, the TLV of this mixture may be calculated by reducing the total fraction to 1.0; i.e.

$$\text{TLV of mixture} = \frac{35}{1.3} = 27 \text{ ppm}$$

Example No. 2: Air contains 200 ppm of hexane (TLV = 500 ppm) 100 ppm of methylene chloride (TLV = 500 ppm) and 20 ppm of perchlorethylene (TLV = 100 ppm)

Atmospheric concentration of mixture =

$$200 + 100 + 20 = 320 \text{ ppm of mixture}$$

$$\frac{200}{500} + \frac{100}{500} + \frac{20}{100} = \frac{300 + 100 + 100}{500} = 0.8$$

Threshold Limit is not exceeded. The TLV of this mixture = $\frac{320}{0.8} = 400 \text{ ppm}$

1B. Special case when the source of contaminant is a liquid mixture and the atmospheric composition is assumed to be similar to that of the original material; e.g. on a time weighted average exposure basis, all of the liquid (solvent) mixture eventually evaporates.

a. Additive effects (approximate solution)

1. The percent composition (by weight) of the liquid mixture is known, the TLVs of the constituents must be listed in mg/M³.

(NOTE: In order to evaluate compliance with this TLV, field sampling instruments should be calibrated, in the laboratory, for response to this specific quantitative and qualitative air-vapor mixture, and also to fractional concentrations of this mixture; e.g., 1/2 the TLV; 1/10 the TLV; 2 X the TLV; 10 X the TLV; etc.)

$$\text{TLV of mixture} = \frac{1}{\frac{I_a}{\text{TLV}_a} + \frac{I_b}{\text{TLV}_b} + \frac{I_c}{\text{TLV}_c} + \dots + \frac{I_n}{\text{TLV}_n}}$$

Example No. 1: Liquid solvent contains (by weight) 50% heptane (TLV = 2000 mg/M³) 30% methylene chloride (TLV = 1740 mg/M³) 20% perchlorethylene (TLV = 670 mg/M³)

$$\text{TLV of mixture} = \frac{1}{\frac{0.5}{2000} + \frac{0.3}{1740} + \frac{0.2}{670}} = \frac{1}{.00025 + .00017 + .0003} = 1390 \text{ mg/M}^3$$

$$= \frac{1}{.00072} = 1390 \text{ mg/M}^3$$

Of this mixture: 50% or 695 mg/M³ is heptane, 30% or 417 mg/M³ is methylene chloride and 20% or 278 mg/M³ is perchlorethylene

These values can be converted to ppm as follows:

heptane: 2000 mg/M³ = 500 ppm
1 mg/M³ = 0.25 ppm
695 mg/M³ = 174 ppm

methylene chloride: 1740 mg/M³ = 500 ppm
1 mg/M³ = 0.287 ppm
417 mg/M³ = 119 ppm

x.

perchlorethylene: 670 mg/M³ = 100 ppm
1 mg/M³ = 0.15 ppm
278 mg/M³ = 42 ppm

The TLV of this mixture = 174 + 119 + 42 = 335 ppm.

1B.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,

$$(4) P_1 = F_1 P_1^0.$$

Combine (3) and (4) to obtain

$$(5) C_1 = aF_1 P_1^0.$$

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

$$(6) \frac{F_1 P_1^0}{T} + \frac{F_2 P_2^0}{T} + \dots + \frac{F_n P_n^0}{T} =$$

$$\frac{F_1 P_1^0}{T_1} + \frac{F_2 P_2^0}{T_2} + \dots + \frac{F_n P_n^0}{T_n}$$

and solving for T,

$$(6.1) T = \frac{F_1 P_1^0 + F_2 P_2^0 + \dots + F_n P_n^0}{\frac{F_1 P_1^0}{T_1} + \frac{F_2 P_2^0}{T_2} + \dots + \frac{F_n P_n^0}{T_n}}$$

$$\text{or } \frac{1}{T} = n \frac{F_1 P_1^0}{T_1}$$

$$(6.2) T = \frac{1}{\frac{1}{T} = n}$$

$$1 = 1 - \frac{F_1 P_1^0}{T_1}$$

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PERMISSIBLE EXCURSIONS FOR TIME-WEIGHTED AVERAGE (TWA) LIMITS

These limiting excursions are to be considered to provide a "rule-of-thumb" guidance for listed substances generally, and may not provide the most appropriate excursion for a particular substance. Efforts are being made to develop such substance-specific excursions, when indicated to be significantly different from that recommended by the present excursion factors.

<u>Substance</u>	<u>TLV</u>	<u>Excursion Factor</u>	<u>Max. Conc. permitted for short time</u>
Nitrobenzene	1 ppm	3	3 ppm
Carbon tetrachloride	10 ppm	2	20 ppm
Carbon monoxide	50 ppm	1.5	75 ppm
Acetone	1000 ppm	1.25	1250 ppm
Boron-trifluoride	C 1 ppm	-	1 ppm
Butylamine	C 5 ppm	-	5 ppm
Styrene monomer	C 100 ppm	-	100 ppm

For all substances:

TLV = 0 - 1 (ppm or mg/m ³), Excursion Factor	
TLV = 1 - 10 "	"
TLV = 10 - 100 "	"
TLV = 100 - 1000 "	"

BASIS FOR ASSIGNING LIMITING "C" VALUES

By definition in the Preface, a listed value bearing a "C" designation refers to a 'ceiling' value that should not be exceeded; all values should fluctuate below the listed value. This, in effect, makes the "C" designation a maximal allowable concentration (MAC). In general, the bases for assign-

$$C_m = 3C_1$$

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

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

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

13C. TLV for Mixtures of Mineral Dusts.

For mixtures of biologically active mineral dusts the general formula for mixtures may be used.

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

$$TLV = \frac{1}{\frac{0.8}{20} + \frac{0.2}{25}} = 8.4 \text{ mppcf}$$

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:

$$TLV = \frac{1}{\frac{0.25}{2.5} + \frac{0.25}{20} + \frac{0.5}{20}} = 7.3 \text{ mppcf}$$

The limit for 25% quartz approximates 8 mppcf.

T = Threshold Limit Value in ppm.

C = Vapor concentration in ppm.

p = Vapor pressure of component in solution.

P^0 = Vapor pressure of pure component.

F = Mol fraction of component in solution.

a = A constant of proportionality.

Subscripts 1, 2, . . . relate the above quantities to components 1, 2, . . ., respectively;

Subscript i refers to an arbitrary component from 1 to n .

Absence of subscript relates the quantity to the mixture.

B. c. 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	TLV	p ₀ ^{at} 25°C	Mol fraction in half-and-half solution by volume
Trichloroethylene (1)	131.4	1.46	ml 100	73 mm Hg	0.527
Methylchloroform (2)	133.42	1.33	ml 350	125 mm Hg	0.473

$$F_1 P_1^0 = (0.527) (73) = 38.2$$

$$F_{1p}^0 = (0.473)(125) = 59.2$$

$$TLV = \frac{38.2 \div 59.2}{38.2 \div 59.2} = \frac{(97.4) (350)}{133.6 \div 59.2} = \frac{(97.4) (350)}{193.0} = 177$$

TLV = 177 ppm
(Note difference in TLV when account is taken of vapor pressure and mol fraction in comparison with above sample 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).

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

ing 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.

APPENDIX D

Some "Inert" or Nuisance Particulates q)

Aluminum (Al_2O_3)	Kaolin
Calcium carbonate	Limestone
Cellulose (paper fiber)	Magnetite
Portland Cement	Marble
Corundum (Al_2O_3)	Pentaerythritol
Emery	Plaster of Paris
Glycerine Mist	Rouge
Graphite (synthetic)	Silicon Carbide
Gypsum	Starch
Vegetable oil mists	Sucrose
(except castor, cashew	Tin Oxide
nut, or similar irritant	Titanium Dioxide
oils)	

q) When toxic impurities are not present, e. g. quartz - 15.

APPENDIX E

Some Simple Asphyxiants - "Inert" Gases and Vapors

Acetylene	Hydrogen
Argon	Methane
Ethane	Neon
Ethylene	Nitrogen
Helium	Nitrous Oxide
	Propane

1970 TLV COMMITTEE MEMBERS

Paul E. Caplan	Harold N. MacFarland, Ph. D.
Hervy B. Eldnas, Ph. D.	Frederick T. McDermott
W. G. Fredrick, Sc. D.	E. Mastromatteo, M. D.
Bernard Grabols, P. E.	Col. Walter W. Melvin, Jr., M. D.
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Herbert E. Stokinger, Ph. D., Chairman
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Documentation of Threshold Limit Values. A separate companion piece to the TLVs is issued by ACGIH under this title. This publication gives the pertinent scientific information and data with reference to literature sources that were used to base each limit. Each documentation also contains a statement defining the type of response against which the limit is safeguarding the worker. For a better understanding of the TLVs it is essential that the Documentation be consulted when the TLVs are being used.

Information concerning the availability of copies of the Documentation of Threshold Limit Values should be directed to the Secretary-Treasurer.

INDUSTRIAL HYGIENE DIGEST

LITERATURE AND NEWS

NEWS ITEMS

1234 MEDEX: A BREAKTHROUGH IN MEDICINE.

A research and development program called MEDEX (Medecin Extension--extension of the physician) is breaking down barriers to extending the capacity of physicians to provide more and better care to patients. Early in 1969, MEDEX recruited a group of former military medical corpsmen. These men have become the prototypes of a totally new health professional to help ease the manpower crisis in the delivery of medical services. MEDEX recruits are performing many physician tasks that do not actually require a physician's sophisticated training and intricate decision-making experiences. They are taking histories, doing parts of the physical examination, applying and removing casts, making hospital and nursing home rounds, assisting at surgery, performing selected diagnostic and therapeutic procedures, making house calls--on the same schedule as the physicians with whom they are working. They extend the physicians' capacities at any time of day or night, seven days a week. Although the evaluation is not yet completed, the assumption of a significant number of physician tasks by MEDEX has engendered unexpected enthusiasm by the physicians and nurses with whom the men work. More important, however, is the almost universal patient acceptance of this new professional. The technological tools developed by MEDEX take on additional significance as the gap continues to widen between the need and the capacity to deliver health care services. It represents one of the few hopes many nations have of extending quality medical care to more of their people.

--Hospital Tribune 4, Sept. 21, 1970

1235 A DEVICE DESIGNED TO TRAP UP TO 99% OF PARTICLES EMITTED BY INCINERATORS.

A device designed to trap up to 99% of particles emitted by incinerators and oil burners will be made and marketed by Union Environmental, Inc., Philadelphia, a subsidiary of Union Corporation. The company has acquired exclusive U.S. and Canadian rights for the Norwegian device. Exhaust gases pass through a fan which forces dust particles as small as 1 micron into a plenum housing where they drop into a soot bin. Air is cleaned several times through centrifugal action and ejected. Costs will be 25 to 30% less than for systems with similar efficiency, Union says.

--Chem. Eng. News 48, 33 (Aug. 31, 1970)

1236 SOME COMMON SENSE RECOMMENDATIONS FOR THE COAL INDUSTRY.

Many concerned citizens in the coal fields were apprehensive about some long awaited recommendations for the coal industry by the U.S. Council on Environmental Quality. It turns out that the recommendations are laced with good common sense, and everyone interested in a strong coal industry and in cleaner air and water can be optimistic for the future. The environmental council suggests: Federal research and development on sulfur oxides and nitrogen oxide control technology should be

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accelerated. Studies of better combustion methods to reduce oxides of nitrogen are also needed; A more balanced research and development program to hasten the development of more efficient energy processes -- gasified coal, fluidized bed combustion breeder reactors, and nuclear fusion all hold promise; The Nation needs to use its fuel resources more effectively through development of a national energy policy; Incentives to accelerate industry support for research and to stimulate corrective actions should be considered. The environmental council is optimistic over coal's future, an opinion shared by leading coal industry executives. The council estimates that the amount of coal used for power by the year 2000 will be four times greater than it is today. It points out that natural gas and residual fuel oil are far too scarce for power generation purposes. --Dominion News Sept. 1, 1970

1237 NOISE CONTROL LESS COMPLEX THAN THAT OF AIR AND WATER.

Contrary to what many people may think, noise is relatively easy to abate. There are not many experts on noise in the country, because it is not a form of pollution that has received much attention, but most of those who have looked into the possibilities of lessening the mounting din in which we live say that the causes of noise are neither as complex and difficult to deal with as those of air pollution nor as costly to cure as those of water pollution. The two main reasons for current lack of progress in noise abatement, they contend, are the general apathy of governments and the public toward the problem and the expenditures--however modest in some cases--that would have to be made to control noise. Most specialists in noise abatement suggest that it is properly a matter for the Federal Government. They reason that since most noise is created by privately owned machines, which wear out and must be replaced every few years, the best way to attack the noise problem is to pass Federal legislation encouraging or requiring manufacturers of sound-producing equipment to meet as yet unformulated noise standards. This approach to the problem would be analogous to the ever-stricter emissions standards that are now being federally imposed on auto makers. The Johnson Administration originally proposed to fix a noise limit of 85dba, with higher levels permitted for short periods. The proposal was so opposed, especially by high-noise industries such as textiles, that the Nixon Administration agreed to a maximum permissible level of 90 dbA. That is 5 db on the A scale more than most otologists regard as safe over prolonged periods.

--Hospital Tribune 4, Sept. 21, 1970

Editor's Note: Dr. Joseph Sataloff, Professor of Otolaryngology at Jefferson Medical College, in his paper at the 34th Annual Meeting of the Industrial Hygiene Foundation in 1969, stated that "the American Standards Association (ASA) Sub-Committee based its proposal (85dba) on audiometric data from only one investigation on a population of American workers. The other publications cited in its bibliography are chiefly laboratory studies from England and the Netherlands and not the result of field investigations. Such limited studies should not, in my opinion, qualify as the basis for establishing American noise standards. . . Other (or additional) audiometric data are needed upon which valid conclusions can be based, as any errors in technique or conclusions may have very far-reaching effects, not so much in marginal losses of hearing as an excessive and perhaps unnecessary costs of engineering controls and personnel changes."

--M. C. C.

1238 NEW TEST MAY CUT EMPHYSEMA TOLL.

Any way one looks at them, the statistics on emphysema are grim. Twenty years ago, fewer than 1,500 Americans died of the baffling lung disease. This year, 30,000 may die of it, making it the fastest growing major disease in the U. S. Even allowing for the possibility that more emphysema cases are being reported because doctors are more actively on the lookout for the disease, this increase is alarming. Now a California researcher may be on the threshold of a mass screening test that could sharply reduce the toll--even though the cause of emphysema remains a mystery, and there is no

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known cure. One use of the mass screening test might be to weed out people who run special risks of contracting emphysema if they have to work under smoky or dusty conditions. Early detection is vital in fighting emphysema, a disease in which the lungs are irreversibly damaged. They lose their elasticity and jam open. "Emphysema develops so insidiously," says the National Heart & Lung Institute, "that many victims are completely unaware that anything is seriously wrong until 50% or more of their lung function has been completely destroyed." In studies of 1,500 persons with no clinical signs of emphysema, it has been found that 5% had an inherited deficiency of a natural enzyme called alpha-antitrypsin. When more than 160 emphysema patients were tested, it was found that no fewer than a quarter were deficient in this enzyme. This alpha-antitrypsin deficiency definitely predisposes people to emphysema. But it does not become apparent until they have been exposed to cigarettes or some other irritant. Illness, including tuberculosis and cancer, as well as one of today's most common medications, birth control pills, can all mask a lack of the enzyme. A study of the antitrypsin levels of workers in dusty and non-dusty jobs compared with the incidence of emphysema in the two groups has been proposed. Such a study could be used to lay the groundwork for preemployment tests so that workers who are genetically prone to emphysema will not be assigned to jobs that are dangerous for them.

--Business Week (2141) pp. 88-90 (Sept. 12, 1970)

1239 HYDROXYL RADICAL KEY TO AIR POLLUTION.

Dr. Donald H. Stedman, chemist, Ford Motor Company, and his colleagues have shown quantitatively that the hydroxyl radical, water, and carbon monoxide all play important roles in the sequence of steps leading to the oxidation of nitrous oxide to nitrogen dioxide. The findings, he says, raise questions about current methods of auto emission abatement and the applicability of previous ideas to smog formation. Hydrocarbon-carbon monoxide emission control has thus far been the major basis for air pollution abatement. As a result, total hydrocarbons from automobiles in the Los Angeles atmosphere, for example, have been substantially reduced, but nitrogen oxide levels have increased. Furthermore, there has been no substantial smog alleviation, Dr. Stedman claims. The Ford chemists thus suggest that nitrogen oxide control should take priority in the near future.

--Chem. Eng. News 48, 13-14 (Sept. 21, 1970)

1240 SOVIETS DESIGN ENGINE THAT CUTS AIR POLLUTION.

A new automobile engine that is said to reduce air pollution from exhaust gases to an "absolute minimum" has been designed in the Soviet Union. The powerplant has been tested by a government commission and recommended for production. Chambers attached to each of the cylinders ensure the complete burning of gasoline. A small quantity of fuel comes in and, when ignited, burns as a lean air/gas mixture in the cylinders. Ordinarily, internal combustion engines cannot operate effectively on such a mixture. In addition to reducing pollutants, Soviet engineers claim the innovation saves 10% on fuel. Rated at 130 hp, the engine is intended for trucks of the Russian ZIL-130 type. Because the new powerplant differs only slightly from those now being built, it will be easy to introduce into present production lines.

--Ind. Research p. 45 (Sept. 1970)

1241 SYNTHETIC WATER CLARIFIER CLEARS MAJOR HURDLE.

The widespread use of alum--a term used in water treatment to denote aluminum sulfate--and iron salts for clarifying municipal drinking water may soon give way, at least in part, to synthetic materials. Nalco Chemical Company has received Public Health Service clearance to begin marketing a synthetic coagulant for potable water clarification. The material, trade-named Nalcolyte 607, is a cationic polyamine. Though PHS acts only in an advisory capacity (states set their own criteria for water treatment chemicals), approval by the agency is tantamount to general acceptance. PHS clearance

comes only after extensive toxicity testing; Nalco has conducted such tests and is confident that its material is safe for potable water use. Nalcolyte 607 produces a relatively hard, integral floc that is more difficult to break up than alum flocs, and even when the Nalcolyte floc does break up, it will reform.

--Chem. Eng. News 48, 17 (Aug. 31, 1970)

1242 GETTING NOISE POLLUTION OFF THE PAYROLL.

Judging by the experience of one large insurance company, "Quiet Please" may well become the rallying cry of cost accountants and other men of efficiency. When it eliminated irritating but commonly accepted office sounds (e.g., office machinery wheezes, elevator whines, air-conditioning whirrs), this company found that typing errors dropped 29 per cent, machine operator mistakes fell 52 per cent, absenteeism fell 37 per cent and employee turnover dropped 47 per cent. The only things that went up were efficiency, morale and cooperation, according to a report published by the National Management Association.

--Signature p. 17, Aug. 1970

1243 FDA EXTENDS BAN ON CYCLAMATES.

On 14 August the Food and Drug Administration extended its ban on cyclamates, an artificial sweetener to include all dietary foods and fruits. Cyclamates have been found to be a cancer-inducing drug in experimental animals. The FDA ban requires that all foods and drugs containing cyclamates be off the market as of 1 September 1970. The decision is a reversal of a previous FDA ruling that would have permitted foods containing cyclamates to be sold to diabetics and dieters on a prescription basis after 1 September. The earlier ruling, which took effect in January, was based on the conclusion that, for some diabetics and dieters, use of cyclamates could be safe if the intake of the drug was limited to less than 780 milligrams per day.

--Science 169, 962 (Sept. 4, 1970)

1244 POLLUTION HAZARDS FROM METALS.

The Federal Government -- and indeed several states -- are now closely looking at the environmental impact of a dozen or more metals. Apparently heading the federal list of possible water polluting metals are lead, cadmium, and arsenic. Senator Philip A. Hart (D.-Mich.) argues that lack of federal regulatory authority is not at the heart of the toxic metal pollution problem and that guidelines for harmful levels of industrial effluents can be set and violators brought to court. However, the Administration's chief water pollution spokesman, Carl Klein, Assistant Secretary of the Interior, contends that there is an obvious need for the President's recommendations for enactment of precise effluent requirements to abate and reduce discharges, for example, of lead and arsenic. He also points out that the scientific community still has not settled on how much arsenic, lead and cadmium may be released into water. Surgeon General Jesse Steinfeld probably put the question of hazards from toxic metals in the best perspective by telling the Hart subcommittee that the problem of the health effects of toxic metals is a legitimate area for concern, but not a legitimate cause for hysteria.

--Chem. Eng. News 48, 12-13 (Sept. 7, 1970)

1245 ATMOSPHERE OXYGEN "OK" DESPITE POLLUTION INCREASE.

After completing a three-year study of the atmosphere, Dr. Lester Machta, a scientist with the Environmental Science Services Administration, and Ernest Hughes, a scientist at the National Bureau of Standards, conclude that there is just as much oxygen in the atmosphere -- 20.946% -- as there was 60 years ago. Thus, the theory that human civilization might be doomed because pesticides and chemical pollutants have reduced the ability of plant life to produce needed oxygen must be placed on the back shelf -- at least for the time being. Machta and Hughes' experiment compared atmospheric analyses as far back as 1910 with measurements made over the past three years. They concluded that since 1910, "changes with time over the globe appear to be either zero or smaller than the uncertainty in the measurements."

--Ind. Research p. 26, Aug. 1970

1246 CARBON TETRACHLORIDE HOUSEHOLD USE BANNED.

Carbon tetrachloride use in household products is banned by the Food and Drug Administration effective this fall. The FDA had previously determined in 1968 that inhalation of the chemical poses a variety of health hazards, including liver damage. An earlier order to ban its use was postponed because of industry objections.

--Am. Med. News 2, Aug. 31, 1970

1247 MICROORGANISMS CONSUME OIL IN TEST SPILLS.

A method of cleaning up oil spills by accelerated microbial biodegradation -- in effect "eating up the oil" -- is being developed by Dr. Edward N. Azarowicz of Bioteknika International, Inc., Alexandria, Virginia. Called Petrodeg, the petroleum-degrading agent contains a mixture of 20 microorganisms -- one of marine origin and the rest terrestrial organisms. The agent also contains necessary chemical nutrients for microbial growth, particularly nitrogen and phosphorus compounds. The microbiological species in the mixture were selected for their capacity to metabolize oil hydrocarbons rapidly and completely. Laboratory and field tests in salt water and brackish river estuaries -- at water temperatures between 55° and 84° F. -- show that Petrodeg completely cleans up every kind of oil tried in as little as four days.

--Chem. Eng. News 48, 48-49 (Sept. 7, 1970)

1248 180 TONS OF OLD BOTTLES USED FOR GLASPHALT ROAD.

More than 180 tons of old glass bottles supplied by the Glass Container Manufacturers Institute, Inc., are being used in paving a 600-foot-long strip of busy roadway, 20 feet wide, at the University of Missouri's Rolla campus. At the rate of two bottles per pound, this means that students, faculty and school visitors will be driving -- safely -- over about 720,000 crushed bottles and jars used as asphalt aggregate. The product's name is derived from the crushed glass which is used in place of gravel and stone ordinarily mixed with standard asphalt. In this further evaluation University researchers will test the glasphalt strip for skid resistance and durability under normal traffic and weather conditions for a period of at least two years. Glasphalt, GCMi reports, is only one of many possible reuses for waste container glass. The most promising outlet right now appears to be in the bottle-making process itself. Glass container industry research indicates that crushed waste glass, or "cullet" as it is called, can constitute 30 per cent or more of the raw materials needed to make new bottles. Salvaged glass containers also may be used in the production of home building materials, such as bricks, building blocks and glass wool insulation, as well as in vitrified sewer pipe, reflector material for signs, glass beads and even as grit for chickens.

--Natl. Glass Budget 86, 9-10 (Aug. 15, 1970)

1249 LASER CANES FOR BLIND PERSONS DEVELOPED.

The Laser Laboratory of the University of Cincinnati Medical Center, internationally renowned for years for the study of the safe use of lasers, has contributed its part in the perfection of a laser cane to be used as a mobility aid by the blind. It is to be emphasized that the laser cane is still under investigation and, when perfected, will aid the blind in detecting objects ahead of, above, and below their paths. A pulse of three to ten watt infrared coherent light emitted from three lasers located just below the curved handle of the cane is reflected from obstacles and detected by three photodiodes situated nine inches below the cane's transmitters. The photodiodes are behind receiving lenses which focus the returning light beams. A sensory stimulator which produces a poking sensation on the index finger of a right-handed user is located on the right side of the cane between the transmitters and the receiving optics. This signal warns the user of hazards ahead. Easily distinguishable auditory tones warn of objects above and below. The cane may be rotated 90 degrees to gauge the width of obstacles ahead. It has an extremely low rate of radiation emission well

within safe limits for human usage. The laser cane, tested only for safety by the UC Laser Laboratory, was developed under VA sponsorship by Bionic Instruments, Inc. of Bala Cynwyd, Pa. At present there are ten canes in existence. --Univ. of Cincinnati Med. Center News Sept. 2, 1970

1250 BARIUM ENEMAS: FDA'S NEW LOOK.

In rescinding a 1964 regulation proscribing the use of tannic acid as an adjunct in barium enemas, the Food and Drug Administration has taken a constructive step that should be welcomed both by radiologists, who are particularly concerned, and by the profession at large. It was concluded that tannic acid in proper dosage is invaluable in "improving barium enema studies and any risk that might be entailed by its use is far less than that of the disease that might otherwise be overlooked."

The public today is appropriately protected by the FDA, but there is a duality of sanction: that of the medical community as well as the public. The newer ruling of the FDA in this instance, taking cognizance of "sanction from the medical community," suggests that the prospects may be brighter for cooperative endeavor.

--Hospital Tribune 4, Sept. 21, 1970

COMING EVENTS

- 1251 Dec. 2-4 American Chemical Society Southeast-Southwest Regional Meeting, New Orleans, La.
- Dec. 3-4 Conference on Clinical Pharmacology, Washington, D.C.
- Dec. 5-10 American Academy of Dermatology, Chicago, Ill.
- Dec. 6-10 Association of State and Territorial Health Officers, Washington, D.C.
- Dec. 6-11 International Clean Air Congress, 2nd, Washington, D.C.
- Dec. 7-11 Elements of Ferrous Metallurgy, 4th, Toronto, Canada
- Dec. 8-11 American Society of Agricultural Engineers, Chicago, Ill.
- Dec. 10-12 American Heart Association, Council of Clinical Cardiology, 11th, Miami, Fla.
- Dec. 11-12 American Federation for Clinical Research, New York, N. Y.
- Dec. 14-15 American Chemical Society Division of Industrial and Engineering Chemistry, Symposium, New Orleans, La.
- Dec. 14-16 Flow Properties of Metals, American Society for Metals, Chicago, Ill.
- Dec. 26-31 American Association for the Advancement of Science, 137th annual, Chicago, Ill.
- Dec. 28-31 American Physical Society, Stanford, Calif.

LEGAL DEVELOPMENTS

1252 LABOR MOVES AGAINST OCCUPATIONAL DISEASE.

As contract negotiations continue between the United Rubber Workers (URW) and the industry, press reports have focused public attention on wage hikes and extended fringe benefits. Consequently, only a handful of safety professionals outside the rubber industry are aware that the URW's proposed contract agreement carries a landmark provision that may have a telling effect on industrial safety and health programs. The URW seeks to establish a Joint Occupational Health Program which would be financed by the rubber companies, staffed by an Occupational Health Committee consisting of three union and three company representatives, and provided data by an Occupational Research Study Group to be established at Johns Hopkins University's School of Public Health. The Joint Occupational Health Program, has already been included in contractual agreements with three of the industry's Big Five. Some industrial safety pros have questioned why the rubber industry, with more than its share of sophisticated safety and industrial hygiene programs, has been selected as the first industry to grapple with a contractual provision for a joint occupational health program. Past reports

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bear out that particularly among the major rubber companies, industrial hygienists and safety directors ride herd on incoming materials, call for data from suppliers, conduct their own lab tests, and periodically monitor departments within plants to see that concentrations remain within safe levels. Joint management-labor safety committees have been operative, and the rubber industry's safety performance on the basis of IFR measurements has been consistently superior to that of industry in general. It may be because the rubber industry has been making such an organized, sustained effort, because it has been dealing with over 1,300 different chemical compounds and itself has been frustrated by the dearth of data on so many chemicals and acutely aware of the intrinsic complexity of the problem, that Labor thought it would be more receptive to the idea than would an industry less sophisticated in matters of chemical safety. Whatever the reason, industrial health and safety pros outside the rubber industry would do well to confer with top management on the posture their companies will adopt when their turn comes, as it promises to, soon, to deal with a contractual provision calling for extended joint efforts in occupational health.

--Occ. Hazards 32, 31-33 (Aug. 1970)

1253 LEGISLATING FOR AIR POLLUTION.

Tough new air pollution legislation with "more deadlines per square inch than any bill I've seen," claimed for it by Senator Edmund S. Muskie (D.-Me.) has emerged from the Air and Water Pollution Subcommittee after months of debate. Sent on to the Senate Public Works Committee, the measure was likely to remain largely intact and win approval there, possibly late last week. If Congress passes the measure, some tight timetables indeed will be set and air pollution control may yet get off the ground. A statutory deadline to achieve national ambient air quality standards within four and a half to five and a half years is asked. Performance standards for emissions from new, major industrial plants would be set. The measure contains a possible out for industry by language calling for latest available control technology, processes, operating methods, or other alternatives to be used. Asbestos, beryllium, cadmium, and mercury are singled out by Senator Muskie as hazardous emissions for tight controls, and broad authority is also granted by the legislation to control trace metals not considered hazardous but affecting public health and welfare.

--Chem. Eng. News 48, 10-11 (Aug. 31, 1970)

1254 POLLUTION COVERAGE EXCLUSIONS.

To clarify the coverage provided to commercial insureds under general liability insurance policies in pollution cases, two exclusions have been filed with state insurance supervisory authorities. The exclusions relate to claims alleging pollution or contamination of air, land or water. The filed exclusions are described by insurance spokesmen as being of a "clarifying nature" because such damages are believed to be outside the policy definition of "occurrence". The first endorsement is explicit in excluding coverage except for those instances in which damage is caused by pollution or contamination which is "sudden or accidental." The second endorsement is intended for application on General Liability insurance issued to insureds having operations of an "oil risk" nature described in the endorsement. From reports received it appears that the endorsements have been approved in 38 states with applications for approval pending in Arizona, Kansas, Louisiana, Maine, Maryland, New Hampshire, New Jersey, North Carolina, Pennsylvania, Tennessee, Vermont, West Virginia and the territory of Puerto Rico.

--For the Defense 11, 75 (Sept. 1970)

1255 ADVISORY COMMITTEE ON CONSTRUCTION SAFETY AND HEALTH.

An Advisory Committee on Construction Safety and Health was established in the Department of Labor on December 23, 1969. The Advisory Committee is a continuing advisory body consisting of nine members appointed by the Secretary of Labor, one of whom is appointed by him as chairman. Three members are

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persons representative of contractors to whom section 107 of the Act applies; three members are persons representative of employees primarily in the building trades and construction industry engaged in carrying out contracts to which section 107 applies; and three members are public representatives selected on the basis of their professional technical competence and experience in the construction health and safety field. In accordance with such rules as may be prescribed under the Contract Work Hours and Safety Standards Act, the Advisory Committee shall advise the Secretary of Labor, the Assistant Secretary for Wage and Labor Standards, and any duly authorized representative of either in the formulation of construction safety and health standards and other regulations, and with respect to policy matters arising in the administration of section 107 of the Act.

--Federal Register 35, 11320-11321 (July 15, 1970)

1256 NEW YORK CITY REGULATIONS ON THE SPRAYING OF MINERAL FIBER INSULATION.

Clean the area before and after spraying. Enclose the area in tarpaulins during spraying. Bag excess material in enclosed areas. Post warning signs when spraying. Provide workers with respirators and coveralls. Appoint a full-time spraying supervisor. Clean and seal sprayed surfaces in the ventilation system. Cease spraying if emission escapes occur. Notify Department of Air Resources before spraying.

--Environ. Sci. Technol. 4, 727 (Sept. 1970)

BOOKS, PAMPHLETS, AND NOTICES

- 1257 PATHOLOGY OF THE LUNG. 2nd Edition. H. Spencer. Available from: Pergamon Publishing Co., Maxwell House, Fairview Park, Elmsford, New York 10523. 848 pp. (1968) Price: \$38.00.

"This second edition of Spencer's *Pathology of the Lung* is truly an encyclopedic work in the traditional manner. It is a pathologists's reference par excellence. . . . The book begins with a full account of the embryology and anatomy of the lung and its postnatal development. Congenital anomalies follow, separated by the rest of the text from hamartomas and teratomas. Infections are covered thoroughly. . . . In this section, as in all areas treated, some mention is made not only of historical, but of geographic and experimental approaches to the subject. The other broad categories covered are emphysemas, pneumoconioses (including pituitary snuff lung!), pulmonary hypertension, diseases of uncertain etiology and tumors. The author weighs his evidence carefully and does not intrude his own viewpoint at any point. . . . The book is lavishly supplied with photographs, drawings, and microphotographs. An appendix gives several special techniques for investigation of the lung, including Gough's sections of whole lungs, Liebow's plastic injections, and a gelatin vascular injection method. The book deserves to retain its place as the definitive English treatise on the pathology of the lung. The references are up-to-date and the new material added to the first edition justifies the active pathologists's purchase of the new second edition."

--Archives of Pathology

Editor's Note: This text will make a unique contribution especially to those engaged in teaching lung pathology. It has all of the advantages - and disadvantages - of single authorship: it is well organized, and integrated with minimal conflicting data or need for cross references. On the other hand, its references in the area of Occupational Disease Pathology do not contain sufficiently "up to date" references in such areas covered as asbestos (e.g. no mention of non-specificity of so called "asbestos bodies"). In fibrous glass the far reaching and erroneous assumption is made, based on two isolated cases of so called "Fibre-glass Lung", that the finding of fibers in the lungs which appeared to be glass, proved that the disease present was caused by them: similarly, under byssinosis, the author reports finding "specific rounded dust bodies, consisting of a central core of black dust surrounded by a yellowish material. . . which stains positively for iron. . . ." In a paper read at the British Occupational Hygiene Society Meeting (London) in September, Dr. Paul Gross, Director of IHF Research Laboratory, reported finding similar bodies in the lungs

of non-occupationally exposed adults in Pittsburgh who were autopsied and whose lungs sediments were subsequently studied. There was no way in which the author could have anticipated the findings of Dr. Gross; however, two needs are readily apparent: (1) Some media must be found to communicate more rapidly and more effectively the findings of studies of occupational disease pathology. Perhaps a medical version of Industrial Hygiene Highlights would be helpful. Comments of interested Digest readers are invited in this regard as to nature of coverage; (2) There is a need for adequate controls in evaluating the significance of observations in relation to studies of single cases of disease. Recognition of this need must be made a more important goal in medical education of the future, so that authors - and readers of erroneous material in the literature - will be less likely to be led astray in such matters.

--R. T. P. deT.

- 1258 SURFACTANT BIODEGRADATION, VOL. 3. R. D. Swisher. Available from: Marcel Dekker, Inc., 95 Madison Avenue, New York, New York 10016. 496 pp. (July 1970) Price: \$33.50.

The waste surfactant problem, one small facet of the world's burgeoning pollution problem, developed in the 1950s and was corrected in the 1960s. Although the surfactants are only a small, specialized class among organic materials, the principles and techniques applied in that campaign are quite general and should be applicable likewise in attacking some of the larger pollution problems which we still face. Accordingly, this book may serve two purposes in bringing together the information which has been developed by academic, governmental, and industrial scientists around the world during the past twenty years. First, it shows the current state of knowledge and understanding of surfactant biodegradation as of mid-1969; second, it provides a useful point of departure for future work on other pollution problems. Although discussion of the environmental-waste surfactant historical background is confined for the most part to the U. S. situation, there is no such limitation on the coverage of the pertinent scientific and technical literature. Geographically the coverage has been world-wide to the fullest extent possible, and chronologically to mid-1969 for the major journals. An important key to developing order out of the chaos of surfactant biodegradation is the chemical structure of the surfactant. Many of the structural formulas used herein have been simplified by omission of hydrogen atoms, and sometimes by omission of bonds also, to bring out more clearly the molecular topology. For an appreciation of the actual topography, the best approach still seems to be the molecular model, properly scaled, studied during assembly as well as afterward. A newly designed Bibliography/Author Index adds a new dimension to the indexing system by its two-directional nature. Each reference cited includes its title in addition to its author and journal location, and each is keyed back to the appropriate pages in the book. This amplifies the power of the author index considerably, since entry to the text via the author index can now be on a selective basis, with the title indicating the subject matter. Operations in the opposite direction are improved also, since the name and year citation in the text provides a much more informative referent than does a naked, anonymous reference number.

--Cond. from Preface

Editor's Note: This book should be of considerable value to research scientists working with surfactants and detergents in light of its comprehensive coverage of the literature now existing. Some of the techniques described for biodegradation studies may also be applied to many broader areas of pollution control.

--M. C. C.

- 1259 SAFETY TRAINING FOR THE SUPERVISOR. J. E. Gardner. Available from: Addison-Wesley Publishing Co., Reading, Massachusetts. 144 pp. (1969) Price: Not given.

A compendium of case studies, simply but clearly presented, follows a series of easy reading and logically sequenced chapters on safety orientation for supervisors and their work teams. The book is not exhaustive, but is in essence a course outline for safety training and will assist those preparing for an in-plant program.

--H. M. B.

- 1260 **EMERGENCY.** National Safety Council. *Available from:* National Safety Council, 425 North Michigan Avenue, Chicago, Illinois 60611. 24 pp. (1970) *Price:* Not given.

Stated in this booklet's introduction is a definition of the word emergency, "a sudden, unexpected occurrence demanding immediate action". It further states that "this matter of fact dictionary definition tells you what an emergency is but it doesn't tell you how to get out of it. And it does not tell you about panic unreasoning fear that so often paralyzes mind and muscles. The antidote for fear is knowledge. Knowing what to do and how to do it in those crucial moments 'demanding immediate action' can dispel panic and keep an emergency from becoming a tragedy". It is the feeling of the National Safety Council that since a person does not have time to consult a book in an emergency situation it is best to be prepared by studying this booklet ahead of time and knowing what to do when an emergency occurs. Thirty three different types of emergencies are discussed from severe bleeding and serious burns through fire, auto accidents, gas poisoning and animal bites. The information is concise, complete and easily understood and its size makes it a handy pocket guide for quick reference.

--M. C. C.

- 1261 **WHAT YOU AND YOUR FAMILY SHOULD KNOW ABOUT DRUGS.** Benco Special Edition. *Available from:* The Ben-Jamin Co., Inc., 485 Madison Avenue, New York, New York 10022. (1970) *Price:* \$.50, bulk discounts offered.

Based on the federal source book "Answers To The Most Frequently Asked Questions About Drug Abuse" produced by the Departments of Defense; Justice; Labor; Health, Education and Welfare; and the Office of Economic Opportunity this booklet answers the 109 most frequently asked questions about drug abuse. Material covered includes marihuana, hallucinogens, stimulants, sedatives, narcotics and a variety of volatile solvents, also nutmeg, belladonna and Jimson weed. A drug glossary of 129 terms is also included. The compactness of this booklet makes it a valuable tool in combating the present widespread inappropriate use of drugs of all kinds for those who are unable or unwilling to read lengthy discussions of these problems.

--M. C. C.

- 1262 **INTERNATIONAL CLASSIFICATION OF RADIOGRAPHS OF PNEUMOCONIOSES (REVISED 1968).** International Labor Office. *Available from:* International Labor Office, Safety and Health Branch, 154 rte de Lausanne, CH 1211 Geneve 22, Switzerland. 23 pp. (1970) *Price:* \$30.00 (including films).

A meeting of experts convened in 1958 by the ILO agreed on an International Classification of Radiographs of Pneumoconioses and selected a set of standard radiographs illustrating the various categories of the Classification. More than 900 sets have been distributed in 55 countries. In December 1968, on the basis of the results of an inquiry carried out among the users of the Classification, a number of ILO consultants, in collaboration with experts of the European Coal and Steel Community, revised the 1958 Classification and adopted the "International Classification of Radiographs of Pneumoconioses (Revised), 1968". It now consists of a "Short Classification" for clinical purposes and of an "Extended Classification" for epidemiological studies. The two systems are closely linked. They also selected a new set of standard radiographs to illustrate this revised Classification. This new set is now available. It is made up of 14 X-ray films, standard size, packed in a cardboard box and accompanied by a leaflet giving details of the Classification, criteria for its use and notes on the radiological technique to be followed. These films will be particularly useful to industrial physicians responsible for the detection of pneumoconioses, to compensation boards, as well as to research centres and specialists interested in this disease.

--Author's abst. Mod.

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1263 BOOKS RECEIVED BUT NOT REVIEWED.

VIRAL INFECTIONS OF THE HUMAN FETUS. G. R. G. Monif. *Available from:* The Macmillan Co., 866 Third Avenue, New York, New York 10022. 164 pp. (1969) *Price:* \$9.95.

ERGONOMICS IN MACHINE DESIGN, VOLS. I AND II. Proceedings of a Symposium, International Labor Office. *Available from:* International Labor Office, (ILO Publications), CH-1211 Geneva 22, Switzerland. (1969) *Price:* Not given.

INTERNATIONAL CATALOGUE OF OCCUPATIONAL SAFETY AND HEALTH FILMS, 6TH EDITION. International Labor Office. *Available from:* International Labor Office, (ILO Publications), CH-1211 Geneva 22, Switzerland. (1969) 557 pp. *Price:* Not given.

INDUSTRIAL MEDICAL PRACTICE

- 1264 RESPIRATORY SYMPTOMS AND PULMONARY FUNCTION IN WELDERS. A. Fogh, et al. *Ann. Occup. Hyg.* 12, 213+ (Oct. 1969)

Groups of 156 welders and 152 controls from the same plants were examined in an evaluation of the possible influence of prolonged exposure to welding fumes upon respiratory symptoms and pulmonary function. No significant difference between the two groups was found in the occurrence of chronic bronchitis and in the ventilatory function as estimated from the 1 sec. forced expiratory volume. Smoking habits appeared to be an important factor in the occurrence of respiratory symptoms in both welders and controls. The percentage of persons having symptoms increases in both groups with increasing use of tobacco, a tendency more pronounced for welders of the older age groups. In welders there also seems to be a relationship between smoking and ventilatory function. This could not be clearly demonstrated in the control group. --Med. Bull. (Std. Oil N.J.) Abstracts

- 1265 A PROSPECTIVE CLINICAL-PATHOLOGIC STUDY OF THE LUNGS AND HEART IN CHRONIC OBSTRUCTIVE LUNG DISEASE. J. H. Cullen, et al. *Am. Rev. Resp. Dis.* 102, 190-204 (Aug. 1970)

A prospective clinical-pathologic study was made of 60 patients with chronic obstructive lung disease. The clinical criteria used did not allow differentiation of chronic bronchitis from pulmonary emphysema in the individual patient. Patients with a low emphysema score had increased goblet cells, evidence of bronchial inflammation, hyperemia, and basement membrane abnormalities compared with patients who had a high emphysema score, but the Reid index was unrelated to the emphysema score. There was a good correlation between the clinical and laboratory evidences of cor pulmonale and enlargement of the right ventricle at autopsy. Patients with chronic obstructive lung disease had a larger right ventricular endocardial surface area and a thinner myocardium than patients in a consecutive series of routine autopsies. An increase in serum bicarbonate was more closely associated with cor pulmonale than was an increase in hematocrit. Cor pulmonale was not significantly related to the degree of emphysema found postmortem or to the degree of airway obstruction as determined spirometrically. --Authors' summary

- 1266 TOBACCO AND HEALTH: REPORT OF SCOTTSDALE RESEARCH CONFERENCE. Alister Brass. *J. Am. Med. Assn.* 213, 1879-1880 (Sept. 14, 1970)

The pharmacology of nicotine and other tobacco smoke fractions, and their effects on animal and human tissues, were discussed at the Second Research Conference on Tobacco and Health of the AMA-ERF, held in Scottsdale, Arizona, May 6 and 7, 1970. The majority of the 70 papers presented dealt with animal experiments. Many were concerned with work in progress or projects about to be undertaken. A selection of the findings reported is given in this article. A third AMA-ERF Conference on Smoking and Health is planned for 1972. --Cond. from text

- 1267 PULMONARY RESPONSES TO INHALANTS. S. Vaisrub. *J. Am. Med. Assn.* 213, 1889 (Sept. 14, 1970)

The repeated simplistic assertions by newscasters and concerned citizens about "air pollution," as if the air and not the lung is the victim of the polluting inhalant, may foster the notion that a simple relationship exists between pollutants and the consequent lung damage, and that much more is known about this relationship than is actually the case. Dispelling this notion, two recent symposia on inhalation carcinogenesis and pulmonary responses to inhalants provide up-to-date information on the state of our knowledge of normal and abnormal pulmonary responses to inhalants. They also provide rare insights into the methodology of their investigations with emphasis on the choice and

evaluation of their experimental models. Comparability is also a consideration in model systems used to study the pathogenesis of disease. Here, however, it provides only a background to the more important question of cause and effect relationship between experimental exposure to an inhalant and the appearance of a lesion. Can we be sure that chronic bronchitis which follows exposure to sulphur dioxide is due to the chemical agent and not to viruses or bacteria which gain entrance because of injured defensive mechanisms? Does a similar possibility exist in interstitial pneumonitis consequent upon exposure to cadmium? Selection of models from specific pathogen free animals may help eliminate these perplexities.

--Cond. from text

- 1268 EXERCISE AND CARDIAC DEATH. E. Jokl and J.T. McClellan, *J. Am. Med. Assn.* 213, 1489-1491 (Aug. 31, 1970)

Potentially lethal cardiac disease may manifest itself first by the terminal collapse. The preceding natural history of illnesses belonging to the nosological category thus identified is distinguished by the absence of symptoms and by unimpaired physical fitness. The four cases described each of which represents a diagnostic entity of the kind under reference concern individuals of both sexes, 45, 16, 25 and 7 years respectively. In the first, autopsy revealed coronary artery atherosclerosis and arteriosclerosis with myocardial involvement; in the second, underdevelopment of the entire arterial system and a congenital anomaly of size and origin of the coronary arteries; in the third, subacute myocarditis; in the fourth, an intracardiac fibroma. The evidence raises the questions of the pathogenesis of cardiac symptoms and of the mechanisms responsible for the onset of fatal seizures of the kind reported here.

--Cond. from text

- 1269 PHYSICAL ACTIVITY AND CORONARY HEART DISEASE. C. D. Enselberg. *Amer. Heart J.* 80, 137-141 (July 1970)

There is no evidence that a training program can lessen the incidence of atherosclerosis, nor is it known whether it will reduce morbidity and mortality from coronary disease; and if it does, whether it will be by virtue of increasing collateral vessels, lessening the incidence of intravascular thrombosis, improving the performance capacity of the heart as a pump, lessening the tendency to develop serious arrhythmias, etc. Nevertheless, training programs seem to be safe and helpful. Even if the major effect is psychological, this alone would justify continuance and further study of such programs.

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

- 1270 VIBRATION SYNDROME. Anon. *Lancet* 2, 350 (Aug. 15, 1970)

The Industrial Injuries Advisory Council has again been asked to consider whether disorders induced by exposure to vibration from machinery should be prescribed under the National Insurance (Industrial Injuries) Act, 1965. In the Council's report the majority of its members hold that these disorders should not be prescribed; but two members dissent. It has long been established that the chief abnormality is a state of "white fingers" or "dead hand", indistinguishable from Raynaud's phenomenon, and now sensibly called in the report "vibration-induced white fingers" (V.W.F.). There are other possible but less easily defined effects, such as bony cysts, neurological changes, or muscular aches in the hands and arms. Extensive investigations were conducted between 1944 and 1949 by members of the Medical Research Council's former department for research in industrial medicine at the London Hospital and some other surveys have been completed since. But little new fundamental knowledge has emerged. There is no doubt at all that a causal link exists between vibration transmitted to the hands and the later appearance of V.W.F. in cold conditions. Moreover, the phenomenon can be demonstrated in most of its victims sooner or later when the weather is right. The disorder may

appear some time after cessation of work with vibrating machinery. It is generally agreed that V.W.F. is often, perhaps usually, a minor disability; but it is not always so. Affected men seldom have to leave their work because of V.W.F., but they may do so on medical advice or if they are frightened of possible long-term effects. Some men find themselves at a disadvantage only if they voluntarily change from a warm inside job to an outdoor one.

--Cond. from text

- 1271 THE FIST AS AN EXTERNAL CARDIAC PACEMAKER. J.B.Wild and J. D. Grover. *Lancet* 2, 436-437 (Aug. 29, 1970)

In three patients with ventricular asystole the hearts responded to continuous rhythmical chest-pounding -- in one case for more than 40 minutes. Each blow on the chest was followed by ventricular depolarisation and systole. Metabolic acidosis did not develop, and no precautions were needed to prevent it. This method might be tried as the first line of treatment for asystole in hospitals; and outside hospitals it seems to have a better chance of success than cardiac massage as a first-aid measure for cardiac arrest.

--Authors' summary

- 1272 VALUE OF VECTORCARDIOGRAM IN DIAGNOSIS OF POSTERIOR AND INFERIOR MYOCARDIAL INFARCTIONS. P. Toutouzas, et al. *Brit. Heart J.* 31, 629-635 (1969)

The vectorcardiogram may aid diagnosis in those few patients who have minimal or equivocal electrocardiogram changes following posterior or inferior myocardial infarction. The classical ECG pattern may not be present after myocardial infarction, and this is especially true for the absence of a pathological Q wave in the inferior leads following inferior infarction. The ECG changes may not yet have developed in the early stages after infarction, and later on the ECG may return completely to normal. At these two extremes the vectorcardiogram is also likely to be normal. However, when there are equivocal or minor changes on the ECG after inferior infarction such as T-wave changes or an rS complex instead of a Q wave, the vectorcardiogram may show a diagnostic pattern of infarction. The vectorcardiogram permits a much better study and analysis of the size, duration, and rate of inscription of the QRS forces. One hundred patients with the clinical diagnosis of myocardial infarction were studied two weeks to three years after their acute episodes. These patients had transient rises in serum lactate dehydrogenase and definite or equivocal electrocardiographic changes of posterior or inferior infarction. Patients with coexistent anterior infarction were not excluded from the study group. Definite evidence of infarction was found on the ECGs of 86 of the patients. The vectorcardiograms in these subjects, although interesting and confirmatory, did not add anything to the diagnosis. While the remaining 14 patients had equivocal changes of infarction on the ECG, the vectorcardiogram definitely showed 9 posterior and 5 inferior infarctions in these subjects.

--Aerospace Med. abst.

- 1273 EVALUATION OF AMANTADINE IN ARTIFICIALLY INDUCED A2 AND B INFLUENZA. A. A. Smorodintsev, et al. *J. Am. Med. Assn.* 213, 1448-1454 (Aug. 31, 1970)

In double-blind placebo-controlled studies of 404 volunteers, amantadine hydrochloride was found to be 51% effective in preventing the development of artificially induced A2 influenza, and 73% to 92% effective in preventing the more severe form of A2 influenza. Milder disease was seen in those who developed A2 influenza in spite of amantadine therapy. Serological responses were also reduced. No significant difference was observed either between once- and twice-daily dosage or between 200 mg and 100 mg/day regimens. No benefit was observed when the start of medication was delayed until symptoms of influenza developed. Amantadine was ineffective against B influenza. No safety problem was evident in any subject.

--Authors' abst.

1274 OCULAR TRAUMA IN INDUSTRY. J. F. Novak. *J. Occ. Med.* 12, 287-290 (Aug. 1970)

The management of an eye injury in industry begins with an accurate and concise history which states in the employee's own words *when, where, and how* the injury occurred. The vision of both the injured and the uninjured eye is recorded both with and without glasses. The commonest eye injury in industry is the foreign body. Small particles which lodge on the lids or in the cul-de-sac may cause no symptoms. A particle lodged on the palpebral conjunctiva of the upper lid causes pain, tearing, and light sensitivity and can abrade the corneal epithelium as it moves over it. Chemical exposures are another common industrial eye injury. The offending agent may be an acid, alkali, or detergent in the form of a gas or fume, liquid, or solid. Damage caused by acids depends upon protein affinity of the anion and the concentration of the acid. Generally, acid burns look most severe shortly after exposure and improve with treatment and time. Acids of low pH, as sulfuric, cause more severe damage. Alkalis dissolve the corneal mucoid. Their action on the eye is insidious, with an innocent initial appearance and worsening with time. Concentrated alkalis as lye caused immediate and permanent damage. Abrasions of the cornea involve only the corneal epithelium. They open the eye to infection until the epithelium regenerates covering the defect. Regeneration occurs by cellular division from the intact epithelium at the edges of the abrasion, covering the defect in 48 to 96 hours. Until healing occurs, there is severe pain, marked light sensitivity and iris irritability, or even severe iritis. Eyes exposed to sufficient ultraviolet radiation, either as a single exposure or cumulatively by repeated exposures, develop a keratoconjunctivitis which has certain characteristics, a symptom complex commonly called *welder's flash*. Other sources of radiation injury are plasma torches and lasers. Lasers cause chorioretinal burns like those from solar radiation in eclipses of the sun. Contusion, lacerations and facial fractures involving the eyes are also covered in this paper.

--Cond. from text

1275 CHRONIC OBSTRUCTIVE LUNG DISEASE IN JAPANESE POISON GAS WORKERS. Y. Nishimoto, et al. *Am. Rev. Resp. Dis.* 102, 173-179 (Aug. 1970)

A high prevalence of chronic bronchitis and expiratory slowing occurred among former employees of a poison gas factory in Japan. Even among nonsmokers, almost one half of the men who had been exposed repeatedly to mustard gas or lewisite before 1945 had a persistent productive cough. Former poison gas workers showed a more bronchitic type of airway obstructive syndrome than ordinary patients with chronic obstructive pulmonary disease in Hiroshima and Chicago, but they did not have less anatomic evidence of emphysema. Using standardized methods of study, few differences between the ordinary clinic patients in Japan and those in the United States were demonstrated when groups were matched for age, sex, and severity of expiratory slowing.

--Authors' summary

1276 POSSIBLE NEUROTOXICITY OF OXYQUINOLINE. H. E. Kaeser and R. Wuthrich. *Deutsch Med. Wochr.* 95, 1685-1688 (Aug. 14, 1970)

Two new cases are presented to illustrate that halogenated oxyquinoline derivatives are potentially neurotoxic. High doses, given over some length of time, may cause optical nerve atrophy or polyneuropathy. Dosage regulations must be strictly observed and long-term administration undertaken only if strictly indicated. The relationship between acute complications (amnesia, confusional states) and oxyquinoline administration is still unclear; individual disposition seems to play an important role. A daily dose of 1,500 mg should not be exceeded in adults.

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

01 132 5087

- 1277 THE RELATIONSHIP OF PARENTAL LONGEVITY TO VENTILATORY FUNCTION AND PREVALENCE OF CHRONIC NONSPECIFIC RESPIRATORY DISEASE AMONG SONS. S. Deutscher and Millicent W. Higgins. *Am. Rev. Resp. Dis.* 102, 180-189 (Aug. 1970)

In the course of an epidemiologic study of the entire community of Tecumseh, Michigan, parental longevity was related to selected characteristics of men aged 30 years and more with one or both parents deceased. Death before or after age 65 was used as a crude index of longevity. Early death of either parent was related to low values of one-second forced expiratory volume among the sons, and premature maternal death was also associated with increased prevalence of chronic bronchitis and emphysema among the sons. Greater longevity of either parent was related to high values of ventilatory lung function among the sons. Differences in smoking habits accounted for some but not all of the relationships described. The evidence strongly suggests that constitutional factors are involved. The forced expiratory volume is known to be an index of chronic respiratory disease, but the results suggest that it is also a biologic characteristic independently related to parental longevity.

--Authors' summary

CHEMICAL HAZARDS

- 1278 ISOCYANATES IN INDUSTRY. Anon. *Lancet* 1, 1375-1376 (June 27, 1970)

The four primary isocyanates chiefly used in industry are tolylene diisocyanate (T.D.I.), diphenylmethane diisocyanate (M.D.I.), naphthylene diisocyanate (N.D.I.), and hexamethylene diisocyanate (H.D.I.). Of these, T.D.I. is the most volatile and apparently the most toxic. It is particularly used in flexible foam manufacture (fortunately isocyanates are released into the atmosphere only during manufacture of foam, and no harm comes from the foam itself). In high concentrations the isocyanates are corrosive and may cause irritation of the eyes, throat, and bronchi. In addition to these purely irritative effects, asthmatic symptoms may follow continued exposures. The onset is generally insidious, with nocturnal cough, which may progress to severe asthma precipitated by any exposure to an isocyanate, even in minute concentrations. When the patient is removed from the environment the symptoms rapidly disappear, but he must be barred from any further contact with the material. The mechanism of this syndrome is not fully understood: it is commoner in those with a history of allergy; and eosinophilia secondary to isocyanate exposure has often been reported. At present, isocyanates provide many puzzles. What is the mechanism or mechanisms of the response? What are safe levels and what method of selection should be adopted for new entrants into the industry? The threshold limit value of 0.02 p.p.m. was prescribed in 1961 by the American Conference of Governmental Industrial Hygienists, and replaced one of 0.1 p.p.m. Until more work has been done in man and linked with frequent environmental monitoring, this figure can only be provisional. Most large firms using isocyanates have some form of medical screening, and there are good prospects that a uniform procedure may be adopted throughout the industry. The doctor who sees unexplained asthma or bronchitis in the young non-smoker, for instance, would be wise to make sure that isocyanates are not concerned.

--Cond. from text

- 1279 THE MEASUREMENT OF OCCUPATIONAL EXPOSURE TO BENZENE VAPOUR. R. J. Sherwood and F. W. G. Carter. *Med. Bull. (Std. Oil N.J.)* 30, 99-100 (July 1970)

Benzene is one of the more widely recognised occupational poisons, and industrial exposures, commonly due to inhalation of the vapour, have been investigated and reported for many years. With increasing recognition of the toxic nature of benzene has come restriction on its industrial uses. Generally, it is no longer used as a common solvent and it is now likely to be found on a large scale only in

plants where it is manufactured, or where it is the basis of a manufacturing process. Exposure may also occur in laboratories unless personnel are properly aware of the toxic hazard. Haematological tests have been widely recommended for the surveillance of benzene workers, but as such tests give positive results only when damage has occurred, they are of little value in limiting benzene exposure to a safe level. Moreover, such tests do not specifically identify damage from benzene. Benzene exposure can be restricted to levels at which ill-effects are most unlikely by appropriate control measures based on analysis of the air which a man breathes at work, or on the determination of benzene in his exhaled breath, or on the measurement of benzene metabolites in his urine. Air monitoring has been used on a limited scale for many years; for the most part this has been for special investigations of industrial benzene hazards, but to some extent it is used routinely to monitor workers' exposure. Analysis of breath to determine the body burden of volatile hydrocarbons is a comparatively recent development, and although this has already found extensive application to assess alcohol absorption, it has only been used on a very limited scale for determination of occupational exposure. The original method of assessing exposure by urine analysis was to determine the ratio of the ethereal to the total sulphate present. A number of other methods have now been developed for determining more specifically the principal benzene metabolite, phenol, in urine. In the first three sections of this paper, each of these approaches to the problem has been examined. New sampling and analytical techniques have led to improvements in the sensitivity of determining exposure, and to more certainty in the interpretation of the results obtained. The fourth section describes a controlled exposure to correlate the three approaches, and compares the advantages of each. The recommended methods are being used in extensive field studies of benzene exposure, which will be considered for a later publication.

--Authors' intro.

1280 POTENTIAL SUBSTITUTE FOR PHOSPHATES IN DETERGENTS. Anon. *Chemistry* 43, 41-42 (July/Aug. 1970)

A partial replacement for phosphate in detergents, which seems promising, is trisodium nitrilotriacetate (NTA). However, NTA does not by itself have all the necessary performance properties, and, therefore, must be used in combination with the phosphates. Also many questions need answers--for example, what unforeseen pollution or other problems would it present? Of phosphates produced in this country, some 13.6% are used in detergents.

--Cond. from text

1281 MERCURY POISONING: PREVENTION BY SPIRONOLACTONE. H. Selye. *Science* 169, 775-776 (Aug. 21, 1970)

The renal tubular necrosis and calcification as well as the mortality induced by mercuric chloride in the rat are readily prevented by prior treatment with well-tolerated amounts of spironolactone.

--Author's abst.

1282 SUCCESSFUL TREATMENT OF PHOSGENE EXPOSURE. Anon. *Mellon Inst. News* 33, 6 (July 30, 1970)

Six men suffered exposure to phosgene and their attending physician, a general practitioner in the area, treated five of the exposed men with hexamethylene tetramine, also known as methenamine and urotropine. None of these developed any measure of pulmonary edema or other expected symptoms. The sixth man who claimed he had not breathed any phosgene was not given the medication and developed pulmonary edema some six hours later, was hospitalized, and eventually became a fatality. Besides confirming the effectiveness of hexamethylene tetramine treatment for phosgene, the above has a general safety moral in that it dramatically illustrates the value of taking every precaution.

--Accident Case History No. 1658 - Manufacturing Chemists Assn.

01 132 5089

- 1283 A STUDY OF MORTALITY, SYMPTOMS, AND RESPIRATORY FUNCTION IN HUMANS OCCUPATIONALLY EXPOSED TO OIL MIST. T. S. Ely, et al. *J. Occ. Med.* 12, 253-261 (July 1970)

It is the purpose of this report to record the findings of a study of groups of people occupationally exposed to oil-mist concentrations in machine shop environments. The significant predictors of FVC, FEV for the groups studied were consistently height, age, and cigarette years. The symptoms in general yielded the smoking variables, as well as disease history in some cases, as the significant predictors. After the effect of these predictors had been taken into account, the effect of oil-mist exposure or any other job environment, as measured by the number of years on that job, was found to be not significant. It is concluded that the practical machine shop oil-mist concentrations experienced by the experimental group were not associated with an increase in respiratory symptoms or a decrement in respiratory performance in that group within the sensitivity of the prevalence study described. This conclusion is not inconsistent with those of other studies or with the current Threshold Limit Value. --Cond. from text

- 1284 METABOLISM OF ETHYLMERCURIC CHLORIDE -- ^{203}Hg IN RATS. Y. Takeda and T. Ukita. *Tox. & Appl. Pharmacol.* 17, 181-188 (July 1970)

Methods for the analysis of the mercury compounds in biological samples were established and applied to the investigation of the metabolic fate of ethylmercuric chloride -- ^{203}Hg in rats. Analyses of mercury compounds contained in the liver, kidney, urine, and feces of rats treated with ethylmercuric chloride -- ^{203}Hg (20 mg Hg/kg.sc) indicated that the content of organic mercury in the kidney was higher than in the liver, that the former increased with time, and that the organic mercury content in feces was higher than in the urine. The organic mercury compound in these organs and excreta was identified as the ethylmercury derivative, and mercury metabolites other than inorganic mercury were not detected. The mercury compound seemed to be bound to protein in the organs. --Authors' abst.

- 1285 METABOLIC FATE OF GOSSYPOL: THE METABOLISM OF GOSSYPOL -- ^{14}C IN LAYING HENS. M. B. Abou-Donia and C. M. Lyman. *Tox. & Appl. Pharmacol.* 17, 160-173 (July 1970)

Orally administered formyl -- ^{14}C -labeled gossypol was rapidly excreted by laying hens into the urine and feces. Only a small portion was deposited in the tissues. A major part of the absorbed gossypol was concentrated in the eggs. The excretion of gossypol into the intestine via the bile seemed to be a major pathway by which absorbed gossypol was excreted. The decarbonylation of gossypol to carbon dioxide and apogossypol was not a major route for gossypol metabolism in the laying hen. The time necessary to eliminate one-half of the radioactive gossypol (10 mg, 0.35 μCi) from the bird body (1 kg) under the conditions used was found to be 30 hr. --Authors' abst.

INDUSTRIAL DUSTS

- 1286 COALWORKERS' PNEUMOCONIOSIS: A REVIEW. J. Rogan. *J. Occ. Med.* 12, 321-324 (Aug. 1970)

Coalworkers' pneumoconiosis can be defined as the tissue response to prolonged retention in the lungs of abnormal amounts of dust derived from coal-mining operations in the first instance. It exists in two forms: simple, which is much the commoner; and complicated, which is rarer. Simple pneumoconiosis is caused by the inhalation and retention of excessive amounts of airborne dust. The causation of complicated pneumoconiosis has been the subject of much speculation and research for many years. Many etiological theories have been propounded but none has been proven. Therefore, rather than recapitulate them at length, it may be more profitable to point out that the attack rate of com-

plicated pneumoconiosis, which invariably supervenes on a background of simple pneumoconiosis, increases markedly as simple pneumoconiosis advances in severity. The characteristic pathological picture of simple pneumoconiosis is of many small separate collections of dust which lie along and around the bronchioles before they open into the alveoli. The coal dust is interspersed with strands of reticulin with an occasional strand of collagen. In complicated pneumoconiosis, a single mass of collagenous fibrous tissue develops in the lung substance, usually in the upper part of the lung. Diagnosis, Epidemiology, Prevention and Compensation Aspects are also discussed. --Cond. from text

- 1287 THE APPROACH TO AIRBORNE DUST MEASUREMENT IN BRITISH COAL MINES. W. H. Walton. *Staub Reinhalt. Luft.* 29, 32-38 (March 1969)

An account is given of the changing methods of airborne dust measurement used in British coal mines and of the reasons for these changes. It is expected that gravimetric standards and sampling procedures, based on the MRE Gravimetric Dust Sampler, will be introduced shortly, replacing particle number standards based on the thermal precipitator. The new standards will be derived from the results of the National Coal Board's Pneumoconiosis Field Research. The general levels of the coal-face dust concentrations existing in the collieries studied by the Research are indicated.

--Author's summary

- 1288 DO-IT-YOURSELF DUST SUPPRESSION SYSTEM SAVES MONEY. R. C. Vance. *Plant Eng.* 24, 84-85 (July 23, 1970)

High levels of dust generation have long been associated with the stone processing industry, and current public opinion and legislative trends are forcing the industry to take rapid action to correct the situation. High effectiveness in dust suppression need not be equated, however, with high cost systems. In one company, it was found that by designing and building their own, superior dust control could be obtained at a minimum cost. Although there were many dust suppression systems commercially available, after checking costs and considering their fabrication and maintenance capabilities, they decided to build one. Although their do-it-yourself dust suppression system, details of which are given by the author, may not be as sophisticated as some of those commercially available, it saved them money and more than met their expectations.

--Cond. from text

- 1289 CONTROLS FOR CLEAR AIR. Anon. *Occ. Hazards* 32, 37 (Aug. 1970)

Respiratory protective devices, for all their indisputable importance, are, according to the American National Standard Institute and the Bureau of Mines, the second line of defense against airborne contaminants. First choice should be built-in dust, mist, and fume control systems. Various dust, mist, and fume control systems and their application are discussed.

--Cond. from text

- 1290 NATURAL AIR CIRCULATION AND ITS ROLE IN DUST SUPPRESSION. L. Oppl *Staub Reinhalt. Luft.* 29, 23-26 (May 1969)

In analogy to the equation for heat exchange between the air circulating in enclosed spaces in industrial plants and the supplied air, and expression for the concentration coefficient is derived which gives the ratio of dust concentration within the working place range to the dust concentration in the exhaust air. The relationship between the concentration coefficient and temperature coefficient is determined on the basis of measurements carried out in metallurgical works, and values for concentration coefficients are given for characteristic heat and dust sources.--Author's summary

- 1291 THE VENTURI SCRUBBER DEVELOPMENT, MODE OF OPERATION AND POWER REQUIREMENTS. R. Nagel. *Reinhalt. Luft.* 29, 1-9 (April 1969)

The development of the Venturi scrubber from the turn of the century is described and its mode of operation is then considered. A difference is made here between the impact effect, which mainly occurs in the throat during lateral injecting and affects coarse particles, and the contact and diffusion effect, which, in the case of axial injecting and as a result of fine atomization, is the main effect occurring in the diffuser. The power requirements are also discussed. The Venturi scrubber is considered as a part of a pneumatic conveying plant, that is, as an acceleration path at the feeding point. Some general conclusions are then drawn from these considerations.

--Author's summary

- 1292 SIGNIFICANCE OF THE PARTICLE SIZE DISTRIBUTION IN THE MEASUREMENT AND CONTROL OF SUSPENDED DUST IN COAL MINING. H. Breuer. *Staub Reinhalt. Luft.* 29, 22-32 (March 1969)

The BAT instrument with preliminary separation of nonrespirable dust by a cyclone is used for determining the characteristic value for fineness of suspended dust and of its components. This characteristic value makes it possible to show the influence of particle size distribution on the scattered-light intensity for fine dust, measured by means of a Tyndall cone, and on the scattered light intensity for konimeter dust samples, measured photometrically. The measured values for fine dust, obtained by gravimetric dust measuring instruments of different preliminary separations, comprise the different particle size distributions of suspended dust and also the different separation characteristics of the preliminary separators. In the case of suspended dust precipitation from an air current by water drops, and also in the case of dust removal by suction and precipitation in dust removal installations, the particle size distribution has essential influence on the separation efficiency.

--Author's summary

- 1293 WET SCRUBBERS: DEVELOPMENT AND TEST STAND RESULTS. H. Becker, H. Breuer and L.-H. Engels. *Staub Reinhalt. Luft.* 29, 8-13 (March 1969)

The requirements with regard to the methods and designs to be used in dust removal technology for coal mining are to a large extent unknown in other branches of industry. Dust separators based on wet methods were the main object of the investigations carried out in recent years. The paper shows the capacity ranges for low-pressure, medium-pressure and high-pressure wet dust separators, and also the functional relationships obtained for separation under specific conditions. The aspects to be considered in the selection of the dust separators investigated are discussed, and characteristic relationships for the efficiency of wet dust separators are summarized.

--Authors' summary

- 1294 DEVELOPMENT AND APPLICATION OF INSTRUMENTS FOR SUCTION REMOVAL OF DEPOSITED DUST IN UNDERGROUND MINES. H.-D. Bauer. *Staub Reinhalt. Luft.* 29, 38-44 (March 1969)

Four different ranges are distinguished as regards the removal of deposited dust in underground coal mining. (1) Dust removal by suction from a flat floor, in most cases covered with concrete (for example, in the range of a shaft); (2) Dust removal by suction from an uneven floor usually covered with crushed rock (for example, in the main galleries); (3) Dust removal by suction from uneven floor which in most cases is not covered with crushed rock (for example, in working galleries); (4) Dust removal by suction from sides of a gallery. Development of a practical experience with dust suction apparatus and dust separation devices suitable for the first three cases are reported. No solution has as yet been found of the problem of dust removal by suction from the sides of galleries.

--Author's summary

- 1295 SILICOSIS, DUST CONDITIONS AND DUST CONTROL IN SWEDEN. A. Ahlmark. *Staub Reinhalt. Luft.* 29, 1-6 (Jan. 1969)

A survey is given of the morbidity of silicosis in Sweden during the last years in correlation to the population exposed to dust in various occupations and their times of exposure. Airborne dust and its concentrations of SiO_2 was examined in altogether about 19,000 gravimetric and impinger samples from about 900 representative sampling sites in mines, stone industries, construction work, steelworks, foundries, and ceramic industries. The best conditions were found in steel foundries and in the porcelain industry (90% of sampling sites "acceptable"), the worst in the quartz industry and in construction work (45-50% "acceptable" sites). Periodic examinations of airborne dust are recommended in industries with a dust hazard. The amount of total dust as a rule should not exceed $90/(\% \text{SiO}_2 + 5)$ mg/m^3 . --Author's summary

- 1296 DIRECT X-RAY DIFFRACTION QUANTITATIVE ANALYSIS OF QUARTZ IN INDUSTRIAL DUST FILMS DEPOSITED ON SILVER MEMBRANE FILTERS. Jean Leroux and C. A. Powers. *Staub Reinhalt. Luft.* 29, 26-31 (May 1969)

This new technique permits the direct analysis of quartz in samples covering a circular area of 8 cm^2 and weighing between 0.2 and 1.0 mg. These samples are collected at the source in the respirable size only. They are analysed by reference to standard samples of quartz obtained by a method discussed in a preceding paper. Use of pure silver membrane instead of organic filter and of molybdenum radiation instead of other commonly used radiations, such as Cu, Co or Cr radiations is discussed. The method is accurate and sensitive with samples containing $10 \mu\text{g}$ of quartz/ cm^2 . --Authors' summary

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 1297 LOW-FREQUENCY NOISE THRESHOLDS. N. S. Yeowart, M. E. Bryan and W. Tempest. *J. Sound Vib.* 9, 447-453 (March 1969)

The absolute threshold of hearing for octave bands of noise with centre frequencies from 125 to 4 Hz has been determined. The results show that the noise threshold behaves in a similar fashion to the tone threshold, but below 32 Hz noise thresholds are more sensitive by a small but significant amount. A hypothesis is advanced that from about 15 Hz downwards the detection process changes and depends on the hearing of individual pressure peaks in the signal presented. Approximate calculations and some experiments on electrical detector circuits with some of the known properties of the ear both agree reasonably with the experimental result that for the 4 Hz octave the noise threshold is 4.1 ± 0.5 dB more sensitive than the tone threshold. --Authors' abst.

- 1298 NOISE-FOURTH FORM OF POLLUTION. S. S. Miller. *Environ. Sci. Technol.* 4, 720-722 (Sept. 1970)

Like other forms of pollution, noise is a by-product of twentieth century technology. But unlike other forms of pollution, noise is not persistent, not cumulative, and not transported over great distances by the atmosphere. Noise dies out rapidly once the noise generation process stops. There are essentially 3 ways to reduce noise. The first approach is to reduce noise at the source. Examples of this are the design and production of quieter aircraft engines, highway tires, industrial machinery, and home appliances. A second approach is operational in nature. This approach is being followed by major airlines in their normally scheduled flights by following certain noise abatement takeoff and landing procedures at major airports in the country. The enclosure of machinery with sound absorbing materials is an example of the industrial operational noise reduction pattern already practiced by some industries. The third is personnel protection through the wearing of devices such as ear plugs or ear muffs. In some cases, the second and third approaches are combined to reduce exposure to the lowest practicable levels. --Cond. from text

1299 LIST OF "A" SCALE NOISE MEASUREMENTS. Anon. *Safety Standards* 19, 21-25 (Sept./Oct. 1970)

Early in the 1950's, a survey of industrial noise was conducted to assess the occupational hearing loss potential at that time. Measurements were made at 580 employee locations in 40 different plants of 12 diverse manufacturing industries. The tables show the A-weighted sound levels of noises measured at machine and work areas for each industrial group. These A-weighted sound levels, which were calculated from octave band sound pressure levels, are intended only to be indicative and those found elsewhere in similar circumstances may be quite different. Safety Standards continues this list from the last issue.

--Editors' abst.

1300 EVALUATION OF ANTIMOTION SICKNESS DRUGS: A NEW EFFECTIVE REMEDY REVEALED. C. D. Wood and A. Graybiel. *Aerospace Med.* 41, 932-933 (Aug. 1970)

Three single drugs (one used in three dosage levels) and three drug combinations were compared in their effectiveness to prevent motion sickness under standardized stress conditions in a slow rotation room. An unexpected finding was that a combination of promethazine 25 mg with d-amphetamine 10 mg had the same range of effectiveness as that found in earlier studies (and confirmed here) for scopolamine 0.6 mg plus d-amphetamine 10 mg. When scopolamine was tested alone, halving the "usual" dose (0.6 mg) reduced its effectiveness about one-fifth and doubling the usual dose increased effectiveness by 29 percent; thus the optimum dose of scopolamine appeared to be approximately 0.5 mg. Betanistine hydrochloride (4 mg) was ineffective and cinnarizine (50 mg) was of small benefit.

--Authors' abst.

RADIOACTIVITY AND X-RADIATION

1301 THE HAZARDOUS EFFECTS OF LASER RADIATION ON THE EYE. B. Tengroth. *Acc. & Med. Hazards in Ophthalmol. Eur. Soc. Ophthalmol., Cong; 3rd. Proc.* 338-342 (1969)

Discussion of the present state of knowledge concerning the effect of laser radiation on the eye. Investigations conducted for the purpose of developing safety regulations are mentioned. Other studies were started in order to quantify the amount of light necessary to cause coagulation for retinal detachment surgery. The transmission of laser light through the optical media of the eye is considered. It is found that very little is known about the character of some physical phenomena connected with high photon densities and what they actually mean in biological tissues. It is concluded that, because of the present lack of knowledge in the laser field, it is difficult to defend the use of the laser in surgery.

--Aerosp. Med. Abstracts

1302 BIOLOGICAL EFFECTS OF LASER RADIATION. M. N. Stein. *Soc. Photo-Opt. Inst. Eng. 13th Ann. Sym. Proc.* 419-420 (1969)

Discussion of the biological hazards arising from the use of laser technology. It is pointed out that the eye is undoubtedly the most vulnerable organ to exposure because it is often a part of the system or apparatus being employed. Although a single accident, mild lesion on the retina will produce only a small blind spot in the visual field of the injured person, it is undesirable. An additional hazard may arise from transscleral exposure to a relatively intense laser beam. Although the surface effects may be a simple burn, which can be treated and will heal with relatively little permanent damage, it has been discovered in experiments with rabbits that occasionally a severe and unusual form of cataract is produced. It is noted that perhaps one of the most urgent requirements in the biomedical field is for a source of basic data on the physical properties of biological tissue, cells, and cell components.

--Aerosp. Med. Abstracts

- 1303 US AIR FORCE PERMISSIBLE EXPOSURE LEVELS FOR LASER IRRADIATION. J. A. Carpenter, et al. *Arch. Environ. Health* 20, 171-176 (Feb. 1970)

As the laser has progressed from an interesting phenomenon to viable engineered systems with a myriad of applications, the concern of the medical community has increased in regard to the biological effect of human exposure to laser irradiation. The focusing effect of the eye and the great degree of collimation in a laser beam characterize ocular exposures as the principal hazard. It has been well established that the deposition of large energy or power densities upon the human retina will create lesions which could cause permanent blindness. The Surgeon General's Office of the US Air Force has addressed itself to this problem, and the establishment of a biomedical research program to attain a solution has resulted at the US Air Force School of Aerospace Medicine. Monkeys were utilized as experimental species, due to their comparable optical quality to human systems. Tabulations are given for the safe laser radiation exposure levels for ruby, neodymium, argon, and carbon dioxide lasers.

--Cond. from text

ENVIRONMENTAL MEASUREMENTS

- 1304 MONITORING CARBON MONOXIDE IN AMBIENT AIR. R. S. Ajemian and H. E. Whitman. *J. Air. Poll. Control Assn.* 20, 310-311 (May 1970)

Using a sequential air sampler and plastic bags, ambient air samples can be collected for monitoring carbon monoxide levels over a 24-hr. period. The carbon monoxide concentration is determined by catalytic conversion to methane and the methane is analyzed using a gas chromatograph with a flame ionization detector.

--Authors' abst.

- 1305 A SIMPLE, PORTABLE DEVICE FOR THE CONTINUOUS MEASUREMENT OF THE CONCENTRATION OF SUSPENDED MATTER AND TRACE GASES IN THE OUTSIDE AIR. M. Benarie and D. Bodin. *Staub Reinhalt. Luft.* 29, 26-29 (June 1969)

An instrument is described in which an air stream is generated by catalytic oxidation of methanol. In this way the air can be sucked through an electroprecipitator or through a layer of gas absorbent. The amount of aspirated air is about 1000 times the methanol mass.

--Authors' summary

- 1306 PREPARATION OF THIN DUST LAYERS FOR X-RAY EMISSION AND DIFFRACTION ANALYSIS. Jean Leroux. *Staub Reinhalt. Luft.* 29, 33-36 (April 1969)

A device and technique have been developed for preparing thin dust coatings ($10 \mu\text{g}/\text{cm}^2$ to $25 \text{ mg}/\text{cm}^2$) in a minimum of time (3 to 10 seconds), with a minimum of space (bench space of device: $30 \times 15 \times 60 \text{ cm}$) and of material. Samples obtained are used as standards in direct analysis of air pollution and industrial dust samples by X-ray emission and diffraction.

--Author's abst.

- 1307 MECHANISMS OF FORMATION OF SULFUR OXIDES IN COMBUSTION. A. Levy, E. L. Merryman, and W. T. Reid. *Environ. Sci. Technol.* 4, 653-662 (Aug. 1970)

The chemistry of sulfur oxidation processes is reviewed with respect to the kinetics and mechanisms of the various processes involved. Sulfur, hydrogen sulfide, carbon disulfide, methyl sulfide, and methyl mercaptan oxidation processes are examined. Detailed examination of the kinetics and mechanism of hydrogen sulfide oxidation is made based on slow reaction, fast (explosion) reaction, flash photolysis, and flame microstructure studies of hydrogen sulfide--oxygen systems. Special attention

is given to the role of the lower oxides, SO_2 and S_2O , in developing the mechanisms of SO_2 formation. The inhibiting effect of SO_2 on a number of combustion processes and the homogeneous formation and depletion of SO_3 in flames via the reaction of O atoms with SO_2 and SO_3 are also reviewed.

--Authors' abst.

- 1308 METHODICAL INVESTIGATIONS OF DUSTFALL MEASUREMENTS. A. Deuber, A. Gilgen and E. Grandjean. *Staub Reinhalt. Luft.* 29, 21-28 (April 1969)

The tests carried out with different measuring methods to be used for measuring dust precipitation in Zurich led to the selection of the Bergerhoff instrument. It results from experiments carried out with the instrument that sulphur oxide and nitric oxide are oxidised in the apparatus to sulphations of nitrations. Investigations into the problem of installation of measuring points have shown that it is difficult to select measuring points at ground level; in Zurich roofs have, therefore, been used for this purpose. It has been found that the height above the roof level is important; as a result of tests 2 m have been recommended as the suitable height. A method is proposed for determining the minimum number of measurements taking into account specific accuracy requirements; the method omits requirements as to the form of measuring values distribution.

--Authors' summary

- 1309 A STUDY OF SULFUR DIOXIDE IN PHOTOCHEMICAL SMOG: EFFECT OF SO_2 AND WATER VAPOR CONCENTRATION IN THE 1-BUTENE/ NO_x / SO_2 SYSTEM. W. E. Wilson, Jr. and A. Levy. *J. Air Poll. Control Assn.* 20 385-390 (June 1970)

There is an appreciable chemical interaction between SO_2 and photochemical smog which depends on the concentration of SO_2 and water vapor. The rate of decay of SO_2 concentration is greatly increased in the presence of photochemical smog. With 0.75 ppm SO_2 , a light-scattering aerosol is produced in dry systems and systems at 22 and 55% relative humidity (RH). Aerosol is not observed until after the NO_2 peak has been reached and the NO concentration has fallen to a very low value. The formation of aerosol corresponds in time to the region of most rapid decrease in the SO_2 profile. In systems at 65% RH or with smaller amounts of SO_2 , no light scattering is observed, but the percentage of SO_2 disappearing is greater. In relatively dry systems the presence of SO_2 results in a general slowing down of the photochemical smog reactions. In systems containing water vapor concentrations comparable to those found in the atmosphere, the inhibiting influence of SO_2 on the smog reaction is less pronounced. However, the maximum concentration of oxidant produced by the photochemical smog reactions is significantly lower when SO_2 is present.

--Authors' abst.

- 1310 GASEOUS NITROGEN COMPOUND POLLUTANTS FROM URBAN AND NATURAL SOURCES. E. Robinson and R. C. Robbins. *J. Air Poll. Control Assn.* 20, 303-306 (May 1970)

Major aspects of the circulation through the atmospheric environment of a number of gaseous nitrogen pollutants have been estimated, including source magnitudes, residual atmospheric concentrations, and scavenging processes. The compounds considered include the major nitrogen oxide pollutants, as well as ammonia and nitrous oxide. Background concentrations of the various nitrogen compounds have been estimated. In the global atmospheric nitrogen cycle, pollutant emissions of NO_2 play only a minor role relative to the natural sources. The atmospheric nitrogen cycle is apparently dominated by natural emissions of ammonia, nitric oxide, and nitrous oxide. Scavenging mechanisms for removing nitrogen compounds from the atmosphere include surface reactions, the formation of nitrate and ammonium aerosols, and the biological reduction of nitrous oxide. Photochemical processes in the stratosphere are well known in the nitrous oxide cycle, but they appear to be less important than biological processes.

--Authors' abst.

- 1311 THE DETERMINATION OF FORMALDEHYDE, ACROLEIN, AND LOW MOLECULAR WEIGHT ALDEHYDES IN INDUSTRIAL EMISSIONS ON A SINGLE COLLECTION SAMPLE. D. A. Levaggi and M. Feldstein. *J. Air. Poll. Control Assn.* 20, 312-313 (May 1970)

Formaldehyde, acrolein, and low molecular weight aldehydes are collected in 1% NaHSO₃ solution in Greenberg-Smith or midget impingers from industrial effluents. Efficiency of collection is excellent when two impingers are used in series. Formaldehyde is measured in an aliquot of the collection medium by the chromotropic acid procedure, acrolein by a modified mercuric-chloride-hexylresorcinol procedure, and C₂-C₅ aldehydes by a gas chromatographic procedure. The method permits the analysis of all C₁-C₅ aldehydes on a single collection sample. Data on aldehyde concentrations from a variety of effluents are presented.

--Authors' abst.

- 1312 FLEXIBILITY OF X-RAY EMISSION SPECTROGRAPHY AS ADAPTED TO MICROANALYSIS OF AIR POLLUTANTS. J. Leroux and M. Mahmud. *J. Air Poll. Control Assn.* 20, 402-404 (June 1970)

Methods previously published by this laboratory for analyzing thin dust coatings of airborne particulates have been further evaluated, as applied to vast air pollution surveys. It was demonstrated that choice of glass fiber filters adapted to high-volume samplers restricts the analysis to a limited number of elements, such as lead. More flexibility and versatility are attained through the use of organic membrane filters mounted in small plastic monitors which permit multielemental analysis at least as accurately as with other popular but time-consuming techniques. These qualities of speed and accuracy allow shorter intervals of sampling which are normally required for better statistical assessment of broad air pollution surveys. Sensitivity of the technique reaches a value close to 0.05 µg/m³, while time of analysis required is about five minutes per element after receipt of the sample.

--Authors' abst.

PREVENTIVE ENGINEERING

- 1313 COMBUSTIBLE GAS DETECTORS. D. R. McFee. *Nat'l. Safety News* 102, 55-60 (Aug. 1970)

In areas where combustible gases are used combustible gas detection systems are an indispensable part of safety. Well-designed process equipment should employ engineered safeguards that compensate for leakage and accidental release. Unfortunately, neither man nor his designs are perfect, and leaks and accidental releases sometimes go unnoticed -- especially when detection equipment is not utilized. The recent and quickly expanding use of liquified gases, such as liquid hydrogen, makes the need for safe, reliable detection systems imperative and has caused a renewed interest in combustible gas detectors. Fire and explosion potentials of many of the gases make assured detection a necessity. Such assurance can be accomplished through proper evaluation and procedures for evaluating several combustible gas detection systems (for hydrogen and propane) are described in this article. Each characteristic or feature of the gas detection system related to safety was examined. Test specifications were established, and each system was evaluated relative to that characteristic or feature.

--Author's introduction

- 1314 CROSS-CONNECTED SYSTEM SAVES WATER AND DOLLARS. W. F. Koester. *Plant Eng.* 24, 66-67 (Aug. 20, 1970)

The use of a water conservation system by a manufacturing plant to save water and money is discussed. A schematic of the water system diagram shows a very high ratio of water in circulation to water consumed. 28.5 million gal per day are pumped but only 1.6 million gal per day are consumed in

nonrecovery processes, sanitary facilities and evaporation and drift from the cooling tower. This is about an 18 to 1 ratio of water circulated to water consumed. The ratio was considerably higher when the steam turbogenerators were built and large quantities of water for test floor cooling were needed. It will probably increase again now that it is planned to resume turbogenerator manufacturing.

--Cond. from text

- 1315 INDUSTRY'S ROLE IN THE CLEAN WATER BATTLE. W. J. Hickel. *Plant Eng.* 24, 66-69 (July 23, 1970)

Plant engineers have a critical stake in the search for improved environmental quality, specifically in reclaiming our water resources. The inescapable fact is that industry ranks high as a polluter of the nation's water supply. There are no overnight cure-alls for our water quality dilemma. But bold, innovative steps and decisions are being made today to attain the momentum needed tomorrow. Ideally, a process for treating wastes from an industry should: (1) Effect the removal of the pollutant at minimum cost. (2) Provide for the economical recovery of any valuable byproducts. (3) Permit the recycling of recovered materials, including water. (4) Operate at minimum cost, and (5) Require relatively low capital investment. In attacking their water pollution problems, industries and cities can work out arrangements mutually beneficial by teaming up in joint treatment systems.

--Cond. from text

- 1316 CRITERIA FOR THE INSTALLATION OF LABORATORY FUME HOODS. B. Feiner. *Ind. Hyg. Rev.* 11, 17-19 (Dec. 1969)

The increasing sophistication of industrial research and development, particularly in the electronics and aerospace industries, has resulted in a marked increase in the use of laboratory fume hoods to meet special needs. Since industrial research and development laboratories are under the jurisdiction of the State Labor Department, plans for laboratory hood exhaust systems must be submitted for approval. This article contains criteria and recommendations based on the experience of the Division of Industrial Hygiene in evaluating the design and effectiveness of various types of laboratory hoods.

--Cond. from text

- 1317 "GAS DIFFUSER" -- A CONTINUOUSLY OPERATING METERING DEVICE WITH A DIFFUSION RATE RANGING FROM μ g TO mg. H. Kettner. *Staub Reinhalt. Luft.* 29, 28-30 (April 1969)

A gas proportioning instrument has been developed which operates on the basis of diffusion through a permeable, mechanically controllable material, at a diffusion rate from μ g to mg per hour. With the help of this instrument it is possible to imitate in a simple way the concentration of injurious material as it occurs in working places and in the atmospheric air. The cartridges filled previously with sulphur dioxide and chlorine deliver uniform quantities of material at constant temperature; charging with other gases and liquids has been tested.

--Author's summary

- 1318 CLOSEUP ON RESPIRATORY PROTECTION. . . A MATTER OF LIFE AND BREATH. Anon. *Occ. Hazards* 32, 34-38 (Aug. 1970)

Safety directors, manufacturers, and Bureau of Mines experts describe what is new in respiratory protective equipment and how best to use it.

--Editors' abst.

- 1319 SIMULTANEOUS REMOVAL OF FLY ASH AND SO₂ FROM GAS STREAMS BY A SHAFT-FILTER-SORBER. R. L. Zahradnik, et al. *Environ. Sci. Technol.* 4, 663-667 (Aug. 1970)

A shaft-filter-sorber has been shown to be an effective device for the simultaneous removal of SO₂ and fly ash from gas streams. A shaft-filter-sorber consists of a bed of slowly falling sorbent pebbles through which a gas stream to be cleaned passes horizontally. A number of tests that use alkalized alumina as sorbent have shown that complete SO₂ removal and 99 + % filtration efficiency are possible at gas mass velocities of 150 lb./hr. ft.² and dust loadings in excess of 3 grains per s.c.f. The SO₂ removal is predictable on the basis of static bed experiments, and a design curve based on this prediction is presented as a means of projecting removal efficiencies at higher gas velocities.

--Authors' abst.

- 1320 PENNSYLVANIA MOVES TO SOLVE SOLID WASTE PROBLEM. H. Steigman. *J. Environ. Health* 33, 85-88 (July/Aug. 1970)

Pennsylvania is completing a plan for a statewide solid waste management system based on 11 regional plans which in turn have county and multi-county plans fed into them. The plan was assisted by a solid waste planning grant from the Bureau of Solid Waste Management, PL 89-272. The Pennsylvania legislature recognized the need for a regional approach to solid waste management and passed a solid waste management act in 1968 which provided for 50 per cent grants to local government for planning solid waste management systems and further required them to implement their plans. The staff of the state health department has provided technical assistance to governmental jurisdictions, private industry and non-profit organizations to develop area-wide solid waste management plans, recycling of waste materials, transportation by rail and truck, as well as developing studies and investigations of special problems. The Pennsylvania Solid Waste Management Act passed July 31, 1968, provides for planning and regulation of solid waste storage, collection, transportation, processing and disposal systems. The act provides for protecting the urbanized and urbanizing areas of the state from pollution and public health hazards emanating from improper handling of solid waste. In implementing the Act, the governor appointed an advisory committee which worked with the Health Department staff to develop the first guidelines for solid waste management by municipalities. These guidelines indicated the task descriptions required and included the location and description of the study area, transportation network, solid waste generated and where they are located, the proposed solid waste management system with schedules for adoption and capital costs. Two years are allowed to complete and submit solid waste management plans. That means they will be submitted for review and approval by January, 1971.

--Cond. from text

- 1321 THE EFFECT OF ODOR CONTROL ON A KRAFT MILL ENERGY BALANCE. J. E. Roberson. *J. Air Poll. Control Assn.* 20, 373-376 (June 1970)

Any mill will have its own unique considerations; therefore, capital cost, operating cost, and acceptable emission levels must all be considered before arriving at a total evaluation of a recovery odor control system. Further, the energy costs in this paper are based on new recovery and multiple effect evaporator installation and assume that the turbine generator condenser is not operating at minimum condensing load. Modifications to existing recovery boiler or evaporator systems may drastically influence these energy costs. However, the annual fuel cost differences and chemical savings illustrate that these may be significant and should be considered in a proper evaluation. Other evaluations on some of these cases have been prepared which indicate that the newer designs omitting the direct contact evaporator may be economically justified.

--Author's summary modified

01 132 5099

- 1322 WATER-POLLUTION CONCLAVE AIRS NEW TREATMENT SCHEMES. R. Remfrez. *Chem. Eng.* 77, 40,42 (Sept. 7, 1970)

San Francisco's international conference on water-pollution control highlighted a coagulating agent that works over a broad pH range, a sludge treatment method that may yield an animal food, and a biological-chemical process for wastewater cleanup. At a session on phosphate removal, data were presented to show that wastewater can be improved by adding lanthanum salts instead of more-conventional coagulating agents--e.g., aluminum, calcium and iron salts. Discussion of a new method for improving the processability of activated sludge caught the audience's attention. --Cond. from text

- 1323 VENTILATION METHODS FOR CONTAMINANT CONTROL. Anon. *Nat'l. Safety News* 102, 46-54 (Aug. 1970)

Industrial dusts and fumes, in one sense, present a problem of microcosm in the ecology question: We are introducing new ingredients into our work environments faster than we can cope with their effects. The evolution of new chemicals, materials, and processes brings a new importance to control of dusts and fumes. Not only are we introducing new substances; we are beginning to realize the long-term effects of some older ones. This paper presents an outline of various methods that are available, and a comprehensive discussion on exhaust and ventilation procedures. --Cond. from text

COMMUNITY AIR HYGIENE

- 1324 DEACTIVATION OF AUTOMOBILE EXHAUST CONTROL CATALYST. R. M. Yarrington and W. E. Bambrick. *J. Air Poll. Control Assn.* 20, 398-401 (June 1970)

A catalytic converter for controlling automobile exhaust emissions was evaluated in California in 1964. Results from this fleet test and subsequent analysis of the spent catalyst are presented. Statistical analysis of dynamometer test results indicates a strong effect of tetraethyl lead content of the gasoline on activity decline. Analysis of spent catalyst revealed that both surface area and accumulated lead are major factors in activity decline. Above 100 m²/g a further increase in surface area at constant lead level resulted in a decline in activity. --Authors' abst.

- 1325 A CORRELATION OF FIELD OBSERVATIONS OF PLUME RISE. J. A. Fay, M. Escudier, and D. P. Hoult. *J. Air Poll. Control Assn.* 20, 391-397 (June 1970)

Data from 137 sets of plume observations, comprising nearly 1500 data points, are correlated with two simple formulae. These formulae, one for the buoyancy-dominated rise region and the other for the stratification-dominated levelled-off region of a plume, represent an approximate form of the entrainment theory for the case of uniform atmospheric stratification and zero wind shear. The observations were made of plumes whose source strengths ranged from 0.4 to 111 Mw and which were emitted from stacks of heights between 21 and 183 m. The two formulae are found to correlate the data equally well over all values of the stack exit and meteorological parameters, provided only that the bulk mean velocity of the stack gases exceeds the mean wind speed by at least 20%. The ratio of observed to calculated plume rise is found to be distributed log normally about the mean value. The median rise at large distances downstream was found to differ insignificantly from that given by the effective stack height formula recommended recently for large buoyant plumes. Based upon the correlation, two formulae are recommended for computing median plume rise at all distances downstream of the stack. The formulae include an estimate of the expected uncertainty in the predicted rise. --Authors' abst.

- 1326 TECHNIQUES FOR CONTROLLING THE OXIDES OF NITROGEN. L. C. Hardison. *J. Air Poll. Control Assn.* 20, 377-382 (June 1970)

Oxides of nitrogen (NO_x) constitute a family of air contaminants. Much of this comes from automobiles and fuel-burning processes. However, chemical and manufacturing processes, while a relatively small contributor to the problem, also cause such nuisances. This paper will touch briefly on the broad aspects of the problem and will deal specifically with the major techniques currently being applied. The paper first deals with the properties of oxides of nitrogen, particularly as they pertain to air pollution. It then describes the principal way in which nitric acid is produced in the U.S., since the manufacture of nitric acid is a prime source of nuisance problems. The practical solutions now available for solving the NO_x emission problem as it pertains to nitric acid plants are detailed. The principal system now used, catalytic reduction, is fully discussed, including detailed sections on the following design criteria: Color freedom, fuel conversion, and temperature rise. Two-stage reduction is outlined as the solution now available when there is pressure to greatly limit emissions, e.g., to 200 ppm, without regard to color. For those industries using nitric acid to carry out a chemical reaction of one sort or another, both catalytic and thermal reduction systems are described, along with the situations under which each is most applicable.--Author's abst.

- 1327 RELATIONSHIP OF HYDROCARBONS TO OXIDANTS IN AMBIENT ATMOSPHERES. E. A. Schuck, et al. *J. Air Poll. Control Assn.* 20, 297-302 (May 1970)

The relation of ambient levels of hydrocarbons to the products of atmospheric photochemistry has proved to be an elusive problem. Models to account for the photochemical processes are available based on laboratory examination of simulated atmospheres. Likewise, dispersion models are available which, for nonreacting species, can predict air quality given knowledge of emission rates and meteorological variables. However, integration of the dispersion model with the photochemical model is as yet an unsolved problem. In this study an empirical approach was applied in which the only assumption made was that there exists a relationship between early morning average hydrocarbon concentrations and subsequent maximum hourly average oxidant concentrations. A direct examination of all available days in several cities shows that, at any given hydrocarbon level, there exists a limit on the amount of oxidant which can be generated. Specifically it shows that the average 6:00-9:00 A.M. concentration of 0.3 ppm C nonmethane hydrocarbon can be expected to produce a maximum hourly average oxidant concentration of up to 0.1 ppm. --Authors' abst.

- 1328 POTASSIUM FORMATE PROCESS FOR REMOVING SO_2 FROM STACK GAS. P. M. Yavorsky, et al. *Environ. Sci. Technol.* 4, 757-765 (Sept. 1970)

A new process has been developed for removing sulfur dioxide from stack gas, and encompasses absorbent regeneration and sulfur recovery. In stack gas scrubbing, sulfur dioxide is adsorbed by a concentrated potassium formate solution at 200°F ., producing thiosulfate. The spent scrubber solution is transferred to a regeneration unit where the thiosulfate is reacted with additional formate at 540°F . to produce hydrosulfide. The potassium hydrosulfide is stripped with carbon dioxide and steam to release hydrogen sulfide from which elemental sulfur is recovered in a Claus reactor. After stripping, the remaining solution of potassium carbonate and bicarbonate is regenerated to potassium formate by reduction with carbon monoxide at a pressure (including steam) of 1000 p.s.i.a. at 540°F . The formate solution is then recycled to the scrubber. Advantages include an all-liquid recycle system, no gas reheat, and mild conditions for regeneration and sulfur recovery.

--Authors' abst.

- 1329 KISH AND FUME CONTROL AND COLLECTION IN A BASIC OXYGEN PLANT. L. A. Thaxton. *J. Air Poll. Control Assn.* 20, 293-296 (May 1970)

Today, production of steel by the basic oxygen process contributes appreciably to the total United States steel production. In 1968, approximately 46,000,000 tons were produced by this method. The inherent operations in this process have created entirely new air quality control problems and added new twists to the familiar ones. This paper places emphasis on the air quality problems which are inherent in the transfer of hot metal from bottle car to charging ladle. Many codes have, in the past, allowed dust and fume emission during hot metal transfer, pouring, and charging operations. Most areas of the United States now or subsequently will require control of these operations. Two compensating factors are that as a shop brings under control the kish and fumes from the reladling operation, the in-house industrial hygiene problems are reduced appreciably as are the complaints of the mill neighbors. A successfully operable "kish and fume control and collection system" must be predicated on six basic parameters. They are: (1) Control of material at the hood-ladle interface, (2) transport of captured material to a suitable dust and fume arrestor, (3) the extinguishment of incandescent particles of carbon, (4) the essentially total removal from the gas stream of fume and kish, (5) the mechanical and electrical control of a system designed as such to present no interference with normal production procedures, and (6) the final disposal of the collected material.

--Author's abst.

- 1330 THE MEDICAL AND BIOLOGICAL IMPORTANCE OF EXHAUST GASES FROM MOTOR VEHICLES. E. Stresemann. *Staub Reinhalt. Luft.* 29, 11-16 (June 1969)

Motor-car exhaust gases affect more and more the hygienic conditions in Europe. The acute and chronic biological effects of these emissions are discussed on the basis of investigations carried out in laboratory or by medical and epidemiological methods. The effects of the individual components of motor-car exhaust gases are presented, and the basically different nature of acute and chronic effects is discussed in detail. Conclusions with respect to preventive hygiene follow from the final consideration. 58 references.

--Author's summary

- 1331 AERIAL PHOTOGRAPHY TO DETECT AND EVALUATE AIR POLLUTION DAMAGED PONDEROSA PINE. R. H. Larsh, P. R. Miller and S. L. Wert. *J. Air Poll. Control Assn.* 20, 289-292 (May 1970)

Forest stands in the San Gabriel and San Bernardino Mountains of Southern California have been damaged severely by oxidants from Los Angeles smog. Ozone was isolated as the principal toxic oxidant. On an estimated 25,000 acres of damaged forest land, ponderosa pine is the most affected tree species. It has been reported that damage symptoms on pine are commonly exhibited by short, chlorotic needles, accelerated needle abscission, and high branch mortality. A feasibility study was conducted with aerial photography to attempt eventual development of a rapid survey technique for estimating the economic impact of oxidant damage on ponderosa pine in these mountains. Four aerial films and five photographic scales were employed. Anscochrome D-200 color film at scales of 1:7920 and 1:1584 was considered optimum for damage detection and evaluation, respectively.

--Authors' abst. modified

- 1332 ON REDUCING THE EMISSIONS OF HARMFUL SUBSTANCES IN THE EXHAUST GASES OF OTTO ENGINES. K. E. Klücksiek. *Staub Reinhalt. Luft.* 29, 17-26 (June 1969)

The author gives a survey of problems occurring and of practical measures taken in the motor-car industry to reduce emissions. The influence of legislature, concerning motor-car exhaust gases, on

the development of motor-vehicles is discussed in particular. New requirements with regard to research and development planning, and with regard to design and testing departments are outlined. The tasks of quality control in serial production and in service have been considerably extended by the introduction of emission control. --Author's summary

- 1333 EFFECTS OF LONG-TERM CONTINUOUS INHALATION OF OZONE ON EXPERIMENTAL ANIMALS. R. A. Jones, et al. Tox. & Appl. Pharmacol. 17, 189-202 (July 1970)

Rats, guinea pigs, monkeys, dogs, and mice were exposed to 0.26 to 3.0 mg/m³ of ozone in 2 series of studies totaling eight 90-day continuous inhalation exposures and to 4.6 mg/m³ in 1 study using repeated exposure of 8 hr/day, 5 days/week for 6 weeks. Minimal changes were noted at 0.34 mg/m³. Mortality occurred at concentrations higher than 0.34 mg/m³ in all species but the dog, and non-specific inflammatory changes, primarily in the lungs, were noted that appeared to increase in incidence and severity with increasing concentration. --Authors' abst.

- 1334 PIGEONS: A NEW ROLE IN AIR POLLUTION. M. F. Tansy and R. P. Roth. J. Air Poll. Control Assn. 20, 307-309 (May 1970)

A pilot study was conducted to determine the lead content of the various tissues and organs of two groups of wild pigeons. One group was obtained in the City of Philadelphia. The other group was captured in rural Jefferson County, Pennsylvania. Tissue and organ lead content of both groups was assayed by means of atomic absorption spectrophotometry. Each bird was carefully examined to determine the possible presence of imbedded or ingested lead. None was found. The mean lead content per unit weight of the hard tissues of the city pigeons was significantly higher than the corresponding values for the rural birds. The blood lead content of the two groups (a parameter which is often assayed in screenings of chronically exposed human populations) did not reflect a significant difference. Possible sources of lead intake were examined and references to past literature were cited which indicate that the most significant general source of biological lead is probably atmospheric. The routine examination of wild animals that may harbor disease-producing organisms or vectors is a commonly accepted procedure. The authors advance the proposition that the ubiquitous presence of certain animal pests, notably pigeons, may lend itself to a similar monitoring of the chronic uptake of atmospheric metallic pollutants. --Authors' abst.

- 1335 PROTECTING INTERIORS FROM POLLUTION. D. Gordon and D. Standley. Architec. & Eng. News 11, 30-31 (Jan. 1969)

Air pollution, commonly thought of as an outdoor problem, also affects the quality of indoor air. To properly control interior pollution, the entry route of the pollutants must be determined and pollutant control must be an internal part of the design. Control methods, emission control and their costs are discussed. --Cond. from text

MANAGEMENT ASPECTS

- 1336 GUIDELINES FOR DEVELOPMENT OF NEW HEALTH OCCUPATIONS. T. C. Points. J. Am. Med. Assn. 213, 1169-1171 (Aug. 17, 1970)

One approach to increasing the supply of health services is rational delegation of some of the physician's traditional functions in delivery of health care. Such an approach involves reallocating duties between the physician and other health personnel to achieve the best use of skills at each level, and often results in reducing the time input in education required to perform a given health

service. This reallocation of duties can take place in two ways: by expanding the medical service role of existing health occupations, or by creating and recruiting for new career roles to assist the physician. Accordingly, the American Medical Association (AMA) Council on Health Manpower, through its Committee on Emerging Health Manpower, has undertaken responsibility for evaluating the need for and proper role of specific new types of health personnel. To provide a consistent frame of reference from which to conduct its evaluation of such new occupations, the Council on Health Manpower prepared "Guidelines for Development of New Health Occupations," which specify the desirable steps to be taken and questions to be resolved by any group or institution attempting to develop a new health career. These guidelines, which were adopted by the AMA House of Delegates, are reprinted in their entirety at the conclusion of this report. The guidelines in no way represent minimum standards to be met in the development of a new health occupation, but rather suggest optimums to be striven for by the group concerned.

--Cond. from text

1337 FIRST ENVIRONMENT REPORT GOES TO CONGRESS. Anon. *Chem. Eng. News* 48, 29-30 (Aug. 17, 1970)

"Our environmental problems are very serious, indeed urgent, but they do not justify either panic or hysteria," comments President Nixon on the first annual report of the Council of Environmental Quality to Congress. "The problems are highly complex," he continues, "and their resolution will require rational, systematic approaches, hard work, and patience." At the outset, the council points out that there are insufficient environmental quality indicators or systems to monitor the environment with any degree of accuracy. Lack of measurement tools prevents an assessment at this time of the status and trends of the major environmental problems. Industrial water pollution control costs, excluding those for waste heat from power production, are estimated at \$3.3 billion over the next five years. Annual operating costs for industry will go from \$515 million in 1969 to \$715 million in 1974. Another \$2 billion may be necessary to prevent thermal pollution. The paper, organic chemicals, petroleum, and steel industries account for more than half of the volume of industrial wastes discharged into the nation's waterways. President Nixon comments in a message to Congress accompanying the report, that "we face the prospect of ecological disaster." Russell E. Train, chairman of the Council on Environmental Quality agrees, but adds that environmental deterioration can be reversed "if we make the necessary national commitment."

--Cond. from text

1338 ALCOHOLISM: RESOURCES FOR HELPING THE PROBLEM DRINKER. National Industrial Conference Board, Inc. *Ind. Med. & Surg.* 39, 280-294 (July 1970)

As it is now recognized that alcoholism cannot be cured, only arrested, many methods of control are needed. The present article lists and describes means available to employers for aiding the alcoholic, who may be found in all ranks of the organization. Every medical director will find this material of benefit.

--Author's abst.

1339 THE JOINT-CURRICULUM FOR SYSTEMS-SAFETY ENGINEERING. R. L. Street, W. L. Johnson and H. E. Lynch. *J. Am. Soc. Safety Eng.* 15, 28-31 (July 1970)

In 1969, the U.S. Army Materiel Command joined Texas A&M University in a safety-engineering graduate program designed to provide an accelerated training program in systems-safety engineering for graduates who had already attained a bachelor degree in electronics, aerospace, mechanical, electrical, or other engineering specialties. The authors are actual participants in this new joint venture; thus they are able to describe in detail each phase and each semester of this unique joint venture. They claim not only its usefulness in accelerating training in system-design, but also its unique advantages in promoting original research. Complete evaluation of this program will not be

possible until after the first class has graduated (in June 1971) when feedback can be received from the various installations that have employed these graduate safety-engineers. It is felt, however, that the end-product will be a highly competent engineer of professional status, a graduate who is capable both of integrating into any team for system-development and of influencing decisions. In this way not only does the end-product of the development meet the purposes for which the system was created, but it also presents to the government, the user, and the public a system that instills confidence in the inherent safety posture of the design. --Authors' summary and conclusion

1340 THE ATTITUDE CREATES THE SITUATION. H. Blanchard. *Arch. Environ. Health* 21, 113-116 (Aug. 1970)

Time magazine's cover story in the issue of February 21, 1969, criticizing the quality of health services rendered in this country was no news to those genuinely concerned with providing the care we know how to give to the sick and disabled. Only a month before the Time story appeared, the American Journal of Public Health published a hard-hitting article by Walter Reuther, the late President of the United Automobile Workers of America, in which he wrote, "Health care in America is in deep crisis -- not because we lack the resources, not because the medical profession lacks the competence; we are in crisis because we lack a sound, modern, universal system for financing and providing comprehensive, high-quality health care." Were the combined impact of the two articles to compel meaningful attention to the real situation, they would make a notable contribution to everybody's well being. For example, the various components of the health establishment might examine their concepts and practices from every angle: (a) To determine if the health care now given meets today's needs; (b) to find out if the services rendered are those desired; and (c) to enlarge both the scope and creative intelligence spent on health care. Nothing would refute mounting criticism of the health establishment and foster favorable public opinion more quickly than community awareness that such an analysis was honestly in process. Change must come. As one outcome of our current world-wide revolution, millions of men and women are demanding attention and services which they have never had before. Yet, despite recognition of the need for the kind of care that will do an effective job in terms of our times, despite pleas in all media and all places for "comprehensive medical care," the record indicates that we have had more talk about one of comprehensive care's basic elements, ie, prevention, than any meaningful action to achieve it. Has the time not come for the hospital to set about altering its image from that of an essentially sickness-oriented center to that of a health-oriented center? Care for the sick, to be sure, but equal concern for the well to prevent sickness from occurring. This apparently still advanced philosophy of care would entail massive change in emphasis throughout the health ranks but, however difficult to implement, it would answer the demands of our time as no other health proposal has yet done. Many hospital administrators will argue that their staffs are so overworked with doing -- which, in many cases, is true -- that they have neither time, money, nor facilities to undertake the additional responsibilities which a new prevention-oriented concept would require. From their point of view, the necessary community cultivation would only increase the already exorbitant demands on the hospital. To compound their apprehension, the fearful suspect that the new pressures would be not only for beds but for additional programs for which they lack personnel and equipment. This attitude may be understandable but it is archaic and intolerable. A mindful observer must wonder at the number of officials desensitized by the delusion that they are somehow immune to the revolutionary social changes already in progress around them. A recent survey of some 300 medium-size hospitals in selected areas across the country conducted by Market Research Associates under the author's direction gives strong support to the premise that the required change of attitude toward health might well start with improved communication between the medical establishment and the lay community. This survey gives considerable indication that the average hospital really does not know how to speak to the nonpatients in the community, so it does not speak to them at all! --Cond. from text

ACCIDENTS AND PREVENTION

- 1341 THE RESUSCITATION AND INITIAL MANAGEMENT OF THE SEVERELY INJURED. D. R. Boyd and F. A. Folk. *J. Occ. Med.* 12, 262-266 (July 1970)

The initial approach to the management of the severely injured is resuscitative. Only after adequate stabilization of all life-threatening problems can the physician direct his attentions to the matters of diagnostic evaluation. The basic approach to these problems has been outlined. The need for continued and intensive observation of these critically ill patients is emphasized. The clinical response to these resuscitative measures will give additional clues and provide a basis for further diagnostic and therapeutic measures. Prevention of injuries is the ideal, but accidents do happen. Orderly management, planned at leisure to be executed promptly in an emergency, will yield the greatest survival and minimize the duration and extent of disability. --Authors' summary

- 1342 A GUIDE TO EMERGENCY PLANNING AND DISASTER CONTROL. M. Krikorian. *J. Am. Soc. Safety Eng.* 15, 17-21 (Aug. 1970)

Advanced planning is the key to controlling emergencies and disasters in any work-place; for this reason such a plan should be a basic part of every safety and accident-prevention program. The author first presents the general guidelines to follow in setting up a disaster-control plan and then presents a step-by-step outline of specific actions to be taken -- including an organization chart showing how to assign individual responsibility for each step in the plan. Highly valuable as a checklist. --Author's summary

- 1343 SAFETY OF PETROLEUM HYDROCARBONS IN HOUSEHOLD AEROSOLS. G. W. Fiero and M. A. Johnsen. *Soap & Chem. Spec.* p. 48 (Oct. 1969)

The potential hazards associated with the use of the petroleum hydrocarbons propane, n- and iso-butane in aerosols are toxicity and flammability. Toxicity may result from single or repeated exposures which may involve inhalation, aspiration, oral or ingestive toxicity, and contact with the skin or eyes. Considerations of the flammability hazards of hydrocarbon propellants far overshadow those of inhalation. A slight danger from inhalation toxicity appears to commence with n-pentane and increases about 3-fold with each step up the homologous paraffinic series to nonane. Tests with rats conducted by Dr. H. W. Gerarde demonstrated that aerosol sprays and foams containing hydrocarbon solvents do not present a significant aspiration hazard. The acute oral LD₅₀ of these solvents indicates a low order of toxicity. The dermal response to hydrocarbon propellants may be frostbite, photosensitivity, and synergism with other active materials. The effects of selected solvents upon the eyes are listed. --Med. Bull (Std. Oil N.J.) abstracts

- 1344 THE HAZARD DUE TO OUTWARD LEAKAGE OF OXYGEN FROM A FULL FACE MASK. O. G. Griffin and D. J. Longson. *Ann. Occup. Hyg.* 12, 147+ (July 1969)

Oxygen leakage from full face masks was determined over the range of pressure found in breathing apparatus fitted with a manual relief valve. This type of apparatus may permit sufficient outward leakage to create a flammability hazard from 2 of the 4 types of mask examined. There is less leakage from cushion seal masks, and it is likely to be harmless if the pressure does not exceed about 1.2 kN/m² (12 cm on water gauge). The relief valve on the breathing apparatus used has an extremely high resistance to flow, resulting in substantial leakage from all 4 types of mask when the relief valve is operated. Rapid ignition of human hair and the face mask occurred at oxygen leakage rates as small as 0.25 l/min. The need for careful choice of full face masks, for correct fit, and for breathing apparatus supplied with a well-designed automatic relief valve is stressed. --Med. Bull. (Std. Oil N.J.) abstracts

- 1345 AVIATION PATHOLOGY IN GENERAL AVIATION. T. C. Brown and J. C. Lane. *Aerospace Med.* 41, 748-753 (July 1970)

Autopsies as part of the data collection for crash injury studies, began in Australia in 1951. Since 1962 autopsies have been held on all victims of general aviation fatal accidents as an essential part of accident investigation. Pathologists with a forensic science background have been appointed as aviation pathologists. The programme has been of value in detecting pilot incapacity, in providing evidence of accident sequence, in providing the basis for modifications in existing aircraft and in suggesting design requirements. Alcohol, but not carbon monoxide, has been found associated with some fatal accidents. As virtually all Australian accidents are investigated, and since the investigation includes the recording of details of injuries in injury-producing accidents and autopsies in fatal accidents, the resulting data represent an unbiased record of the in-use performance, including the crash protection performance, of general aviation aircraft. --Authors' abst.

- 1346 HOW TO CONTROL STATIC ELECTRICITY IN WORK CLOTHES. D. A. Lyttle. *Environ. Control & Safety Mgmt.* 140, 36-37, 46 (Aug. 1970)

Latest research on fabrics for work clothes reveals a new way to control dangerous static and reduce fire and explosion hazard. Fabrics incorporating static control answer one of the challenges of static electricity in industry. They minimize the charge build-up on an individual moving around in or removing his work clothing. An electrostatic charge built up by scuffing, or any residual charge already on the individual when he puts on garments made from static control fabrics, must be reduced with other static control procedures. --Cond. from text

- 1347 AN EVALUATION OF THE HAZARD CREATED BY NATURAL DEATH AT THE WHEEL. Susan P. Baker and W. U. Spitz. *New Engl. J. Med.* 283, 405-409 (Aug. 20, 1970)

Assessment of the hazard associated with sudden natural death of drivers suggests that the magnitude of the problem does not warrant costly and restrictive control efforts. Investigation of 591 collisions that caused fatal injuries to drivers or pedestrians revealed that none of them resulted from natural death at the wheel. Natural death of a sober driver apparently does not entail measurable risk of death or severe injury to his passengers or other persons. Collisions caused by these deaths are relatively infrequent, representing less than 6 per 10,000 motor-vehicle collisions. Nonfatal medical impairments still need to be explored more precisely before driver examinations and restrictions can be considered justified and effective. --Authors' abst.

- 1348 INTEGRATION OF THE MEDICAL TEAM WITH THE ACCIDENT INVESTIGATION UNIT. V. A. M. Hunt. *Aerospace Med.* 41, 745-747 (July 1970)

The paper opens with a brief summary of the position and powers of the Accidents Investigation Branch in the United Kingdom. It emphasises the importance of meticulous examination of all available information and the value of close participation by medical experts, both with respect to autopsies and other aspects of aviation medicine. It points out that not many states put into practice the formation of a Human Factors Group during an investigation, as suggested by the International Civil Aviation Organisation (ICAO). The paper emphasises the importance of recording the location of bodies with respect to the general wreckage and the retention of clothes and personal belongings with the bodies until after the autopsies are completed and the importance of permitting autopsies to be carried out without delay. The paper concludes with a request for help in assessing why well trained crews on occasion make gross errors in emergency and for assistance in assessing the effect of fatigue and emotional stress. It suggests that a memorandum should be prepared for the guidance of police, coroners and pathologists on the part that medical participation can play in accident investigation. --Author's abst.

- 1349 NEW POSSIBILITIES IN COAL MINE COMMUNICATIONS. Anon. *Environ. Control & Safety Mgmt.* 140, 34-35 (Aug. 1970)

Experiments with two-way wireless transmission of code messages from underground mines may lead to a system replacing conventional wire communication and could have special significance in emergency situations in underground coal mines when conventional wire communications are either disrupted or fail to function. One of the industry's problems until now has been that there was no practical way to transmit high frequency radio signals through the ground except at enormous power levels. The system just unveiled used low frequency signals to accomplish the two-way communication. --Cond. from text

- 1350 INTERPRETATION OF CARBOXYHAEMOGLOBIN FOUND AT POST MORTEM IN VICTIMS OF AIRCRAFT ACCIDENTS. D. J. Blackmore. *Aerospace Med.* 41, 757-759 (July 1970)

The problems of the interpretation of carboxyhaemoglobin saturation as determined on blood taken at post mortem are discussed with relation to errors in methodology; the normal range; endogenous production of carbon monoxide; range of carboxyhaemoglobin saturation following inhalation of the products of combustion and the differentiation between carboxyhaemoglobin subsequent to inhalation of fire and tobacco smoking. Measurement of the carbon monoxide content of a specimen by gas chromatography and comparison with the total haemoglobin content as determined by atomic absorption spectrophotometry and spectrophotometry is the method of choice. Using this technique a carboxyhaemoglobin saturation in excess of 8% is outside the range observed in accident victims not associated with fire. Anomalies can occur in which low carboxyhaemoglobin saturations are observed following inhalation of fire as deduced from pathological and anatomical findings. Carbon monoxide is produced sporadically in stored blood specimens, although at 40°C none was produced in 21 days following deliberate contamination of samples. Staining erythrocytes for the presence of carboxyhaemoglobin has proved a useful adjunct in the assessment of time between inhalation of carbon monoxide and death. --Author's abst.

01 132 5108

INDEX

- Accident(s)
 airplane
 interpretation of carboxyhemoglobin in victims 1350
 use of autopsies for data collection 1345
 automobile
 caused by natural death at wheel 1347
 investigation unit
 integration of medical team 1348
- Acrolein
 determination in industrial emissions 1311
- Aerosols, household
 safety of petroleum hydrocarbons 1343
- Air circulation, natural
 role in dust suppression 1290
- Air pollutants, microanalysis
 flexibility of x-ray emission spectrography 1312
- Air Pollution
 analysis of catalytic converter for controlling exhaust emissions 1324
 correlation of observations of plume rise 1325
 damage to ponderosa pine 1331
 determination of industrial emissions 1311
 effects of long-term inhalation of ozone 1333
 effect on quality of indoor air 1335
 exhaust gases from motor vehicles 1330
 formation of sulfur oxides in combustion 1307
 gaseous nitrogen compounds 1310
 investigations of dustfall measurements 1308
 kish and fume control and collection in oxygen plant 1329
 measurement
 portable device 1305
 preparation of thin dust layers for x-ray diffraction analysis 1306
 monitoring carbon monoxide in ambient air 1304
 reducing emissions in motor vehicles 1332
 relation of hydrocarbons to oxidants in ambient air 1327
 removal of SO₂ from stack gas 1328
 role of pigeons 1334
 sulfur dioxide in photochemical smog 1309
 techniques for controlling oxides of nitrogen 1326
- Alcoholism
 resources for helping problem drinker 1338
- Aldehydes, low molecular weight
 determination in industrial emissions 1311
- Amantadine, evaluation in artificially induced A₂ and B influenza 1273
- Automobile
 accidents, caused by natural death at wheel 1347
 emissions
 medical and biological importance 1330
 reduction 1332
 exhaust, deactivation of control catalyst 1324
- Aviation
 medicine
 accident investigations 1348
 autopsies as data for crash injury studies 1345
 interpretation of carboxyhemoglobin in accident victims 1350
- Benzene vapor
 measurement of occupational exposure 1279
- Book(s)
 emergency 1260
 ergonomics in machine design, vol. 1 1263
 ergonomics in machine design, vol. 2 1263
 international catalogue of occupational safety and health films, 6th edition 1263
 international classification of radiographs of pneumoconioses (1968) 1262
 pathology of the lung 1257
 safety training for the supervisor 1259
 surfactant biodegradation 1258
 viral infections of the human fetus 1263
 what you and your family should know about drugs 1261
- British coal mines
 airborne dust measurements 1287
- Bronchitis
 prospective clinical-pathologic study 1265
- Carbon monoxide, monitoring in ambient air 1304
- Cardiac
 arrest, use of chest pounding as first aid measure 1271
 death, and exercise 1268
 infarct, vectorcardiogram a diagnostic aid 1272
- Chest pounding
 use as first aid measure in cardiac arrest 1271
- Chickens, toxicity of gossypol 1285
- Cigarette smoking
 report of conference on tobacco and health 1266
- Coal mine(s)
 communications, new possibilities 1349
 British, airborne dust measurement 1287
 underground, suction removal of deposited dust 1294
- Coal mining, suspended dust
 significance of particle size distribution 1292
- Coalworkers' pneumoconiosis, review 1286
- Combustible gas detectors for safety 1313
- Communications
 new possibilities in coal mines 1349
- Contamination control, ventilation methods 1323
- Detergents
 potential substitute for phosphates 1280
- Diffuser, gas
 continuously operating metering device 1317
- Disaster control guide 1342
- Drugs, what you should know (bk. rev.) 1261
- Dust(s)
 airborne measurement in British coal mines 1287
 conditions and control in Sweden 1295
 control systems 1289
 do-it-yourself suppression system 1288
 efficiency of wet scrubbers 1293
 measurement and control in coal mining 1292
 operation and power requirements of Venturi scrubber 1291
 preparation of thin layers for x-ray diffraction analysis 1306
 quartz, x-ray diffraction analysis 1296
 suppression, role of natural air circulation 1290
 suction removal of deposited in underground mines 1294
- Dustfall measurements, investigations 1308

<u>Electricity, static</u>		<u>Kish, control and collection in oxygen plant</u>	1329
control in work clothes	1346	<u>Kraft mill energy balance</u>	
<u>Emergency (bk. rev.)</u>	1260	effect of odor control	1321
planning guide	1342	<u>Laboratory fume hoods,</u>	
<u>Emission(s)</u>		criteria for installation	1316
industrial		<u>Laser</u>	
formaldehyde, acrolein, low molecular		irradiation, permissible exposure levels	1303
weight aldehydes	1311	radiation	
spectrography, x-ray		biological effects	1302
flexibility for microanalysis of		hazardous effects on eyes	1301
air pollutants	1312	<u>Lung disease</u>	
<u>Emphysema</u>		chronic obstructive	
prospective clinical-pathologic study	1265	in Japanese poison gas workers	1275
of lungs	1339	prospective clinical-pathologic study	1265
<u>Engineering, systems safety</u>	1337	<u>Lung(s)</u>	
<u>Environmental health, federal programs</u>		pathology (bk. rev.)	1257
<u>Ethylmercuric chloride -- 205 Hg</u>		pulmonary response to inhalants	1267
metabolism in rats	1284	<u>Machine shops, exposure to oil mists</u>	1283
<u>Exercise, and cardiac death</u>	1268	<u>Mask, full face</u>	
<u>Exhaust</u>		outward leakage of oxygen	1344
automobile, deactivation of control		<u>Mercury</u>	
catalyst	1324	compounds, analysis in rats	1284
gases of motor vehicles		poisoning, prevention by spironolactone	1281
medical and biological importance	1330	<u>Mist control systems</u>	1289
reduction of harmful substances	1332	<u>Motion sickness, new effective remedy</u>	1300
<u>Eye(s)</u>		<u>Nitrogen</u>	
hazardous effects of laser radiation	1301, 1302	compound pollutants, gaseous	
ocular trauma in industry	1274	urban and natural sources	1310
<u>Face mask, full</u>		oxides, techniques for controlling	1326
outward leakage of oxygen	1344	<u>Noise</u>	
<u>First aid</u>		fourth form of pollution	1298
emergency (bk. rev.)	1260	list of "A" scale measurements	1299
severely injured	1341	thresholds, low frequency	1297
<u>Fly ash</u>		<u>Odor control</u>	
removal from gas streams by shaft-		effect on kraft mill energy balance	1321
filter-sorber	1319	<u>Oil mist, occupational exposure</u>	1283
<u>Formaldehyde</u>		<u>Oxidants</u>	
determination in industrial emissions	1311	relationship to hydrocarbons in ambient air	1327
<u>Fume</u>		oxides, nitrogen, techniques for controlling	1326
control		<u>Oxygen</u>	
collection in oxygen plant	1329	outward leakage from full face mask	1344
systems	1289	<u>Oxyquinoline, possible neurotoxicity</u>	1276
hoods, laboratory		<u>Ozone, long-term continuous inhalation</u>	
criteria for installation	1316	effect on experimental animals	1333
<u>Gas</u>		<u>Pathology, lung (bk. rev.)</u>	1257
detectors, combustible	1313	<u>Pennsylvania</u>	
diffuser, continuously operating		management of solid waste problem	1320
metering device	1317	<u>Petroleum hydrocarbons</u>	
<u>Gossypol, metabolism in laying hens</u>	1285	safety in household aerosols	1343
<u>Health</u>		<u>Phosgene exposure, successful treatment</u>	1282
care, changes in attitudes	1340	<u>Phosphates</u>	
occupations, new		potential substitute in detergents	1280
guidelines for development	1336	<u>Photochemical smog</u>	
<u>Hearing thresholds, determination</u>	1297	study of sulfur dioxide	1309
<u>Heart disease, coronary</u>		<u>Physical activity</u>	
relation to physical activity	1269	cardiac death	1268
<u>Hoods, laboratory fume</u>		relation to coronary heart disease	1269
criteria for installation	1316	<u>Pigeons, new role in air pollution</u>	1334
<u>Hydrocarbons</u>		<u>Pine, ponderosa</u>	
petroleum, safety in household aerosols	1343	air pollution damaged	1331
relationship to oxidants in ambient air	1327	<u>Plume rise, correlation of field observations</u>	1325
<u>Indoor air pollution, protection</u>	1335	<u>Pneumoconiosis</u>	
<u>Industrial use of isocyanates</u>	1278	coalworkers, review	1286
<u>Influenza, artificially induced A₂ and B</u>		international classification of radiographs	1262
evaluation of amantadine	1273	(bk. rev.)	
<u>Inhalants, pulmonary response</u>	1267	<u>Poison gas workers, Japanese</u>	
<u>International classification of radio-</u>		chronic obstructive lung disease	1275
<u>graphs of pneumoconioses (bk. rev.)</u>	1262	<u>Ponderosa pine, air pollution damaged</u>	1331
<u>Isocyanates, in industry</u>	1278		

<u>Potassium formate process</u>		<u>Water (Cont'd.)</u>	
removal of SO ₂ from stack gas	1328	pollution, new treatment schemes	1322
<u>Pulmonary function, welders</u>	1264	purification, industry's role	1315
<u>Quartz dust, x-ray diffraction analysis</u>	1296	<u>Welders</u>	
<u>Radiation, laser</u>		respiratory symptoms and pulmonary function	1264
biological effects	1302	<u>Wet scrubbers, efficiency</u>	1293
hazardous effects on eyes	1301	<u>What you and your family should know about</u>	
permissible exposure levels	1303	drugs (bk. rev.)	1261
<u>Respiratory</u>		<u>X-ray</u>	
disease, chronic nonspecific		diffraction analysis	
prevalence among sons	1277	quartz dust	1296
protective equipment	1318	thin dust layers	1306
symptoms, welders	1264	emission spectrography	
<u>Resuscitation, severely injured</u>	1341	flexibility for microanalysis of air	
<u>Safety</u>		pollutants	1312
accelerated training program	1339		
training for the supervisor (bk. rev.)	1259		
<u>Scrubbers</u>			
Venturi, operation and power			
requirements	1291		
wet, efficiency	1293		
<u>Shaft-filter-sorber</u>			
removal of fly ash and SO ₂ from gas			
streams	1319		
<u>Silicosis, in Sweden</u>	1295		
<u>Solid waste, Pennsylvania management</u>			
system	1320		
<u>Spirocholactone, use to prevent mercury</u>			
poisoning	1281		
<u>Stack(s)</u>			
correlation of observations of plume			
rise	1325		
<u>Static electricity, control in work</u>			
clothes	1346		
<u>Steel production, kish and fume control</u>			
and collection	1329		
<u>Sulfur</u>			
dioxide			
in photochemical smog	1309		
removal from stack gas	1328		
oxides			
mechanisms of formation in combustion	1307		
removal from gas streams by shaft-			
filter-sorber	1319		
<u>Surfactant biodegradation (bk. rev.)</u>	1258		
<u>Sweden</u>			
silicosis, dust conditions and control	1295		
<u>TLV's (threshold limit values)</u>	p.111		
<u>Threshold limit values (TLV's)</u>	p.111		
<u>Tobacco, and health</u>			
report of conference	1266		
<u>Vectorcardiogram</u>			
diagnostic aid in cardiac infarction	1272		
<u>Ventilation, methods for contamination</u>			
control	1323		
<u>Ventilatory function</u>			
relationship to parental longevity	1277		
<u>Venturi scrubber</u>			
operation and power requirements	1291		
<u>Vibration syndrome</u>	1270		
<u>Underground coal mines</u>			
suction removal of deposited dust	1294		
<u>Water</u>			
conservation, use of cross-connected			
system in plants	1314		

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New York, N. Y. 10019

American Scientist
Scientific Research Society
of America
51 Prospect St.
New Haven, Conn. 06511

Anal. Chem.
Analytical Chemistry
1155 Sixteenth St.
Washington, D.C. 20036

Ann. Internal Med.
Annals of Internal Medicine
4200 Pine St.
Philadelphia, Pa. 19104

Appl. Spectry.
Applied Spectroscopy
American Inst. of Physics
335 E. 45th St.
New York, N. Y. 10017

Arch. Dermatol.
Archives of Dermatology
535 No. Dearborn St.
Chicago, Ill. 60610

Arch. Environ. Health
Archives of Environmental
Health
535 No. Dearborn St.
Chicago, Ill. 60610

Archiv. Indus. Hyg. & Toxicol.
Archiv Za Higijenu Rada I
Toksikologiju
Institut za medicinska is-
trazivanja i medicinu rada
Mose Pijade 158
Zagreb, Yugoslavia

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535 No. Dearborn St.
Chicago, Ill. 60610

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535 No. Dearborn St.
Chicago, Ill. 60610

Association & Society Mgr.
Acolyte Publications Inc.
647 Sepulveda Blvd.
Bel Air, Los Angeles,
Calif. 90049

Battelle Res. Outlook
Battelle Research Outlook
Battelle Mem. Institute
505 King Avenue
Columbus, Ohio 43201

Brit. J. Ind. Med.
British Journal of
Industrial Medicine
Tavistock Square
London, WC1, England

Brit. Med. J.
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Tavistock Square
London, WC1, England
Bull. of the Allegheny Medical Society
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713 Ridge Avenue
Pittsburgh, Pa. 15212

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American College of
Physicians
4200 Pine St.
Phila., Pa. 19104

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Bulletin of Pathology
445 N. Lake Shore Dr.
Chicago, Ill. 60611

Business Week
McGraw-Hill, Inc.
McGraw-Hill Building
330 West 42nd Street
New York, N. Y. 10036

Ca
A Cancer Journal for
Clinicians
American Cancer Soc., Inc.
219 E. 42nd St.
New York, N. Y. 10017

Can. Med. Assn. J.
Canadian Medical Asso-
ciation Journal
150 St. George St.
Toronto 5, Canada

Canadian Risk Management
Jardine & Young Ltd.
287 MacPherson Ave.
Toronto 190, Ontario,
Canada

Cancer
J.B. Lippincott Co.
E. Washington Sq.
Phila., Pa. 19105

Carcinogenesis Abstracts
Medical Literature, Inc.
Phila., Pa. 19103

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Chemical Engineering
McGraw-Hill Book Co., Inc.
330 W. 42nd St.
New York, N. Y. 10036

Chem. Eng. News
Chemical & Eng. News
1155 16th St., N.W.
Washington, D.C. 20036

Chemistry
Science Service, Inc.
1719 N St., N.W.
Washington, D.C. 20006

Chest
American College of
Chest Physicians
113 E. Chestnut St.
Chicago, Ill. 60611

Conference Board Record
National Industrial
Conference Board
845 Third Avenue
New York, N. Y. 10022

Conn. Health Bull.
Connecticut Health
Bulletin
165 Capitol Avenue
Hartford, Conn. 06115

Emergency Med.
Emergency Medicine
Fischer-Murray, Inc.
280 Madison Avenue
New York, N. Y. 10016

Environ. Cont. & Safety
Environ. Control &
Safety Management
Alfred M. Best, Co., Inc.
Park Avenue
Morristown, N. J. 07960

Environ. Health Letter
National Press Bldg.
Washington, D.C. 20004

Environ. Research
Environmental Research
Academic Press Inc.
111 Fifth Avenue
New York, N. Y. 10003

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Environmental Science &
Technology
American Chemical Soc.
1155-16th St. N.W.
Washington, D. C. 20036

Excerpta Medica
Excerpta Medica Foundation
119-123 Herengracht
Amsterdam, The Netherlands

Harvard Bus. Rev.
Harvard Business Review
108 Tenth St.
Des Moines, Iowa 50305

Health Services Research
Hospital Research and
Educational Trust
840 No. Lake Shore Dr.
Chicago, Ill. 60611

Human Factors
The Johns Hopkins Press
Homewood Campus
Baltimore, Md. 21218

Hygiene and Sanitation
U.S. Dept. of Commerce
Clearinghouse for Federal
Scientific & Technical
Information
Springfield, Va. 22151

ILO Panorama
International Labor Office
Public Information Branch
CH-1211
Geneva 22, Switzerland

Indiana State Board of
Health Bull.
Indiana State Board of
Health
1330 W. Michigan St.
Indianapolis, Ind. 46206

Industrial Bulletin
Arthur D. Little, Inc.
Acorn Park
Cambridge, Mass. 02140

Industrial Health
National Institute of
Industrial Health
2051 Kizukisumiyoshi-cho
Kawasaki, Japan

Ind. Hyg. News Report
Flournoy & Associates
1845 W. Morse
Chicago, Ill. 60626

Ind. Med. & Surg.
Industrial Med. & Surgery
Box 546
Kendall Station
Miami, Florida 33156

Ind. Res.
Industrial Research, Inc.
Industrial Research Building
Beverly Shores, Ind. 46301

Industrial Safety Chronicle
National Safety Council
Central Labour Inst. Bldg.
Sion, Bombay 22 0 0
India

J. Acoust. Soc. Am.
Journal of the Acoustical
Society of America
Prince & Lemon Sts.
Lancaster, Pa. 17601

J. Air Poll. Control Assn.
Journal of the Air Pol-
lution Control Association
4400 Fifth Ave.
Pittsburgh, Pa. 15213

J. Am. Insurance
Journal of American
Insurance
American Mutual Insurance
Alliance
20 No. Wacker Dr.
Chicago, Ill. 60606

J. Am. Med. Assn.
Journal of the American
Medical Association
535 No. Dearborn St.
Chicago, Ill. 60610

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Journal of the American So-
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5 No. Wabash Ave.
Chicago, Ill. 60602

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Journal of Environmental
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1550 Lincoln St.
Denver, Colo. 80203

J. Occ. Med.
Journal of Occupational
Medicine
150 N. Wacker Drive
Chicago, Illinois 60606

J. Safety Research
Journal of Safety Research
National Safety Council
425 No. Michigan Ave.
Chicago, Ill. 60611

J. Science of Labour
Institute for Science of
Labour
(Rodo Kagaku Kenkyusho)
Soshigaya II, Setagaya-ku
Tokyo, Japan

Lab. Invest.
Laboratory Investigation
Williams & Wilkins Co.
428 E. Preston St.
Baltimore, Md. 21202

Laboratory Med.
American Society of
Clinical Pathologists
710 S. Wolcott Ave.
Chicago, Ill. 60612

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Laboratory Medicine-The
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P.O. Box 823, Biscayne Annex
Miami, Fla. 33152

Lancet
7 Adam St., Adelphi
London WC1, England

Mayo Clinic Proceedings
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Rochester, Minn. 55901

Measurement and Data News
Measurements and Data Corp.
1001 E. Entry Dr.
Pittsburgh, Pa. 15216

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del Trabajo
Instituto Nacional de Medi-
cina y Seguridad del Trabajo
Ciudad Universitaria
Madrid, Spain

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Medical Bulletin, (Standard
Oil New Jersey)
30 Rockefeller Plaza
New York, N. Y. 10020

Med. J. Australia
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Publishing Co., Ltd.
Seamer St., Glebe
Sydney, N.S.W., Australia

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La Medicina del Lavoro
Via S. Barnaba, 8
Milan, Italy

Michigan's Occupational
Health
Division of Occupational
Health
Mich. Dept. of Health
Lansing, Mich. 48914

Military Med.
Military Medicine
Assn. of Military Surgeons
of the United States
1500 Massachusetts Ave., NW
Washington, D.C. 20005

NAC News and Pesticide
Review
National Agricultural
Chemicals Assn.
1155 15th St. N.W.
Washington, D. C. 20005

NAPCA Abstract Bull.
Air Poll. Tech. Inf. Cent.
Office of Technical Infor-
mation and Publications
National Air Pollution
Control Administration
1033 Wade Avenue
Raleigh, N. Carolina 2760

Natl. Glass Budget
443 S. Pacific Ave.
Pittsburgh, Pa. 15224

Natl. Safety News
National Safety News
425 N. Michigan Ave.
Chicago, Ill. 60611

New Engl. J. Med.
New England Journal of
Medicine
10 Shattuck St.
Boston, Mass. 02115

Noise News and Reviews
National Council on Noise
Abatement
1625 K Street N.W.
Washington, D. C. 20006

Occ. Hazards
Occupational Hazards
614 Superior Ave., West
Cleveland, Ohio 44113

Occ. Health News & Views
Penns. Dept. Health
Div. Occupational Health
Health and Welfare Bldg.
Seventh & Forster Sts.
Harrisburg, Pa. 17102

Occ. Health Rev.
Department Natl. Health
& Welfare
Ottawa, Ont., Canada

Ordnance
American Ordnance Assn.
Transportation Bldg.
Washington, D.C. 20006

Penn. Health
Pennsylvania's Health
Department of Health
Commonwealth of Penna.
Harrisburg, Pa. 17120

Penna. Med.
Pennsylvania Medicine
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Taylor bypass & Erford
Lemoyne, Pa. 17043

Personnel
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Association, Inc.
135 W. 50th St.
New York, N. Y. 10020

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American Petroleum Inst.
1271 Ave. of the Americas
New York, N. Y. 10020

Plant Eng.
Plant Engineering
1301 S. Grove Ave.
Barrington, Ill. 60010

S.A.E. Journal
Society of Automotive
Engineers
485 Lexington Ave.
New York, N.Y. 10017

Safety News Letter
National Safety Council
Chicago, Ill. 60611

Safety Standards
U.S. Dept. of Labor
Bur. of Labor Stds.
Washington, D.C. 20210

Science
Am. Assn. for Advance-
ment of Science
1515 Mass. Ave. N.W.
Washington, D. C. 20005

Scientific Information Notes
Natl. Science Foundation
Washington, D.C. 20550

Scientific Research
McGraw Hill, Inc.
McGraw Hill Bldg.
330 W. 42nd St.
New York, N. Y. 10036

Skin & All. News
Skin & Allergy News
4907 Cordell Ave.
Washington, D.C. 20014

Smaller Manufacturer
Smaller Manufacturers
Council
Chamber of Comm. Bldg.
Pittsburgh, Pa. 15219

Spotlight on Safety
N. Y. State Dept. of Labor
State Campus
Albany, N. Y. 12226

Stanford Research Inst. J.
Stanford Research Institute
Menlo Park, Calif. 94025

Staub Reinhalt. Luft.
VDI-Verlag GmbH
4 Dusseldorf 1
Post Box 1139
Dusseldorf, Germany

Technol. Rev.
Technology Review
Alumni Association
Massachusetts Institute of
Technology
Cambridge, Mass. 02139

Tenn. Ind. Hyg. News
Tennessee Industrial Hygiene
News
The Tenn. Dept. of Public
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Nashville, Tenn. 37201

Texas Health Bulletin
Texas State Dept. of Health
1100 W. 49th Street
Austin, Texas 78756

Thorax
British Medical Association
B.M.A. House, Tavistock Sq.
London WC1, England

Tin and Its Uses
Tin Research Institute
483 W. Sixth Ave.
Columbus, Ohio 43201

Today's Health
American Medical Assn.
535 N. Dearborn St.
Chicago, Ill. 60610

Toxicol. & Appl. Pharmacol
Toxicology & Applied
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Academic Press
111 Fifth Ave.
New York, N.Y. 10003

Trans.Soc.Occ.Med.
The Transactions of the
Society of Occ. Medicine
Royal College of Surgeons
Lincoln's Inn Fields
London WC2, England

Tufts Health Science Rev.
Tufts-N.England Med. Cent.
Office of Comm.&Pub. Aff.
171 Harrison Avenue
Boston, Mass. 02101

WHO Chronicle
World Health Organization
Chronicle
World Health Organization
Sales Section
Geneva, Switzerland

Work-Environ.-Health
Work-Environment-Health
Institute of Occ. Health
Helsinki, Finland

SUPPLEMENTAL LIST OF JOURNALS FOR NOVEMBER DIGEST

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Pergamon Press Ltd.
Headington Hill Hall
Oxford, England

Brit. Heart J.
British Heart Journal
British Medical Association
B.M.A. House
Tavistock Sq.
London, W.C.1, England

Deut. med. Wochschr.
Deut. medizinische Wochenschrift
Herdrweg 63, Postfach 732
Stuttgart N, Germany

Eur. Soc. Opthol. Cong. 3rd Proc.
European Society of Ophthalmology, Congress
3rd Amsterdam, Netherlands
Edited by J. Francois
Basel Switzerland
S. Karger AG

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New York State Department of Labor
80 Centre Street
New York, New York 10013

J. Sound Vibr.
Journal of Sound Vibration
Academic Press Inc. (London) Ltd.
Berkeley Square House
Berkeley Square
London, W1, England

Mellon Institute News
Mellon Institute of Carnegie-Mellon University
4400 Fifth Avenue
Pittsburgh, Pennsylvania 15213

Soap Chem. Specialties
Soap and Chemical Specialties
MacNair-Dorland Company
254 West 31st Street
New York, New York 10001

Soc. Photo-Opt. Inst. Eng. 13th Ann. Sym. Proc.
Society of Photo-Optical Instrumentation Engineers
P.O. Box 288-1716 South Catalina Avenue
Redondo Beach, California 90277