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Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

JANUARY, 1968
(Vol. 32, No. 1)

INDUSTRIAL HYGIENE FOUNDATION
4400 FIFTH AVENUE + PITTSBURGH, PA. 15213

INDUSTRIAL HYGIENE FEATURES

See Abst. No. 13 for a discussion on some characteristics of industrial hygienists.

Organizing for ergonomics is the title of Abst. No. 15.

Abst. No. 21 reports on the clinical stages of breast cancer.

A survey on respiratory symptoms and smoking habits in Jamaica is given in Abst. No. 23.

Abst. No. 27 is concerned with the roentgenologic diagnosis of anatomic emphysema.

See Abst. No. 28 for pitfalls in disinfectant evaluation.

Observations of the effect on rats of single exposures to crotonaldehyde vapor are presented in Abst. No. 38.

"Asbestos" bodies: their nonspecificity are discussed in Abst. No. 44.

Abst. No. 46 presents cardiopulmonary function studies in workers dealing with asbestos and glasswool.

Characteristics of a compact electric-motor driven spinning disc aerosol generator are described in Abst. No. 52.

FOUNDATION FACTS

NEW MEMBER: The Foundation is pleased to add the name of General Asbestos and Rubber Division, Raybestos-Manhattan, Inc., to membership.

ENGINEERING DISCUSSIONAL: The fourth annual Engineering Discussional on "The Control of Environmental Health Hazards" held January 9-11 at the Holiday Motor Inn (Sewickley) and sponsored by the IHF Engineering Committee was considered highly successful and most informative by the 46 representatives of the Foundation's membership in attendance. 1968 Discussional Committee Chairman N.V. Hendricks, Standard Oil Company (N.J.), arranged details of the program which covered: Health Hazards and Their Control in Pilot Plants; Illumination; Laboratory and Fume Hood Ventilation; Engineering Aspects of Threshold Limit Values; and Filters and Filter Testing. Plans are underway to develop next year's program with H. Wilbur Speicher, Westinghouse Electric Corporation, as 1969 Discussional Chairman. January 14-16, 1969 are the dates tentatively reserved.

IHF WORKSHOP ON TLV'S: On February 1-2 the third Workshop on Threshold Limit Values, sponsored by the IHF Chemical-Toxicological Committee, will be held at The Kettering Laboratory, University of Cincinnati. Dr. Emil A. Pfitzer of The Kettering Laboratory and Secretary of the Chem-Tox Committee will serve as Moderator and also conduct a pre-Workshop Orientation Session on "What You Need to Know About TLV's." Dr. Herbert E. Stokinger, Chairman of the American Conference of Governmental Industrial Hygienists' Threshold Limits Committee, will open the Workshop giving "Documentation of Intended Values for 1968." Representatives of organizations active in TLV coordination and validation have been invited to present their views and other having data may also present it during this session. (See Chem-Tox Bulletin No. 7 or contact IHF Headquarters for additional information).

STAFF ACTIVITIES: Harry M. Bowman has been named Associate Managing Director of IHF effective January 1 (see article on page 1). Miss Marianne Kaschak of the Industrial Hygiene Research Unit has been elected Secretary-Treasurer of the American Industrial Hygiene Association Pittsburgh Section for the current year. At the request of Dr. Robert T. P. deTreville, Managing Director, Dr. Philip E. Enterline, Advisory Fellow to IHF, represented the Foundation at a meeting of the Working Group on Epidemiology of Air Pollution and Human Disease, sponsored by The New York Academy of Sciences, December 14-16, 1967, in New York City.

TRUSTEES MEETING: The IHF Board of Trustees will meet February 16 at Webester Hall Hotel in Pittsburgh.

33rd ANNUAL MEETING - OCTOBER 14-15, 1968

TABLE OF CONTENTS

THIS ISSUE CONTAINS ABSTRACT NUMBERS 1-76

	Page
Mr. Harry M. Bowman, Appointed Associate Managing Director	1
News Items	1
Coming Events	2
Legal Developments	3
Books, Pamphlets and Notices	3
Industrial Medical Practice	5
Skin Diseases and Burns	9
Chemical Hazards	9
Industrial Dusts	12
Physical Aspects of the Environment	16
Radioactivity and X-Radiation	16
Environmental Measurements	17
Preventive Engineering	18
Community Air Hygiene	19
Index	21
Addresses of Journals Abstracted	23

MR. HARRY M. BOWMAN

APPOINTED ASSOCIATE MANAGING DIRECTOR



On January 1, 1968 Mr. Harry M. Bowman of West Caldwell, New Jersey was appointed Senior Fellow of Mellon Institute and assigned full time to Industrial Hygiene Foundation as its Associate Managing Director

Mr. Bowman, formerly associated with the Thiokol Chemical Corporation in Denville, New Jersey is already known to many in the Foundation's membership. For the past ten years he has participated in several Foundation activities: e.g., he was a speaker at the 1960 Annual Meeting, and has served on (1) the Chemical-Toxicological Committee, (2) the Policy and Planning Committee (as Chairman) and (3) the Board of Trustees.

Mr. Bowman will assume responsibility for the conduct of Industrial Hygiene Foundation's business affairs which in the past have been administered directly by Dr. Robert T. P. deTreville, Managing Director. Since 1963, Dr. deTreville, has also administered the Foundation's expanding research activities in the laboratory and the field. Appointment of an Associate Managing Director will allow him to devote a much greater portion of his time in support of the Foundation's scientific activities.

Formerly with the Bakelite Company from 1939 to 1954, Mr. Bowman joined the Thiokol Chemical Corporation's Reaction Motors Division as research spectroscopist. In 1956 he became supervisor of the Chemistry Administration Section where industrial safety and hygiene became one of his major concerns; in 1957, Manager of the Research Operation and Plans Department where the industrial safety and hygiene responsibility expanded to the research complex; Director of the Nuclear Technology Department in 1961; and the following year assumed the position of Assistant to the General Manager of the Reaction Motors Division. Early in 1967 he became Manager of the Facilities Management and Manager of Proposal Management, which position he left to come to the Industrial Hygiene Foundation.

Author of a number of published articles dealing with his field, Mr. Bowman has also been an officer in several research associations: former Vice President of the Society for Applied Spectroscopy; past President of the Association for R & D Administration; past Chairman of the Speakers Bureau of the Cobleniz Society; past Assistant Chairman and Director of the New Jersey section of the American Astronautical Society; past State Chairman of the New Jersey Council for Research and Development. He is also a member of the Air Force Association, American Ordnance Association, American Association for the Advancement of Science, and Seminar Leader for the American Management Association.

Mr. Bowman was awarded a B. S. in Physics from New York University and has done graduate work at the New York University, Stanford University Graduate School of Business, and Fairleigh Dickinson University. A veteran of World War II, in which he took part in the Battle of the Bulge, he is actively interested in civic, community, and church affiliations. The Bowman's son, Ted, is serving with the U.S. Air Force at Misawa AFB, Japan.

We welcome Harry and Kay Bowman to Pittsburgh.

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Industrial Hygiene Foundation
4400 Fifth Avenue
Pittsburgh, Pennsylvania 15213

INDUSTRIAL HYGIENE DIGEST
Literature and News

NEWS ITEMS

1 Perchlorethylene Safety.

Under the auspices of the Laundry and Cleaners Allied Trades Association (LACATA) an educational program designed to cover all aspects of the safe handling and use of perchlorethylene as a drycleaning solvent is being undertaken by an international committee of producers of perchlorethylene. The program is being implemented by the Subcommittee on Safe Handling of Perchlorethylene under the guidance of a LACATA general committee composed of representatives from the major producers of perchlorethylene. The American Institute of Laundering Inc., the National Automatic Laundry and Cleaning Council and the National Institute of Drycleaning Inc., are also participating in the program. The Subcommittee has become a member of the Industrial Hygiene Foundation Inc., which is also assisting in this program. Principal objectives of the program are to promote safe methods of handling perchlorethylene in commercial and coin-op dry cleaning operations to acquaint owners and employees of commercial and coin-op drycleaning operations and customers of coin-op drycleaning shops with essential characteristics of the solvent and to provide factual data for the guidance of public health, labor, fire and other regulatory agencies. -- Am. Ind. Hyg. Assn. J. 28, 598 (Nov.-Dec., 1967).

2 Optokinetic Nystagamus.

The National Safety Council has suggested ways to cope with conveyor-belt sickness—a form of optokinetic nystagamus—caused by the necessity of inspectors working at conveyor belts to rapidly shift their focus of vision. This occupational hazard may induce a fatigue which could contribute to more serious difficulties. One simple preventative measure is to screen off objects that move in directions that don't match the conveyor-belt flow. Some measure of prevention is also achieved by convincing workers of their need for plenty of sleep and adequate, energy-building breakfasts. This type of occupational problem also occurs in some other industrial situations requiring intense visual concentration with rapid shifting of the focus. This has been thought to contribute to some emotional disturbance also.
-- Am. Ind. Hyg. Ind. J. 28, 522 (Nov.-Dec., 1967).

3 Epoxy Resins.

A general conference on epoxy resins held recently at the USA Standards Institute recommended the initiation of a prbject on safety requirements for epoxy resins. The scope of the project is to provide producers and users of epoxies (employed in industrial applications) with a set of criteria and labeling recommendations so that they can better (1) define the hazard category into which their specific products fall by use of the classification principle set forth, and (2) design labels which will adequately warn of such hazards according to the degree of care in handling required. The conference proposed the title for the project to be Safety in Epoxy Resins, and that the Society of the Plastics Industry be invited to sponsor the project.
-- Natl. Safety News 96, 20 (Dec., 1967).

4 Trace Characterization.

The National Bureau of Standards has published as Monograph 100, Trace Characterization—Chemical and Physical, by W.W. Meinke and B.F. Scribner (editors). Copies of this 580-page publication are available for $4.50 each from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. This publication resulted from a symposium held in October, 1966, on the subject of the trace characterization and bringing together the leading authorities from the United States and abroad in many different fields which contribute to the physical and chemical characterization of materials, especially to the detection and determination of trace amounts of defects and foreign substances. Discussed in the publication are electrical measurements; electrochemical methods; optical and x-ray spectroscopy; x-ray diffraction; optical methods; chemical spectrophotometry; nuclear methods; mass spectroscopy; preconcentration; sampling and reagents; and electron and optical microscopy as applied to trace characterization. This volume brings together state-of-the-art summaries in most of the areas pertinent today for trace characterization, and offers a glimpse of problems to be faced in the future. -- Am. Ind. Hyg. Assn. J. 28, 540 (Nov.-Dec., 1967).

5 Ambient Air Quality Guides.

The quality of the air we breathe is becoming of more and more concern to the population. The amount of contaminated air a person can breathe without adverse effects has now been established by the American Industrial Hygiene Association through a new series entitled Ambient Air Quality Guides. The subjects covered in this series are: Aldehydes; Beryllium; Carbon Monoxide; Ethylene; Fluorides; Iron Oxide; Lead; Ozone; Phenolic Compounds; Regional Planning; Sulfur Compounds; Total Particulate Matter. Each Guide includes the following: (1) Physical and Chemical Properties in the Atmosphere, (2) Potential Harmful Effects, (3) Annoyance Effects, (4) Air Sampling and Analysis and (5) Recommended Air Quality Values. For many years (since 1955) the American Industrial Hygiene Association has published threshold limits for various contaminants in the workroom atmosphere, which are known as Hygienic Guides, and now has applied this highly specialized knowledge to the community atmosphere. The first of these Guides will be published in the January - February, 1968 issue of the American Industrial Hygiene Association Journal, and may be purchased from the American Industrial Hygiene Association, 14125 Prevost, Detroit, Michigan 48227. American Industrial Hygiene Association News Release, December 11, 1967. Price: not given.

6 We May Be Leaving a Deadly Legacy of Pollution.

A task force was appointed by HEW Secretary Gardner about six months ago to advise the department on how to cope with man's increasing power to foul the environment. It submitted 34 recommendations to the department. Ten were for immediate programs to achieve sharp abatement of pollution and stringent safeguards against unknown haaards from new products. Industrial smokestack and auto exhaust emissions would be cut 90 per cent within a few years. No new synthetic substance would be marketable after 1970 without some proof of safety. Other recommendations were for setting up a national environmental protection system to look at pollution not piecemeal but as a whole, and to deal with new hazards as they srise. It was estimated that about half of the task force's proposals would require new legislation. At a Senate hearing several weeks ago Dr. William H. Stewart, Surgeon General of the Public Health Service, called air pollution a "health challenge of the first magnitude confronting the American people today". Common colds and other upper respiratory infections occur more often during high levels of pollution. This has been documented in Maryland, Detroit, and in Britain, Japan and the Soviet Union. But these illnesses are all caused by viruses and the complex circumstances that make them more common during pollution episodes are obscure. The six-person task force headed by Ron M. Linton a former Senate aide, has added its voice to those who are urging that man's pollution of his environment be studied as a whole and wherever possible, abated for the good of the present, and future, generations. -- Cond. from Medicine, New York Times, Sunday, June 18th, 1967.

Editor's Note: See also Industrial Hygiene Digest Abstract 1131, December, 1967 on the Linton Report.

COMING EVENTS

7

Feb. 1- 2	Industrial Hygiene Foundation, 1968 Workshop on Threshold Limit Values, Cincinnati, Ohio.
Feb. 2- 3	American College of Psychiatrists, New Orleans, La.
Feb. 3- 7	American Academy of Allergy, Boston, Mass.
Feb. 6-10	American College of Radiology, Chicago, Ill.
Feb. 7- 9	American Academy of Occupational Medicine, Washington, D.C.
Feb. 8-10	Society of University Surgeons, New York, N.Y.
Feb. 11-12	Congress on Medical Education (64th Annual), Chicago, Ill.
Feb. 14	Symposium on Atherosclerosis and its Relationship to Carbohydrate Metabolism, New York, N.Y.
Feb. 16-17	American Psychopathological Association, New York, N.Y.
Feb. 19-21	American College of Surgeons, Sectional Meeting, Dallas, Texas.
Feb. 21	Association for the Advancement of Psychoanalysis, New York, N.Y.
Feb. 21-25	Institute on Diabetes (5th Annual), Aspen, Colorado.
Feb. 22-24	American Academy of Forensic Sciences, Chicago, Ill.
Feb. 24-Mar.3	Canadian-American Medical-Dental Association, Park City, Utah.
Feb. 27	National Multiple Sclerosis Society, New York, N.Y.
Feb. 28-Mar.3	American College of Cardiology, San Francisco, Calif.
Feb. 29-Mar.2	Symposium on Cystic Fibrosis and Related Human and Animal Disease, New York, N.Y.

LEGAL DEVELOPMENTS

8 Sulfur in Fuels.

The State of New Jersey has proposed a code regulating the amount of sulfur in fuels in a three-phase program beginning January 1, 1968. The second and third phases are slated to start on October 1, 1970 and October 1, 1971, respectively. The proposed code schedules progressive reduction in allowable percentages of sulfur in commercial fuel oils; sets dates for reduction of emission rates of sulfur dioxide from noncommercial fuels; and prohibits expansion, reconstruction or construction of coal-fired boilers of more than one million BTU per hour capacity except under certain controlled conditions. Coal merchants would not be permitted to sell bituminous coal containing more than 1% sulfur nor anthracite with more than 0.7%. The use of coal with higher sulfur content would be prohibited except under certain controlled conditions. The code regulates both commercial and noncommercial fuels.

-- Am. J. Hyg. Assn. J. 28, 530 (Nov.-Dec., 1967).

BOOKS, PAMPHLETS AND NOTICES

9 The Particle Atlas. A Photomicrographic Reference for the Microscopical Identification of Particulate Substances. W. C. McCrone, R. G. Draftz, and J. G. Delly. AVAILABLE FROM: Ann Arbor Science Publishers, Inc., P.O. Box 1425, Ann Arbor, Michigan 48106. PRICE: not given.

Dust particles constitute a major problem in air pollution control. Millions of dollars are spent through out the world to clean buildings, windows, drapes, clothing etc., soiled by small particles. Some of these particles also cause plant damage and a few react chemically to produce eye-watering and lung-damaging effects (e.g. asbestos and quartz). Visibility in cities is seriously hampered by high concentrations of suspended dust. Knowledge of the sources of these particles would be helpful in effecting pollution control. Most clean-rooms today, though unquestionably effective, are susceptible to erratic operation due to contamination by small particles. Particles far too small to be seen without the microscope can cause rejection rates on high-priced parts to skyrocket without warning. When this occurs it is very important to be able to identify the source. In problems of air pollution, clean-room contamination, process failure and criminalistics—the key is often the identification, though microscopy, of small particles. Even when large samples are available, the techniques described for ultramicrosamples may be the most effective means of identifying the substance and solving the problem. This publication endeavors to present all of the skills necessary for working with small particles—how to choose and use the necessary microscope, how to collect, manipulate and characterize particles of interest and how to identify each of the particles in a sample. Two specific questions can be answered by using the techniques given: (1) What is the identity of each unknown particle in a sample and (2) Does the sample contain any particles from a given source? After becoming proficient in small particle identification, the microscopist looking though the microscope will be able to say as he looks at each successive particle, "This one is a diatom, this one's wheat starch, here's pine pollen, cement dust, quartz sand, an orlon fiber, oil soot, a paint chip." He can identify most of the components in the sample and may also be able to estimate the percentages with considerable accuracy. The substances covered in this atlas are considered to be the most common and important. With this reference, an investigator should be able to solve most, if not all of his particle identification problems. A course in identifying particles with the help of this atlas, which is said to be given by the McCrone Research Institute in Chicago may be of interest; and the Taft Center of the U.S. Public Health Service in Cincinnati is also said to teach such a course. The Gelman Instrument Company sells sets of prepared slides of known particulates. -- Mod. from Intro.

Editor's Note: The importance of small particle identification in the lungs at autopsy has been raised by the finding of so called asbestos or ferruginous bodies—curiously shaped or elongated fibers, coated with an iron-protein material—in the lungs of about half of the urbanites who come to autopsy. Usually there is absence of any evidence of associated lung disease, and the finding would be of academic interest, except for the claim of Thomson[1] that all such bodies result from environmental exposure to asbestos. In letters[2] to the editor of the American Medical Association

1 Thomson, J.G., et al: Asbestos as Modern Urban Hazard, S. Afr. Med. J. 37:77-81, 1963.
2 Arch. Pathol., Vol. 82, Aug. 1966 and Nov. 1966.

Archives of Pathology (AMA), we have pointed out that many filamentous shaped particles, organic as well as mineral, have sufficiently small diameter to reach lung acini (primary lobules of the lung). Photomicrographs made by Dr. Paul Gross, Director, Research Laboratory, Industrial Hygiene Foundation, from home vacuum sweepings revealed fibers, about 1μ in diameter, which disappeared on incineration, and were thus definitely not asbestos. Furthermore, as described in papers[3, 4] at the 31st and 32nd Annual Meetings of IHF, we have successfully produced ferruginous bodies indistinguishable from asbestos bodies with non-asbestos fibers (including a clay, an abrasive, and a form of filamentous glass). This new reference provides an atlas of small particles from a wide variety of sources, under the following headings: (A) Wind Erosion Particulates: (1) Biological; (2) Fibers; (3) Rocks and Minerals; (B) Industrial Dusts: (1) Abrasives and Polishes; (2) Catalysts; (3) Cements; (4) Detergents and Cleaners; (5) Fertilizers; (6) Food Processing; (7) Metals Refining and Processing; (8) Polymers; (9) Miscellaneous Industrial Dusts; (C) Combustion Products. In view of the ease of exposure of the population to dusts such as these and many others not listed, and the lung's nonspecific reaction to many of them, the finding of ferruginous bodies in the lungs of adult urbanites at autopsy should not be either surprising or alarming, while research in the laboratory and field are being carried out to better define health hazards of any sort, real or potential, in employees or the public at large.

-- R.T.P. deT.

3, 4 Paul Gross, M.D.,: The Pulmonary Reaction to Man's Environment, Transactions of the 31st Industrial Hygiene Foundation Annual Meeting, October 18-19, 1966 at Chatham Center, Pittsburgh, Pennsylvania

John M. G. Davis, M.D., et al: Asbestos Bodies and Bioeffects—A Detective Story, Presented at the 32nd Industrial Hygiene Foundation Annual Meeting, October 10-11, 1967 at Chatham Center, Pittsburgh, Pennsylvania (to be published).

10 Year Book of Nuclear Medicine, Vol. 2-1967. J.L. Quinn, III, Editor. AVAILABLE FROM: Year Book Medical Publishers, Inc., 35 East Wacker Drive, Chicago, Ill. 60601. 366 pp. PRICE: $10.00.

Nuclear medicine is that clinical discipline concerned with the diagnostic, therapeutic and investigative uses of radionuclides. It is generally understood that this excludes the therapeutic use of sealed radiation sources. In keeping with this, the second volume of the Year Book of Nuclear Medicine remains unchanged in organization and presentation. It was a year of extension of current knowledge and new applications of established procedures. No new concepts concerning detectors, detecting or the detected occurred. The multiple-crystal, rapid rectilinear scanning systems became commercially available. Image-amplification radionuclide detectors appear to be almost ready. Educational goals and measures of competence in nuclear medicine were given greater attention. In some circles the core curriculum of a nuclear medicine residency was discussed as containing six months of basic nuclear medicine sciences, 18 months of clinical nuclear medicine and 12 months of parallel or related experience in investigative or applied medicine. Technetium became available to smaller hospitals in either the sterile generator or individual dose forms and the important new radionuclide indium-113m matured and iodine-123 became more available. An article by Mr. Donald Charleston, a senior scientist at the Argonne Cancer Research Hospital on radiation detector systems, which is well worth reading, helps to bridge the gap between the physician and his instrument colleagues.

-- Cond. from Intro. by R.T.P. deT.

11 Atmospheric Emissions From the Manufacture of Portland Cement. T.E. Kreichelt, D.A. Kemnitz, and S. T. Cuffe. U.S. Dept. of HEW, Public Health Service, Bureau of Disease Prevention and Environmental Control, Cincinnati, Ohio. Public Health Service Publication No. 999-AP-17. AVAILABLE to requesters as supply permits from 5555 Ridge Avenue, Cincinnati, Ohio 45213.

This report has been prepared to provide reliable information on actual and potential atmospheric emissions from portland cement manufacturing plants and on methods and equipment normally employed to limit these emissions to satisfactory levels. In 1964, production of portland cement in the United States was approximately 361,000,000 barrels. Cement production is expected to increase at the rate of about five percent per year, with a comparable increase in the construction of new plants. Dust generated in the dry-process kiln may vary from 1 to 25 percent expressed in terms of finished cement; from the wet process, 1 to 33 percent. Sulfur dioxide emissions from the kiln operation are generally minor; most of the oxides of sulfur in the kiln gases combine with the alkalies as condensed sulfates. In the wet process, an odor problem may arise from heating certain types of raw material such as marine shells, marl, clay, or

shale. Dust emissions as low as 0.03 to 0.05 grain per standard cubic foot have been obtained in newly designed well-controlled plants. Approximate dust-grain loadings needed to meet California ordinances vary from 0.08 grain per standard cubic foot for small kilns (i.e., 2,000 barrels per day capacity) to 0.02 grain per standard cubic foot for large units (i.e., 8,000 barrels per day capacity). The approximate corresponding dust collection efficiencies range from 98.3 percent for small kilns to 99.8 for large units. Kilns of up to 4,000 barrels per day capacity could meet the process weight limitations with exit dust loadings of 0.05 grains per standard cubic foot; a dust collection efficiency of approximately 99.6 percent would be required, however. For large kilns (8,000 barrels per day) lower exit dust loadings of 0.02 to 0.03 grain per standard cubic foot would be required to meet the emission regulations of Los Angeles and of the Bay Area, respectively. Although the economic benefits resulting from the reuse of collected dust do not completely offset the cost of the dust-collection equipment, the esthetic value to the community plus a compliance with certain municipal and state air pollution control ordinances make these advances in dust arrestment worthwhile. -- R.T.P. deT.

12 Sloan-Kettering Institute for Cancer Research. Progress Report XVII. The Cancerous Change. Sloan-Kettering Institute for Cancer Research. AVAILABLE FROM: Memorial Sloan-Kettering Cancer Center, 444 East 68th Street, New York, N.Y. 10021. 72 pp. (April, 1967) PRICE: not given.

Cancer may be thought of as a descent with modification of somatic cells. It occurs in all classes of vertebrates—fishes, amphibians, reptiles, birds, and mammals. Except for control measures in human beings, the disease may serve as a partial check on the size of the affected populations. The spontaneous occurrence of the disease represents natural selection for the cancer against the organism. In addition, man himself selects for cancer. Sometimes he does this wittingly for investigative purposes by cultivating strains of laboratory animals that readily develop the disease. However, man also selects for cancer without realizing this. Unconscious selection for malignant disease follows from improper management of radiation, whether of X-rays or radioactive chemicals. Radiation, as an atomic explosion by-product, increased the incidence of leukemia among survivors at Hiroshima. In other circumstances, cancer develops from harmful habitual practices. Chronically poor dietary habits may be associated with the development of cancer. In the past, the disease often originated from chronic exposure in industry to certain chemicals. Since man has the power of selection, it is evident that some persons exercise this power to risk developing cancer in themselves. Chronic, heavy cigarette smoking is such a risk. Selection by man against cancer represents hope, and is reflected by all efforts to understand and control the disease. Proper management of radiation and industrial environments, regulation of chemical additives to foods, drugs and cosmetics, improved dietary habits, therapeutic and research endeavors, education of the medical profession and the public—these are some of the human efforts designed to control and prevent cancer.

-- Epilogue (p. 70).

INDUSTRIAL MEDICAL PRACTICE

13 Study of Public Health Careers: Some Characteristics of Industrial Hygienists. W.P. Shepard, C.W. Dean, and R.H. Elling. Am. Ind. Hyg. Assn. J. 28, 573-582 (Nov.-Dec., 1967).

In a nation-wide questionnaire study of about 10,000 professional public health workers, 767 out of the then 1,042 members of the American Industrial Hygiene Association (AIHA) returned satisfactory replies. Concerning their basic disciplines of origin they are a remarkably heterogeneous group. They are exceptionally well qualified academically. Only about one half work in industry, the rest in health departments or research or teaching institutions. They are well compensated compared with the general sample of public health professionals. A surprising number identify their work as "not in public health". They are held in comparatively high esteem by industrial physicians. Their job stability and satisfaction compare well with the general sample. There are 7 references. -- Authors' abst.

14 Personality and Achievement of Air Traffic Controllers. D.K. Trites, A. Kurek, and B.B. Cobb. Aerospace Med. 38, 1145-1150 (Nov., 1967).

Personality characteristics of 338 Enroute Air Traffic Control Specialists contributing to greater or less than predicted achievement in training at the FAA Academy and relationships between this over- and underachievement in training and subsequent job performance were investigated. From a regression weighted combination of aptitude test scores and biographical characteristics

predicted course grade averages were computed and subtracted from actual grade averages to obtain an estimate of over- or underachievement. These difference scores were correlated with the 18 scales of the California Psychological Inventory and with measures of job performance. Overachievers were found to be more intellectually efficient, more interested in achievement, responsible, dominant, tolerant, self-controlled, socially mature and aware of others, interested in giving a good impression, and had a greater personal sense of well-being than the underachievers. Relationships between the difference scores and six aspects of job performance were all significantly positive. It was concluded that (1) over- or underachievement during training reflected differences in personality structure among trainees, and (2) over- or underachievement was a relatively stable characteristic of individuals manifested subsequently in their job performance. There are 13 references. -- Author's abst.

15 Organizing for Ergonomics. F.A. Damon.
Am. Ind. Hyg. Assn. J. 28, 583-587 (Nov.-Dec., 1967).

Elimination of unnecessary physical and psychical stress promotes more effective utilization of the physical and mental capabilities which the worker brings to the job. A corporate Ergonomics Committee provides an effective, systematic method to bring the knowledge of several disciplines to bear properly to "fit the job to the worker". This paper outlines the organization, function, and operation of such a committee. Six references are given.
-- Author's abst.

16 Work-rest Cycle in Aircrewmen Fatigue. R.L. DeHart.
Aerospace Med. 38, 1174-1179 (Nov., 1967).

The stresses acting upon military aircrewmen are numerous and variable. These stresses are modified by such factors as morale, motivation and mission accomplishment. The interaction of stress and the individual may produce a subjective sense of weariness, with a concomitant objective deterioration in performance—an acceptable definition of fatigue. This study was undertaken to more clearly delineate the subjective effects of fatigue in terms of the actual work-rest cycle. The subjects were highly motivated aircrewmen in an operational squadron, performing a variety of aircraft systems tests. The missions were variable, from low level ground approach tests to high level photographic evaluations, from duration times of less than one hour, to over fifteen hours, and with a world-wide geographic spread. A daily activity log, designed to cover a 24-hour period, was prepared by each subject. The log was divided into the following five major sections: Rest, Duty, Recreation, Nutrition, and Physiological Reactions. Twenty-four subjects completed the study, preparing the log for 30 consecutive days, thus providing a total of 24 man-months of subjective data for evaluation. The daily logs were analyzed to establish trends and the influence of duty time and other factors on subjectively described symptoms of fatigue. The importance of modifying influences of such factors as job satisfaction and mission accomplishment on subjective fatigue are presented. There are 15 references.
-- Author's abst.

17 Psuedomonas aeruginosa Epidemic Traced to Delivery Room Resuscitators. J. Fierer, P.M. Taylor, and H.M. Gezon. New Engl. J. Med. 276, 991-996 (May 4, 1967).

An outbreak of Pseudomonas aeruginosa infection in a premature nursery involved 22 newborn infants and resulted in two deaths. The original source of the epidemic was found to be the delivery-suite resuscitation equipment that had been contaminated via a wash-sink aerator. Pyocine typing was used to relate the epidemic type of pseudomonas in premature infants to the delivery-room contamination. Crossinfection through the contaminated hands of personnel in the nursery was thought to be responsible for the majority of the infections in infants not resuscitated at birth, and the infection proved uncontrollable as long as infected babies remained in the nursery. There are 18 references. -- Authors' abst., Public Health Eng. Abstr.

18 Functional Chest Pain. D.E. Flinn.
Aerospace Med. 38, 1167-1170 (Nov., 1967).

In aviation medicine, accurate diagnosis of the cause of chest pain is particularly important. Although the requirement of flying safety demands the early detection of cardiac disease, it is also important to recognize and properly manage the cases in which chest pain is caused by emotional factors. Functional chest pain may be a conversion ("hysterical") symptom, in which emotional distress is perceived as a somatic symptom, or it may be the result of

smooth muscle spasm, mediated through autonomic innervations, affecting organs of the upper abdomen and chest. Important factors in the differential diagnosis of chest pain include its characteristics, the manner in which the patient describes and reacts to the pain, and the circumstances in which it occurs. The possibility of adding an iatrogenic element in cases of functional chest pain can be minimized by careful history and examination. There are 8 references. -- Author's abst.

19 Heart Rate of Pilots Flying Aircraft on Scheduled Airline Routes. H.P.R. Smith. Aerospace Med. 38, 1117-1119 (Nov., 1967).

The heart rate of seven experienced pilots was recorded at five-second intervals during take-off and landing and at five-minute intervals during preflight checks, taxying and the remainer of the flight. The rate of all of the pilots was raised during every take-off and landing. It was also increased to a varying extent according to the difficulties and hazards of the remainder of the flying task. The results support the view that the number of hours flown is not the only parameter needed to measure the work done by civil air transport pilots. There are 5 references. -- Author's abst.

20 Ultra-Low Frequency Displacement Ballistocardiogram Normal Standards and Clinical Observations. J.E. Smith. Aerospace Med. 38, 1120-1129 (Nov., 1967).

In this study, as in previous studies, the resting electrocardiogram has limited value and the positive Master two-step test, although of more definitive diagnostic accuracy, occurs too late in the disease process to be of any help for the early detection and prevention of cardiovascular disease. The use of maximal exercise testing with treadmills may be a useful method of assessing risk by measuring the R-ST segment deviation and apparently these changes can be detected at a much earlier time in the disease process. It is also possible that the abnormal ballistocardiogram may be of great value in assessing future risk. This also seems to occur at a point in time that would make preventive measures more effective. The presence of a low amplitude displacement IJ + JM under 20 mm. or 100 micron when combined with a small acceleration HI and deep acceleration K (HK/HI ratio over 1.6 to 2.00) seems to be associated with markedly increased risk of the future development of vascular disease. Certainly, more medical emphasis should be directed to those cases having ST segment deviations on maximal exercise stress testing, abnormal ballistocardiograms and abnormalities in the biochemical area. It is still uncertain what benefits can be obtained by an aggressive program of prevention, but it seems possible that meticulous dietary adjustments, progressive exercise stress programs and an attempt to use psychiatric techniques for the relief of anxiety should all be looked at carefully. If all of these techniques combined would prevent one case of coronary heart disease per year in an airline captain at any age, it would easily pay for the cost of a medical department. An airline captain is probably one of the most expensive pieces of biological hardware in existence. The loss of a captain between the ages of 40 to 50 may represent an investment loss as high as $250,000.00 when one orients to the cost of training, loss of license insurance and pension rights. The loss of 20 captains is comparable to the cost of a modern DC-8 jet airliner. Approximately 70 per cent of our pilots who lose their licenses on medical grounds have been due to cardiovascular disease. With an aging population and nearly 5,000 pilots, the economic results speak for themselves without reference to the humanistic factors. There are 23 references. -- Cond. from Author's text

21 The Clinical Stages of Breast Cancer—What do They Mean? J.E. Devitt. Can. Med. Assn. J. 97, 1257-1262 (Nov. 18, 1967).

A consecutive series of 1,440 breast cancer patients has been retrospectively reviewed, with reference to the factors related to the presenting clinical stage of the tumors. The known time existence before presentation for treatment did not correlate with either the presenting clinical stage or the survival rates for these stages. In spite of earlier presentation for treatment over the 16 years the distribution of patients in the different clinical stages was unchanged. The crude survival rates and annual death rates suggest that the different clinical stages contain biologically different tumors. The higher incidence of skin recurrences, their earlier occurrence, and the poorer subsequent survival rates of patients with the more advanced clinical stages also indicate a biological difference between the tumors of the different stages. With the host-tumor relationship so important in determining the subsequent outcome of the patient, it is desirable that we employ methods of therapy associated with the least treatment-induced suffering. There are 14 references. -- Author's summary

January, 1968

63 Public Health Evaluation of Nuclear Power Plants. C.L. Weaver and G.E. Stigall. Health Physics 13, 189-196 (Feb., 1967).

The potential effect on public health and the environment from the proposed operation of major nuclear reactor facilities is now being evaluated or a routine basis. In the past year, several reactors in the 1,200 to 1,600 MW thermal power level have been evaluated prior to the start of construction. With the use of several power reactors as typical examples, the role of the Public Health Service in providing assistance to state health agencies on potential environmental problems is discussed. Five references are given.

-- Abst. cond., Public Health Eng. Absts.

ENVIRONMENTAL MEASUREMENTS

64 Application of Gas Chromatography in Manned Space Flight. J.D. Lem, Jr.* Aerospace Med. 38, 1110-1117 (Nov., 1967).

A trace contaminant detection system using gas chromatographic techniques has been developed to provide real-time analysis of the space cabin atmosphere and suit gas during space flight. Information concerning the presence and buildup of any toxic contaminants during flight was considered essential in preparation for missions of long duration. Gas chromatography, with its inherent simplicity and amenability to miniaturization, has proven to be a valuable tool in the detection system. Rigid reliability requirements are imposed on spacecraft systems and flight instruments. A maximum effort was therefore expended in this program to obtain an instrument capable of performing in a space environment without overcompromising the versatility of gas chromatography in the laboratory. The carrier gas in the detection system is helium, housed in a 5.9-inch-diameter titanium sphere. Electronics are provided for amplification of the detector signals, zero compensation, oven temperature control, amplifier attenuation, and automatic programing. The analyzer subassembly consists of three separate columns and associated cross-section ionization detectors. The system has undergone extensive testing at NASA-MSC,* including both laboratory tests and chamber simulations, and will be of great assistance in answering the trace contaminant questions. -- Author's abst.

* From the Crew Systems-Support Development Branch of the National Aeronautics and Space Administraction Manned Spacecraft Center, Houston, Texas.

65 Determination of the Threshold Effects of Atmospheric, Irritating Pollutants—Comparison of Two Methods. R. Guillerm, R. Badre, and J. Hee. Ann. Occ. Hyg. (London) 10, 127-133 (April, 1967). French.

Two biological tests are proposed for determining the threshold effects of atmospheric irritating pollutants such as acrolein, crotonaldehyde, methacrolein, acetaldehyde, propionaldehyde, and isobutyraldehyde. Methods involve the measure of ciliary activity of tracheal epithelium in vitro and bronchomotricity in guinea pigs in vivo. Ciliary frequency is measured by photo-oscillography. Bronchomotricity is measured by recording transthoraco-pulmonary pressure in artificially ventilated spinalized guinea pigs. Threshold effect in parts per million of the various irritants based on the ciliary activity and the bronchomotricity respectively was: acrolein 15-20 and 20; crotonaldehyde 25-35 and 40-50; methacrolein 120-150 and 110-120; acetaldehyde 450-500 and 400; propionaldehyde 650-700 and 700; and for isobutyraldehyde the value for bronchomotricity was 1500-2500. Further tests are indicated to verify the validity of the tests with inorganic irritants. -- APCA Absts.

66 Sampling and Analysis of Organic Solvent Emissions. A. L. Vander Kolk. Am. Ind. Hyg. Assn. J. 28, 588-589 (Nov.-Dec., 1967).

Stack emissions were evaluated for air pollution purposes by using both Mylar bag sampling and gas washing bottles containing normal hexane and orthoxylene. Analysis was done by gas chromatography. Agreement between the two sampling techniques was good, and each method has its advantages and disadvantages. -- Author's abst.

67 A Preliminary Report on the Use of Silver Metal Membrane Filters in Sampling for Coal Tar Pitch Volatiles. R.T. Richards, D. Therese Donovan, and J.R. Hall. Am. Ind. Hyg. Assn. J. 28, 590-594 (Nov.-Dec., 1967).

Background information concerning reasons for the initiation of this study, the tentative threshold limit of 0.2 mg. per cubic meter of air (American Conference of Governmental Industrial Hygienists (ACGIH), and previous attempts at sampling with glass fiber filters are discussed. Problems encountered in obtaining consistent results with glass fiber filters and the benzene extraction analysis technique led to a search for a better technique. Comparison of glass fiber filters, cellulose acetate membranes, cellulose filters, and cellulose thimbles with the silver membranes were made. This comparison included weight stability with humidity changes and benzene extraction and airflow determinations. The results of actual sampling are listed, and other possible uses of the metal membrane in industrial hygiene are discussed. There are two references. -- Authors' abst.

PREVENTIVE ENGINEERING

68 Gaseous Fluoride Emissions From Stationary Sources. R.C. Specht and R.R. Calaceto. Chem. Eng. Progr. 63, 78-84 (May, 1967).

Methods of controlling the emission of fluorides from the brick and tile, steel, aluminum, and phosphate fertilizer industries are examined. The brick and tile industry receives brief treatment and a concluding statement mentions that a Venturi-type scrubber was used in bottle manufacture with 92% efficiency. In the steel industry, the emission of fluorides from sintering plants exceeds those from open hearth furnaces and different control measures are required. The addition of 6% by weight of ground limestone to the sintering mix reduced fluoride emission by nearly one half. The final treatment consists of the means for supplying and injecting pulverized limestone and the final dust separation equipment. Reduction of fluorides is estimated at 96%. The basic difference between the treating systems of the sintering and open hearth processes is the pressure under which they operate and the material used as a reactant; $Ca(OH)_2$ is used in the open hearth process. Among the methods discussed in regard to the aluminum industry are the wetting by sprays of the hot gases escaping through roof monitors, the use of sieve-plate gas absorber column, and a floating bed type of scrubber which overcomes the tar-fouling problem and is reported to remove 95% of fluorides. Fluoride control is achieved with cyclones and packed towers. The effects of fluorides on vegetation, cattle, and man are briefly discussed including the effects of inhalation of HF at various concentrations. -- APCA Absts.

69 Fluorine Scrubber. R.C. Timberlake. Southern Eng. 85, 62-64 (June, 1967).

The control of gaseous fluorides from the superphosphate curing area of the American Cyanamid's Brewster, Fla., plant is described. The problem involved handling large volumes of air containing widely varying concentrations of fluorine. Four blowers, each with a capacity of 87,500 cfm, were used to deliver the exhausted air to rubber-lined scrubbers. The 9-ft. impeller is made of stainless steel and the housing is rubber-lined. The ducts are made of Cyanamid's Laminac polyester resin. Each of the four scrubbers has 50 spray nozzles and uses 500 gal. water/min. to capture the fluorine as dilute fluosilicic acid. The scrubber project eliminates 97% of the total fluorides liberated by all sources of the operations. -- APCA Absts.

70 The Use of Ammonia to Eliminate Acid Smuts From Oil-Fired Plant. P. Etoc. J. Inst. Fuel 40, 249-251 (June, 1967).

The process of injecting ammonia into flue gases was developed primarily to control corrosion of low-temperature heat exchange surfaces by neutralizing the sulfur trioxide. The present paper deals with the extension of the use of ammonia to control acid-condensation smut formation. There are 1 reference. -- Public Health Eng. Absts.

71 Sulfur Dioxide and Fly Ash Removal From Coal-Burning Power Plant. W.A. Pollock, J.P. Tomany, and G. Frieling. Air Eng. 9, 24-28 (Sept., 1967).

A system comprised of direct limestone injection into a furnace in combination with wet scrubbing is described. Based on data developed on a Turbulent Contact Absorber (TCA) scrubber, the simultaneous removal of fly ash and sulfur dioxide from coal-burning power-plant flue gases is practical. Fly ash collection efficiencies in the order of 98% and overall sulfur-dioxide removal of 91% can be expected at wet scrubber pressure drops of about 4.5 inches, watergauge. For a generating capacity of 25 mw. equivalent to 100,000 cfm. of flue gases at 300°F. the investment and operating costs are approximately $10/kw and $1.17/ton of coal respectively. An expanded experimental program is recommended. -- APCA Abstr.

72 Controlling Combustible Emissions. L.C. Hardison. Paint Varnish Prod. 57, 41-47 (July, 1967).

The control of solvent emissions may be handled by adsorption, thermal incineration, and catalytic incineration. Adsorption has the disadvantage of requiring reconstitution of the solvent and presents a complex addition to the manufacturing procedure. Adsorption as a means of concentrating solvent into a smaller stream for subsequent incineration appears attractive for some paint spray applications. Incineration provides the most nearly universal answer to the solvent emission problem, and perhaps the most costly. Catalytic incineration is not universally accepted at the present time because of the lack of evidence of sustained performance, and will require a guarantee of service and replacement in order to gain acceptance for solvent emission control. Thermal incineration, on the other hand, can be assumed to sustain a given performance level if the flows, temperatures, etc., are held constant. This will be the main tool for solvent incineration in the coating industries in the near future.
-- Author's summary, APCA Abstr.

COMMUNITY AIR HYGIENE

73 Air Pollution Control: Its Impact Upon Municipalities, Industry and the Individual. W.H. Megonnell. Air Eng. 9, 12-14 (July, 1967).

The impact of air pollution control is more readily assessed in terms of industrial costs than in community or individual costs. Yet the effect is felt by all in many ways. Restrictions in the quality of fuel that can be burned, and the combustion equipment that can be installed affect industry, the community, and the individual directly. Industry feels the effect of legislation making it necessary for them to install scrubbers or other equipment to meet air quality standards, and the individual must help to bear the economic burden in the form of increased prices for products. Government officials must take steps to cope with air pollution from community service and activities. However, in addition to reviewing the burdens imposed on these groups by air pollution controls, it is important also to assess the positive gains made by these groups—gains in improved living conditions, decreased deterioration of equipment, improved community attractiveness, and many other benefits. -- APCA Abstr.

74 Industrial Participation in Community Air Pollution Control Development. J.D. Coons. Mining Congr. J. 53, 56-58, 60-62 (March, 1967).

Current federal and state legislation on air pollution makes it clear that industrial management must look beyond the individual industry and the local area and formulate a general solution if the continual development of such legislation is to provide effective and workable control of pollution within the capability of our economy. The San Francisco Bay Area Air Pollution Control Law is a fine model of enabling legislation. Recognition of the airshed as a reasonable unit of self control is important. Establishment of an Advisory Council which draws on the varied interests within the community and encourages free discussion of the problems may result in improved acceptance of the control rulings. Enabling legislation will receive attention in the majority of state legislatures within the next one or two sessions. Many of the decisions embodied in enabling legislation are such that all industry should be concerned with them.
-- APCA Abstr.

75 Identification of Volatile Compounds in Kraft Mill Emissions. P.O. Bethge and L. Ehrenborg. Svenska Papperstid. 70, 347-350 (May, 1967).

Results of examination of the low boiling point constituents of the relief and blow gases from a kraft sulfate mill by gas chromatography and mass spectrometry are reported. The object was to identify the emissions that might contribute to the obnoxious odor. Gas samples were taken from the pipeline leading to the recovery furnace in a 5-liter plastic bag and these uncondensable gases were analyzed using a gas chromatography with a 5 A molecular sieve column and a thermistor detector. The sample of the raw turpentine emission was obtained from the vapor over the liquid in a bottle of raw turpentine. This sample was separated into fractions analyzed by a gas chromatograph or from a chromatograph mass spectrometer combination. In addition to a number of terpenes, 25 compounds were identified including thiophene, three sulfides, and hydrogen sulfide. -- APCA Abstr.

76 Smoke and Smell Reductions are Major Diesel Exhaust Problems. M.L. Brubacher, et al. SAE. Journal 75, 34-37 (Sept., 1967).

Although the smoke may not be harmful to health, the sight and smell of the exhaust from some diesel-powered vehicles is objectionable. Automotive diesels operate well within the California maximums for unburned hydrocarbons and carbon dioxide. This is not true for the maximum established but not yet mandatory for oxides of nitrogen. The problem presented by these oxides needs careful study since some research suggests that photochemical smog might be increased by reductions in the concentration of nitrogen oxides. Much has been accomplished by engine manufacturers to reduce smoke density in the last 35 years. Since a smoking diesel costs more to operate, economics exert a steady pressure towards improved combustion efficiency. Fuel additives have been developed which reduce exhaust density levels. Tighter fuel specifications and better maintenance have also helped to reduce smoke. The various methods of measuring smoke density used here and in Europe are discussed. -- APCA Abstr.

INDEX

Accident(s)
injury from 10 MeV electrons 62
Aerosol(s)
electric-motor driven generator 52
elimination of 5-micron from lungs 50
size analysis by metal film technique 51
Air pollutants
determination of threshold effects of irritating 65
Air pollution
control
impact on municipalities, industry and individuals 73
industrial participation 74
emissions from manufacture of Portland cement (bk. rev.) 11
measurement(s)
particle atlas (bk. rev.) 9
Air traffic controllers
personality and achievement 14
Ammonia
use to eliminate smuts from oil-fired plant 70
Andersen cascade impactor
calibrating with aerosols 55
Antarctica
organochlorine pesticides in 42
Asbestos
cardiopulmonary function studies in workers 46
hemolytic activity 45
"Asbestos" bodies
their nonspecificity 44
Aviation
ballistrocardiogram, ultra-low frequency displacement 20
functional chest pain 18
heart rate of pilots flying scheduled flights 19
personality and achievement of air traffic controllers 14
word list for speech discrimination testing 61
work-rest cycle in aircrewmen fatigue 16

Ballistrocardiogram
ultra-low frequency displacement 20
Beryllium
prevention of intoxication in Russia 36
Books
atmospheric emissions from manufacture of Portland cement 11
Sloan-Kettering Institute for Cancer Research, progress report 17, April 1967 12
the particle atlas 9
year book of nuclear medicine, vol. 2-1967 10

Caisson disease
experimental study 60
Cancer
breast, significance in clinical stages 21
skin, action of cigarette smoke condensate on mouse skin 22
Sloan-Kettering Institute for Cancer Research, progress rept. 17, April 1967 12
Carbon monoxide
detection in exhaled air by potassium pallado sulfite 33
poisoning, hyperbaric oxygen therapy 32
Carbon tetrachloride
poisoning 39
Carcinogens
metabolism of labeled hydrocarbons 31
Carmine dye
source of salmonellosis 24
Cement
atmospheric emissions from manufacture of Portland (bk. rev.) 11
Chest pain
functional 18
Chromatography
application in space flight 64
Coal mines
dust retention in lungs and lymph nodes of horses 49
Crotonaldehyde
effect of vapor on rats 38

Decompression sickness
experimental study 60
Dermatitis, dermatosis(es)
from anesthetic ointments 29
Diesel (see also exhaust gases)
smoke and smell reduction in exhaust 76
Disinfectants
pitfalls in evaluation 28
Dust(s)
retention in lungs of coal-mine horses 49
Dust collector(s)
collection for 150-ton electric furnace 57
Dust counting, determination
relationship between gravimetric and impinger number concentration 54
threshold limit values for respirable dusts 58
Dust sampling, samplers
adhesive-coated cylinder 53
calibrating with aerosols 55

Electric furnace, dust collection system 57
Emphysema
pulmonary, small airway disease in pathogenesis 26

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Emphysema (cont.)
roentgenologic diagnosis of anatomic 27
Ergonomics, organizing for 15
Exhaust gases, automotive engines
smoke and smell reduction in diesels 76

Fatigue
work-rest cycle in aircrewmen 16
Filter(s)
new CS, high-performance cloth arrestor 56
silver metal membrane for sampling coal tar volatiles 67
Fluoride(s)
methods of controlling emission 68
scrubber for control of gaseous 69
Fly ash
removal from coal-burning power plant 71

Glasswool
cardiopulmonary function studies in workers 46

Hearing
aerospace word list for speech discrimination testing 61
Heart
ballistocardiogram, ultra-low frequency displacement 20
function chest pain 18
rate of pilots flying scheduled flights 19
Horses, dust retention in lungs of coal-miner 49
Human Engineering
organizing for ergonomics 15
Hyperbaric
chamber and decompression sickness 60
oxygen therapy, in carbon monoxide poisoning 32

Impactors, calibrating with aerosols 55
Impinger, standardization for dust count 58
Industrial hygiene
characteristics of industrial hygienists 13
Insecticides
organochlorine in antarctica 42
residues in
human body fat 41
marine organisms 40

Jamaica
respiratory symptoms and smoking habits 23

Kraft mill
identification of odors in emissions 75

Lead poisoning, in children 37
Leptospirosis, acquired from squirrels 25
Lung(s), elimination of 5-micron aerosols 50

Marine organisms
organochlorine residues in 40
Mines, noise control 59

Nitrous oxide
exposure of experimental animals 34
teratogenic activity 35
Noise control and reduction, in mines 59
Nuclear medicine
year book, vol. 2, 1967 (bk. rev.) 10
Nuclear power plants
public health evaluation 63

Odor(s), identification in kraft mill emission 75
Oil-fired plant
use of ammonia to eliminate acid smuts 70
Ointment(s), dermatitis from anesthetic 29

Particle atlas (bk. rev.) 9
Pesticides
mobile laboratory methods for determination 43
Plastic(s)
identifying volatile pyrolysis products 30
Psychology
personality and achievement of air traffic controllers 14

Radiation (ionizing, nuclear, x-rays, etc.)
injury from 10 MeV electrons 62
public health evaluation of nuclear power plants 63
Resuscitation
psuedomonas aeruginosa epidemic traced to 17

Salmonellosis, from carmine dye capsules 24
Scrubber, for control of gaseous fluorides 69
Silicosis
from inhalation of silicic acid 47
medication in experimental 48
Sloan-Kettering Institute for cancer research, prog. rept. 17, April, 1967 (bk. rev.) 12
Smoking
action of cigarette smoke condensate on mouse skin 22
respiratory symptoms and habits in Jamaica 23
Solvent(s)
controlling combustible emissions 72
sampling and analysis of emissions 66
Space flight
application of gas chromatography 64
Squirrels, source of human leptospirosis 25
Sulfur dioxide
removal from coal-burning power plant 71

Threshold effects
determination of atmospheric irritating pollutants 65
Threshold limit values
for respirable dusts 58

Zoonoses
leptospirosis acquired from squirrels 25
salmonellosis from carmine dye 24