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NOVEMBER, 1946

# INDUSTRIAL HYGIENE DIGEST

(Vol. 10, No. 11)

## *Literature Abstracts*

- MEDICAL
- ENGINEERING
- LEGAL --- decisions and trends

## *Industrial Health News*

ANNUAL MEETING ISSUE



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**INDUSTRIAL HYGIENE FOUNDATION**

4400 FIFTH AVENUE  
PITTSBURGH 13, PA.



# FOUNDATION FACTS

Foundation Facts is a monthly newsletter devoted to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a non-profit association of industries for the advancement of healthful working conditions.

Vol. 8

November, 1946

No. 11

## Annual Meeting "Recap"

Official registration for the 11th Annual Meeting of Members of Industrial Hygiene Foundation was 423 -- only five less than last year despite the Pittsburgh hotel strike. The meeting was held at Mellon Institute, Pittsburgh, the Foundation's headquarters on November 7 with members and guests quartered in suburban hotels, clubs, private homes, The "Y", etc.

Round-table conferences for professional and technical personnel from industrial member companies, which were held the day before and the day after the annual meeting, were well attended and proved so popular that this plan will be continued next year. Attendance at the Conferences follows:

|                                  |    |
|----------------------------------|----|
| Chemical & Toxicological.....    | 48 |
| Engineering.....                 | 88 |
| Medical (49) and Medico-Legal... | 64 |

200

## Abstracts Available to Members

Texts and abstracts of all of the regular addresses and papers presented at the annual meeting are being sent to members and subscribers in the current "Annual Meeting Issue" of the INDUSTRIAL HYGIENE DIGEST.

Meanwhile, all presentations at the meeting have been turned over to the printer for the official Transactions and publication will be speeded.

A new information circular, "Production Comes from People," describing the Foundation, listing members, officers, etc., was released at the annual meeting. Copies will be sent to members in an early mailing. Extra copies are available for members of your organization upon request.

I-H-F

Abstract of report on "Findings from Foundation Plant and Laboratory Research" by F.R. Holden, Ph.D., W.C.L. Hemeon and Theodore F. Hatch, Industrial Hygiene Foundation, at the 11th Annual Meeting of Industrial Hygiene Foundation held at Mellon Institute, Pittsburgh, November 7.

A primary objective of Industrial Hygiene Foundation is to provide the member companies with the services of a central agency devoted to the continuing study of industrial health problems. Accordingly, the technical staff members spend a considerable portion of their time in active investigation of specific problems in industrial hygiene in the plants of member companies.

Table I  
Distribution of Foundation Investigations by Industry  
(1937 - 1945)

| Industrial Group                                             | Per cent of<br>Total Studies |
|--------------------------------------------------------------|------------------------------|
| 1. Ceramic, asbestos, stone products. . . . .                | 33                           |
| 2. Mining, smelting and refining, metal processing . . . . . | 25                           |
| 3. Manufacturing, metal and miscellaneous . . . . .          | 17                           |
| 4. Chemicals production . . . . .                            | 25                           |

Table II  
Distribution of Foundation Investigations by  
Nature of Problem  
(1937 - 1945)

| Operation or Exposure                                                      | Per cent of<br>Total Studies |
|----------------------------------------------------------------------------|------------------------------|
| 1. Dust exposures - silica, asbestos, nuisance dusts. . . . .              | 41                           |
| 2. Various chemical exposures . . . . .                                    | 21                           |
| 3. Metal fumes: welding, soldering, cutting, foundry . . . . .             | 9                            |
| 4. Metal cleaning, plating: degreasing, acid mists, chromic acid . . . . . | 6                            |
| 5. Dermatitis . . . . .                                                    | 5                            |
| 6. General industrial hygiene surveys . . . . .                            | 7                            |
| 7. Studies of atmospheric pollution . . . . .                              | 8                            |
| 8. Heat, ventilation. . . . .                                              | 3                            |

#### Summary of Activities, 1946

In continuation of this work, a total of 51 separate plant investigations have been conducted thus far in 1946, involving the collection and analysis of approximately 2500 samples, including over 1200 dust determinations and studies of dust composition. Greatest emphasis has been placed on the dust-producing industries during the year, but a variety of chemical operations have also been studied, as in the past. Table III summarizes the work in 1946.

Table III  
Summary of Foundation Investigations, 1946

---

|                                                 |                   |
|-------------------------------------------------|-------------------|
| Number of separate projects. . . . .            | .24               |
| Number of separate plant studies . . . . .      | .51               |
| Distribution of projects, by nature of problem  |                   |
| Dust exposure and control . . . . .             | .10 (35 plants)   |
| Chemical toxicological, miscellaneous . . . . . | .6                |
| Lead exposures. . . . .                         | .2                |
| Community atmospheric pollution . . . . .       | .2 (4 operations) |
| Dermatitis. . . . .                             | .2                |
| Metal fumes . . . . .                           | .1                |
| Heat exposure . . . . .                         | .1                |
| Number of analyses . . . . .                    | .2459             |
| Dust. . . . .                                   | .1274             |
| Lead. . . . .                                   | .275              |
| Miscellaneous Metals. . . . .                   | .345              |
| Miscellaneous chemical. . . . .                 | .665              |

---

### 1. Value of Industry Wide Studies

Attention is called to the fact that during 1946 the 10 projects in dust-producing industries included studies in 35 separate plants. Five of these projects were isolated studies involving single plants; the other five, including 28 plants, were multiple studies set up on an industry-wide basis or as overall investigations for companies with several different plants. These studies were deliberately designed to bring together for critical study the experiences of as many plants as possible having common problems. Outstanding among the advantages of these industry-wide studies has been the demonstration that sound solutions of most problems are generally found in the industry — not all in one plant, necessarily, but within the total experience.

The "dangerous trades" of our fathers have all but disappeared. Modern industry demonstrates every day that potentially toxic substances can and are being used without hazard. In general, one may say that there are more workers, by far, handling such materials safely than not. The problem today is largely one of discovering the effective control measures in actual use and making them available to the whole industry.

The concept of study on an industry-wide basis is entirely in accord with the primary purpose of the Foundation and, moreover, is of particular value in that it makes the day-to-day work of the organization more valuable to the members than would be possible through independent studies alone.

### 2. Value of Quantitative Studies

Industrial hygiene is, above all, a practical field and there is no place in it for elaborate testing procedures and methods of analysis unless they aid materially in the solution of practical problems. Field experience during this year, as in the past, has demonstrated that systematic, quantitative study is of direct value in a highly practical way. For example, it was our privilege during the year to investigate a large plant in which records of dustiness and

Medical records extended back for a period of 20 years. These data combined with our own investigation made it possible to provide fairly definite answers to the questions which were put to us: After this prolonged period of systematic effort to eliminate the hazard, how good is the present control; and, if further improvement is needed, how can our efforts be expended most effectively? The experience of the company is outstanding proof of the practical value of quantitative study. In fact, this company was so far ahead of the parade that when they started a systematic program of dust control, its scope was seriously limited by the lack of adequate dust counting instruments and techniques. That was 25 years ago. In fact, the early phase of their dust control program, was limited in scope by the lack of adequate dust-measuring instruments at the time.

Still another illustration comes from a study of heat exposure, in which fundamental analysis revealed that the major heat source was radiation rather than simple air temperature. From this it was evident that ventilation, the common method of control, was not the method of choice and would produce relatively little benefit from the money expended.

One of the most valuable items in the year's experiences was a request to investigate a new process while still in the pilot stage and to determine the probable control requirements for the final manufacturing operation so that proper plans could be made in advance. This represents the highest appreciation of the value of quantitative analysis and is a procedure highly to be recommended.

### 3. Design of Ventilating Systems and other Control Measures

Analyses of industrial ventilation systems and other control measures during the year have shown, as in the past, that full advantage is not being taken of all of the basic engineering knowledge which is available to assist us in the design of control measures. It is particularly disturbing to find inadequate performance after the expenditure of considerable money. Thus, in a comparative study of two plants doing the same work we found the poorer results in the plant having the more expensive system of ventilation and using the higher rates of ventilation.

Plant engineers will undoubtedly agree, that the design of control equipment generally takes a secondary place in the engineering organization and they frequently complain that not enough time or money is appropriated for basic engineering analysis. Thus, they are forced to resort to empirical design data, which too often, results in inadequate performance. Too much money and effort is being spent by industry to improve working conditions without securing the desired results. The solution lies in fuller utilization of existing engineering data and the systematic development of additional basic information. In our experience, such an approach pays for itself. It is the function of the Foundation to assist in this development.

### 4. Appraisal of Dust Hazards and of Dust Control Measures

It is of great practical significance that dust continues to occupy the major place in the entire array of industrial problems with which we are concerned. The dust studies have taken us into many industries in which systematic correlations between incidence of lung damage and nature and magnitude of

exposure have not been made. Thus, it has been necessary to draw heavily upon the experiences gained in a few industries for which such correlations exist in order to make the best possible appraisal of each new situation. In reviewing this work, one is impressed with the need for much more extensive information than we now possess. Some progress has been made in refining techniques through improvements in the determination of dust composition. The new procedure, reported at the 1940 Annual Meeting has continued to give interesting and valuable data. Other improvements in appraisal methods are currently being investigated.

We are impressed with the significant difference between the silicosis problem in industry and the far more general nuisance dust problem. It is necessary to distinguish between them since, more often than not, the nuisance dust is the more spectacular and is likely, therefore, to receive more attention.

I-H-F

# INDUSTRIAL HYGIENE DIGEST

(Vol. 11, No. 3)

## *Literature Abstracts*

- MEDICAL
- ENGINEERING
- LEGAL . . . decisions and trends

## *Industrial Health News*



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Vol. 9

March, 1947

No. 3

## Walter S. Paine

Walter S. Paine, veteran industrial health and safety engineer of Aetna Casualty and Surety Company, and a member of the Foundation's Legal Committee, died at Hartford, Conn., on March 3.

Mr. Paine was born in England in 1883 and was educated at Green Mountain Junior College and at Syracuse University, from which institution he was graduated in 1911 in mechanical engineering. He joined Aetna in 1915.

At the time of his death Mr. Paine was a member of the board and chairman of the executive committee of the National Safety Council. He was also active in the American Standards Association.

## Annual Index Issued

The annual index, covering INDUSTRIAL HYGIENE DIGEST for 1946, is now being issued to Member companies and Subscribers. Additional copies may be had upon request. Please note that the Foundation does not have extra copies of articles abstracted in the Digest, unless the abstract so states. For copies of original articles please communicate with the publications from which the material is taken. Lists of these publications, together with addresses, are also available upon request.

## Role of the Supervisor

There are many cases, says the National Foremen's Institute, "where supervisors cannot do anything about a health hazard. It may be a job for an engineer. But it is always the supervisor's responsibility to call existing or developing health and safety hazards to the attention of management. For, in most cases, top executives have no one to turn to but the supervisor for information on what is going on at the plant. And since top executives know that a disregarded health hazard is always accompanied by inefficiency of operation and frequently results in labor trouble, they expect their supervisors to spot and report health hazards whenever and wherever they develop."

## "Men versus Machines"

The first "letter to the editor" in the March issue of Fortune is by Theodore F. Hatch, the Foundation's Research Director, commenting upon a recent article on "Men versus Machines." Mr. Hatch points out that "if we are to realize the full benefits from further mechanization, machines must be designed to meet human as well as functional requirements."

I - H - F

- 277 On the Mechanism of Retarded Pneumoconiosis: Delayed Radio-Opacity and Intra-Pulmonary Displacement of Particles. A. Policard and E. Martin. Bull. Acad. Med., 130, 35-37 (1946)

It is well-recognized that a pneumoconiotic lesion may progress after the cessation of the patients exposure to dust. The authors record the case of a coal miner who had worked for 13 years (with an interruption of 3). The progression of disease was followed until his death, 10 years after leaving the mine. Findings of the autopsy are given and a discussion of the case follows. The nodule may have existed previous to its discovery by radiograph; it may have been radio-transparent and may only recently have become opaque, by the deposit, for instance, of calcium or iron. The general lymphatic absorption and blood dissemination of the coal dust implies a gradual movement which may, in the course of time, alter the radiographic picture. -- From J.I.H.&T.

- 278 Some Hematologic Observations in Silicosis. H. Heimann. Occ. Med., 2, 470-475 (Nov., 1946)

A series of hematologic observations made of 65 persons with silicosis is reported. For the entire group of persons with silicosis, with and without superimposed infection, statistical analyses revealed that the disease was associated with (a) a rise in the number of young polymorphonuclear leukocytes, (b) a rise in mean corpuscular hemoglobin and (c) an increased rate of erythrocyte sedimentation. In simple silicosis, as well as in silicosis with infection, there is a shift to the left of the polymorphonuclear leukocytes and an increase in the rate of the erythrocyte sedimentation. These data suggest that neither an abnormally increased sedimentation rate nor a shift to the left of the polymorphonuclear leukocytes in silicosis necessarily indicates that pulmonary infection is present as a complication of the fibrotic condition of the lungs.

- 279 Fatal Industrial Accident (Fatal Bronchopneumonia Following Hemoptysis Caused by Electric Shock After Clinical Cure of Pulmonary Tuberculosis.) F. Damiani. Lotta contro la tuberc., 16, 99ff. (Mar.-Apr., 1946) (Italian)

A man, 30 years old, had had bilateral pulmonary tuberculosis, which had healed after bilateral pneumothorax and prolonged treatment in a sanatorium. Recovery lasted for more than 10 years, as demonstrated by periodic clinical examinations, roentgenograms and examinations of the sputum. He was in excellent health all these years, during which he worked as he had before his illness. He then suffered an electric shock during work, and immediately afterward complained of pain in the chest. The pain increased from the second day, accompanied by fever and hemoptysis and followed by terminal tuberculous bronchopneumonia. Electric currents can damage the respiratory tract with resulting pulmonary emphysema or pulmonary edema. When injuries of this type occur in lungs with healed tuberculosis, they may activate the old process. The recurrence is of industrial origin and its victims are entitled to the benefits of industrial laws. -- Occ. Med.

- 280 Tuberculosis in Industry. B.L. Vosburgh. Bull. Nat. Tuberc. Assoc., 32, 97 (June, 1946)

Under a program of routine screening of all prospective employees, the Schenectady General Electric Plant has noted a reduction in the rate of active tuberculosis from a high of 3 per 1000 to a level of 0.5 which

- 327 Asbestos Dust. Anon. Safety Rev. (U.S. Navy), 4, 13 (Jan., 1947)

The brief article calls attention to the hazard of exposure to asbestos dust and the need of adequate localized ventilation. All working places with possible exposure should be checked for asbestos dust, and where mechanical exhaust ventilation must be supplemented by wearing of personal protective equipment, it should conform to Bureau of Mines specifications.

- 328 Air-Operated System Dumps Cyanide with Safety.

Anon. Compressed Air Mag., 52, 49 (Feb., 1947)

At the Kerr-Addison Mill in Virginiatown, Ontario, cans of cyanide to be used in the extraction of gold from ores, are handled mechanically by a system that is completely inclosed and controlled from the outside. Except for loading and unloading, the operation is automatic. After a can has been placed on the skip and the chamber has been closed, it is hoisted by an air cylinder. At the limit of its travel it is tripped and its contents are dumped into the hopper of a reagent feeder that discharges into conditioner tanks. Reversal of the piston stroke returns the skip to the starting position; but before the empty is replaced by a full container, the fumes and dust in the enclosure are exhausted to the atmosphere. Thus hand dumping with its attendant skin rashes are avoided. Diagrams are presented.

- 329 Dust Control Lessons from Fontana Dam. F.N. Chirico.

Occ. Hazards, 2, 24-25 (Feb., 1947)

Certain features of the dust control system introduced during the construction of Fontana Dam in North Carolina were not only unique but because of their extreme effectiveness in curtailing hazards have become a pattern for the industry. The most radical of those features was a mechanical water spray mounted on the frames of the electric shovels, continuously and thoroughly wetting the rock. This process reduced dust concentrations to averages of 1.4 to 2.7 M.P.C.F., and was much more efficient than intermittent hand wetting. It was also unnecessary to wet the rock during crushing—a point at which hand wetting has been found undesirable. Elimination of dust fog also increased night visibility. Other dust-reducing features included wet drilling, efficiently designed ventilation systems, total enclosure of indoor screens, with self-closing doors, top and skirt-board coverings at transfer and discharge points, dust-tight manholes, counterweighted hinged covers on chutes, discharge of the dust collector effluent through high stacks, and the installation of water sprays with conveniently located shut-off valves. Specially designed ejector ventilation systems were installed in the cement unloading plant, supplying clean air to the workers and removing the cement dust which was subsequently collected. An average of less than 10 M.P.C.F. was attained at that point, less than five in the concrete mixing plant, and less than four in the quarry and rock crushing plant.

- 330 Report on an Investigation into Dust and Ventilation Conditions in the Copper Mines and the Broken Hill Mine in Northern Rhodesia with Particular Reference to Silicosis. J. De V. Lambrechts. 42 pp. Lusaka: Govt. Printer. (1945)

The emphasis in this report is upon dust. It is recommended that dust sampling results form a basis for ventilation requirements. Depths



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

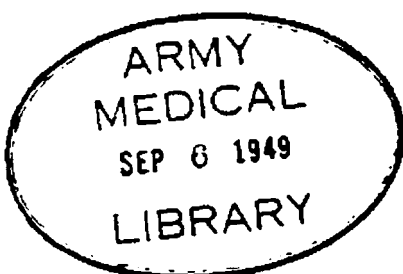
**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**



**AUGUST, 1949**  
**(Vol. 13, No. 8)**

**INDUSTRIAL HYGIENE FOUNDATION**  
4400 FIFTH AVENUE - PITTSBURGH 13, PA.



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a non-profit association of industries for the advancement of healthful working conditions.

Vol. 11

August, 1949

No. 2

## M.E. Coyle of General Motors to Keynote Annual Meeting

## Conferences to Include one on Air and Stream Pollution

M.E. Coyle, Executive Vice-President of General Motors Corp., will deliver the keynote address opening the 14th annual meeting of Industrial Hygiene Foundation at Mellon Institute, Pittsburgh, on November 17. Mr. Coyle will speak on subjects of broad interest to industrial management, as corporate activities and their influence on the National economy.

Besides the main meeting for management representatives, four professional conferences will be held here on November 16---(1) Medical, (2) Chemical & Toxicological, (3) Engineering and (4) Legal. These round-table sessions are being arranged by the respective professional committees in the Foundation and the agenda will be announced soon.

November 18, the day after the main meeting, will be devoted to a conference on the Air and Water of Industrial Communities, with emphasis on air pollution. The membership voted 3 to 1 in favor of such a conference which in effect will be a continuation of the main meeting. The agenda will cover subjects of interest to both management and technical representatives.

The Medical Conference on November 16, the main meeting on November 17 and the "air and water" conference on November 18 will all be held in the main auditorium at Mellon Institute. The other conferences (November 16) will all be held either at the Institute or nearby at sites to be announced.

Hotel reservations should be made now. Both the Hotels Webster Hall and Schenley, near Mellon Institute, promise full cooperation, as do the downtown hotels and the Pittsburgh Convention Bureau.

More details later.....

## I-H-F in American Can Company's Annual Report

The 47th annual report of the American Can Company, a Foundation member, contains the following:

"With the assistance of Industrial Hygiene Foundation of America, which is located in the Mellon Institute in Pittsburgh, a survey was conducted of the Company's medical program for employees. The purpose of this survey was to determine ways whereby the Company's already comprehensive medical program can be made more effective."

(Editor's Note: The Foundation is now engaged in four other such studies dealing with medical administration, cost and procedure.)

--- November 16, 17, 18---

However, great care should be taken to exclude the tuberculous in selecting persons to receive aluminum therapy (4) It is not believed that a scientifically controlled experiment in industry is feasible for the evaluation of aluminum for the prophylaxis of silicosis. This follows from the uncontrollable variables inherent in the industrial situation and other factors which have been discussed. For these reasons, it appears improbable that any research agency would consider it advisable to undertake such a project except under special conditions already discussed, and which may not be attainable. (5) The McIntyre Research Foundation, as presently organized, is not equipped to solve the aluminum prophylaxis problem in relation to silicosis. The steps considered necessary to accomplish this objective are outlined. (6) Research should be continued with laboratory animals with the object of finding a more adequate basis for application to man. Such study is now included in the program of the Saranac Laboratory of the Trudeau Foundation. -- Authors' Summary

- 366 Effects of Electricity on the Human Body. W.B. Kouwenhoven.  
Ind. Med. 18, 269 (July, 1949).

The author discusses briefly the various effects of electricity on the body, including variations with the amount of current. The current values of interest are: (1) threshold of feeling, about 1 milliamperere, (2) let-go current, above which it is difficult to let go of a wire, about 9 milliamperes for men, 6 for women; (3) current producing ventricular fibrillation, 0.1 ampere; (4) current producing a block in the nervous system, one ampere or more; and (5) the counter shock current. The last three result in death if prolonged; otherwise artificial respiration may save the victim. These effects refer to alternating current of commercial frequency. Direct current is much less harmful. The only effect of high-frequency currents is heating.

- 867 Asbestosis and Cancer of the Lung. Editorial.  
J.A.M.A. 140, 1219-1220 (Aug. 13, 1949).

Records of English, American and German physicians and The Annual Report of the Chief Inspector of Factories in England for 1947 show that the occurrence of cancer of the lung is related to pulmonary asbestosis. This relation is supported by the following observations: (1) The incidence rate of cancer of the lungs in asbestosis patients is 10 to 15 times as high as among the general population. (2) The male-female ratio is more nearly equal than it is for the general population, which indicates that an environmental and evidently occupational carcinogen tended to equalize the incidence rate of cancer of the lungs for both sexes. Recent experimental observations support this interpretation of clinical evidence.

- 868 Changes in the Lungs Produced by Natural Graphite. H.E. Harding and G.B. Oliver. Brit. J. Ind. Med. 6, 91-99 (April, 1949).

A brief description is given of the industrial uses of natural graphite, which is a crystalline carbon mixed with up to 10% of free silica and with other minerals. The greatest dust risk occurs in the grinding of natural graphite, for which evidence is presented to show that this can lead to

# A BETTER PLACE TO WORK

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*Transactions Bulletin No. 9*

Foundation Facts, 1947-48

A Better Place to Work

Community Attitude on Working Conditions

Results of Foundation Field Research

Industrial Health Programs in Action

Summaries of Conferences

Industrial Health Administration

Atomic Power and Industry

Sickness Insurance

Health and Welfare Funds



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**INDUSTRIAL HYGIENE FOUNDATION**  
4400 FIFTH AVENUE      PITTSBURGH 13, PA.

TRANSACTIONS  
of  
TWELFTH ANNUAL MEETING  
of  
INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, INC.  
NOVEMBER 20, 1947

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# FOUNDATION FACTS, 1947-48

## ANDREW FLETCHER

President, St. Joseph Lead Company  
Chairman, Board of Trustees, Industrial Hygiene Foundation

### Members and Guests of the Industrial Hygiene Foundation:

It gives me great pleasure to welcome you to this, our 12th Annual Meeting. I can well remember the early years of our activities, and the skepticism with which Industry, Labor, and Governmental Departments viewed our proposed program of research directed toward the improvement of conditions for the American Workman, and for the community in which he lives. The foresight and courage of the original organizers has certainly been amply repaid in dollars, as well as in human happiness. Today the Foundation is sound financially, our membership now includes most of the leading industrial companies, and our name and findings are known throughout the United States - in fact, in many far distant lands. There are no Industrial Hygiene Foundations elsewhere in the world. The foreign visitors, who come to us, have difficulty in understanding that the Foundation is a wholly voluntary research organization, supported by industries united for the well-being of workers.

Mr. McMahon, our Managing Director, will give you a short report on the Foundation's affairs, and it is therefore unnecessary for me to comment on the results accomplished since our last meeting. You will be filled with a sense of satisfaction and pride in his report, and in the list of our new members. But we must not become complacent, as only a start has been made in the research that is necessary to solve the many hygienic problems that face, and will continue to face labor, management, consumers, and, in general, our entire population.

### Research Needs and Implications

I had the great privilege of spending two weeks during last September with the top ranking officers of our Navy, who discussed their problems, as well as the relationship of industry to the Navy. I was greatly impressed by the attitude of the Navy toward the necessity of research, and I was extremely interested in the comment that the war would have been greatly extended if England had not developed, through research, the relatively crude radar that enabled their small airforce to successfully repel the large German bombing flights. It was also stated that the war might even have been lost, if Hitler had continued expenditures for research in the development of new weapons instead of stopping such expenditures in February, 1941 and not resuming the research on guided missiles, fast submarines, etc., until November, 1942. In the past, Europe largely provided the well-springs of fundamental research, and the research in the United States has, for the most part, been concerned with the practical application of fundamental scientific facts. For instance, we took the German work in nuclear

physics and made the atom bomb; we aided England in the perfection of radar, etc. The President's Scientific Research Board, in its current studies on "Science and Public Policy," reports that for the fiscal year of 1947 the Government spent 625 millions for research and development in the physical and biological sciences—this sum, of course, does not include expenditures by the Atomic Energy Commission. It was also reported that private outlays for research were slightly less than 600 million, and that Russia's 1947 budget was \$1,200,000,000. It would seem to me that even 1 billion, 200 million falls short of the amount that our country should spend in research to guarantee its existence and to guard the lives of its people.

### Leadership in Industrial Hygiene

Just as continued research is necessary for our armed forces and our country as a whole, so too is research necessary to improve the health and welfare of the men and women in industry. Last year, in my opening talk, the question was asked, "Who is going to take the leadership in industrial health—the Unions, the Government, or Industry?" You probably know that in addition to the funds expended by Federal and State Governments on industrial hygiene, the Anthracite Health and Welfare Fund announced in June a grant of \$575,000 to the Jefferson Medical College for a five-year study of "Miners' Occupational Diseases." Last month the Ladies Garment Workers Union announced a one million expansion of its Union Health Center in New York. If the accomplishment of the Industrial Hygiene Foundation in the past was based solely on the dollars expended, or if our present budget of around \$100,000 per year was the sole indication of future results, then our contribution toward the improvement of working and living conditions would indeed be depressing. Although "dollars" are always helpful, the Foundation, through our competent staff, is even now able to stimulate industry toward taking the leadership in industrial hygiene that is so necessary. Your Board of Directors have not yet felt that the Foundation's financial resources, or the size of its staff, are sufficient to undertake fundamental research, especially as our membership covers such a large field, but we recognize our obligation toward fundamental research and at some appropriate time we will discharge our responsibility. We are in a position to efficiently and satisfactorily study particular industries, and to make constructive suggestions that will aid individual companies in that industry to improve conditions.

### Control of Air Pollution

For example, the Foundation has been studying air pollution in certain areas, and this problem may become even more important, as cities and communities throughout this country are tightening up on regulations governing air pollution. Pittsburgh, Niagara Falls, Cleveland and Los Angeles have already expressed deep concern, and Louisville has taken action against a large plant operating in that city to abate the public nuisance arising from dust, smoke and odors—eleven damage suits have actually been filed by citizens of Louisville against the corporation. There is continued public demand for the control of air pollution, just as there is a demand for improved working and living conditions. I am sure that industry should not wait until the demands are translated into stringent regulations and subse-

quent legal action. Industrial management must learn to be led. Smoke cannot be banished by laws, neither can accidents nor industrial diseases. The technical problems must first be solved.

In addition to surveys for industries and individual companies, the Industrial Hygiene Foundation is watching the development of proper industrial codes, and is in position to aid on any problems where employer and employee need disinterested, competent advice of a technical nature.

### Production Through Better Working Conditions

To combat inflation, and to aid a distressed world, what we need is greater production on the part of every worker in this country. I am hopeful that we are nearing the end of the cycle of industrial strife, and of the period of extreme positions on the part of either management or labor. I know of no better way for improving labor-management relations, and thereby improving production, than by developing together ways for improving working and living conditions. Industrial harmony and mutual respect must be earned—they cannot be bought or imposed through propaganda, any more than an individual can buy respect or a good reputation. The maintenance of good working and living conditions speaks louder than all the pamphlets or posters ever published.

The Foundation is your organization, and at all times stands ready to aid employer, employee, our State or Governmental Departments in all problems of industrial hygiene.

Before introducing Mr. McMahon, I wish to express the appreciation of the Industrial Hygiene Foundation to Dr. Weidlein, and the Mellon Institute for the many courtesies that have always been so wholeheartedly extended, as well as for the guidance and financial assistance that we have received. Without the help of Dr. Weidlein and his assistant, Dr. Hamor, our Foundation could not have grown to its present magnitude, and American industry would probably not have such a competent organization for the handling of industrial health problems.

And now it gives me great pleasure to present Mr. McMahon, Managing Director of the Foundation, who will report to you on our accomplishments since the last Annual Meeting.

## I-H-F IN 1947

### JOHN F. McMAHON

Managing Director, Industrial Hygiene Foundation

What has Industrial Hygiene Foundation done during the past year?

The following are some partial answers to that question:

At the first meeting of the Foundation's Board of Trustees, on December 16, 1935, this organization was launched with 23 member companies and associations. As of today, there are 349 members.

Twenty-two companies and associations have affiliated thus far this year. They are:

|                                 |                                  |
|---------------------------------|----------------------------------|
| American Can Company            | Inland Steel Company             |
| Anthracle Institute             | National Ass'n Fan Manufacturers |
| Atlas Powder Company            | National Pulverizing Company     |
| Austin Motor Company (England)  | National Steel Corporation       |
| Crucible Steel Company          | National Supply Company          |
| Federal-Mogul Corporation       | New Jersey Pulverizing Company   |
| Firestone Tire & Rubber Co.     | Pittsburgh Coke & Chemical Co.   |
| Ford Motor Company              | Sharon Steel Corporation         |
| General Ceramics & Steatite Co. | Sun Oil Company                  |
| General Electric Company        | Sun Sand Company                 |
| Godrej and Boyce Mfg. Co.       | Sylvania Electric Products Co.   |

Actually, the number of new members is 54 inasmuch as one of the organizations is the Anthracite Institute, which has taken out a multiple membership covering its 32 member companies. There are now 103 special subscribers—governmental agencies, private institutions, etc.

### Field Work

Field work continued to increase in a satisfactory manner and involved studies in approximately 70 different plants. This work will be described by Mr. Hatch, the Foundation's Research Director. In an engineering survey for the pottery industry, directed by Mr. Hemeon, Head Engineer, the Foundation collaborated with the U. S. Potters Association to hold a Pottery Dust Control Clinic here in Mellon Institute on October 13. Sixteen companies sent 31 representatives to this all-day conference.

### Conferences

Conferences are proving a practical measure for increasing Foundation services to member companies. A Medical Conference, an Engineering Conference, and a Conference for Attorneys and Compensation Officials were held here yesterday. Tomorrow there will be a conference for research directors, chemists, industrial hygienists and toxicologists. These closed sessions, limited to member firms in mining and manufacturing, draw together specialists, with similar interests and problems, from all types of heavy industry and so serve as valuable vehicles for the exchange of information and experience. But already, some of these sessions are beginning to exceed conference size. In the year ahead the Foundation hopes to sponsor several conferences for specific industries, possibly for engineers in the steel industry or for physicians associated with the asbestos industry, etc.

### Publications

"Health in Industry," the Transactions of our last annual meeting, was issued early in the year. Yesterday the printer delivered two new bulletins, "Air-Conditioned Crane Cabs," a publication in our Engineering Series, and "Industrial Air Sampling and Analysis," a handbook for plant chemists, and the first bulletin in our new Chemical and Toxicological Series.

In mid-year the Legal Committee issued a short analysis of Occupational Disease Compensation Statutes and Developments in the 1947 Sessions of the State Legislatures, as well as a memorandum on sickness insurance. More recently the Foundation released a comprehensive digest of the important Medical Survey of the Bituminous Coal Industry. Meanwhile, members of the Foundation staff published a number of papers in appropriate journals. Foundation publications for the year are on display in the lobby.

### The Staff

The Foundation's staff is now composed of 10 people, seven men, and three girls in the general office. An engineer was added this year and early in the coming year we hope to appoint a laboratory assistant who will also help with the monthly Industrial Hygiene Digest. The staff now includes a Research Director, a Medical Director, a Head Engineer, together with other engineers and chemists. Member companies can regard these specialists as advisory members of their own staffs and can call upon them accordingly.

We are glad to announce the establishment of an x-ray panel, under the auspices of the Foundation's Medical Committee, to which member companies may refer questionable chest x-rays. You may obtain details from Dr. Walmer, our Medical Director.

## Industrial Health in General

Now a view of the field at large--Top developments of the year in industrial health include:

1. Completion of the Medical Survey of the Bituminous Coal Industry, which high government officials are reported to have said could well be a "pattern for all industries."
2. The grant of \$575,000 from the United Mine Workers Anthracite Welfare Fund to Jefferson Medical College for research on "miners' occupational diseases."
3. Establishment of industrial health education centers at New York University and University of Cincinnati.
4. Completion of the Foundation's two-year study on Industrial Health Departments by Dr. C. O. Sappington.
5. The Saranac Symposium on Beryllium.
6. Establishment of a Division of Medical Research by the U.S. Atomic Energy Commission.
7. The inauguration of sickness insurance in California and the introduction of some 30 bills on this subject in 13 other state legislatures at the 1947 sessions.
8. Expansion of industrial and research attention to problems of hygiology, resulting in many useful contributions to the literature. The Foundation endeavors to stimulate all such useful activity.

MR. FLETCHER: Each year the Foundation has been extremely fortunate in having an outstanding citizen as its keynote speaker. Today, our keynote speaker is one of the most interesting, as well as the most likable individuals I know. We have been friends for over twenty-five years, and after you have heard him speak, you will understand what I mean. He heads one of America's outstanding industrial organizations, the American Brake Shoe Company, which employs 10,000 people and operates 60 plants located in 21 States and several foreign countries. While his office is in New York, he spends much of his time in the plants, three of which are located here in Pittsburgh. He says the world is plagued with problems so immense that individually we are overwhelmed, but he expresses the opinion that if we will work together and concentrate on the problems one at a time, and on the ones of which we have some knowledge, then perhaps the other problems will take care of themselves! I suppose it is because of this belief that he has developed a first-hand knowledge of working conditions and industrial health. As a matter of fact, there is probably no man in the top management of a large industrial organization who is more actively interested in the broader aspects of employee health, than is this gentleman. That is why the Foundation recently elected him to its Board of Trustees, and why he is the keynote speaker for our meeting today. I am happy indeed to introduce Mr. William B. Given, Jr., President, American Brake Shoe Company.

interpretation. If not, there are many in the public who are all too ready to supply an unfavorable interpretation. Whatever you do, you must remember that Industrial Hygiene must be interpreted as managing with a heart.

MR. McMAHON: I would like to ask, Mr. Stock, what are the social responsibilities that the public seems to expect from the plant?

MR. STOCK: When we asked the citizens in a number of representative communities, "What should a plant do for its employees," the very first idea that comes into their mind is security. To a large extent this word, "Security," is just a nice tasting word to the American public, having no specific meaning. But a fairly large portion of the public use the word "Security" to mean good working conditions, healthful and safe jobs. A fourth to a third of the general public mention specifically that industrial plants should provide for their employees clean places to work, good lighting, good ventilation, showers, good drinking water, safety devices of all kinds and so forth.

MR. McMAHON: If I may ask one more question, what do you find is the benefit of using the "Y" in the formula, of telling the story?

MR. STOCK: I am glad you asked that. Recently, in a study of about 48 companies, we made a comparison of the top 12 and the bottom 12 in public vote in their communities. We found that all top 12 in public vote not only lived right but interpreted their living right. The management of the bottom 12 told us they didn't bother to interpret their good acts. None of the top 12, with average age older than the bottom 12, had ever had a strike. Of the bottom 12, eleven had had one or more strikes within the last 10 years.

We have studied numerous examples of the pay-off of adding good interpretation to good acts. Notably, we have observed cases where strikes have been averted or shortened, production increased, and costly turnover cut down. Mr. Given has pointed out that when people know that a plant is a good place to work they want to work there. This has tremendous meaning to a firm that's trying to hire and keep the most qualified workers.

## SUMMARY OF FIELD STUDIES AND RESEARCH - 1947

THEODORE F. HATCH

Research Director, Industrial Hygiene Foundation  
President, American Industrial Hygiene Association

Field research undertakings by the Foundation during the past year have exceeded the work of previous years in magnitude and scope as well as in the number of projects. Studies have covered a wide variety of representative industrial problems, ranging from investigation of underground operation to measurements of amounts and composition of wastes discharged from stacks. A few undertakings were routine in nature, requiring the use of highly standardized procedures for the correction of well-recognized hazards. For the most part, however, the studies have been more basic, even requiring entirely new procedures, and having to do with broader problems than the simple discovery and correction of a hazardous exposure. This is best indicated by the following list, which summarizes briefly the primary objectives of some major projects:

### SUMMARY OF PRIMARY OBJECTIVES OF SPECIAL PROJECTS

1947

1. Coordination of dust control procedures (industry-wide).
2. Over-all appraisal of industrial health problems and advice on organization and operation of industrial hygiene service by company.
3. Preliminary investigations of new dust and fume problems to develop the needed research program for further study.
4. Basic engineering analysis of operations with Engineering Department to develop sound design procedures for ventilation and other control measures in place of empirical practices.
5. Over-all study of operations in a chemical plant to provide the most effective layout and design of a new plant and equipment for maximum "built-in" control of hazardous materials.
6. Development of an operator training program, basic control measures, and a continuous sampling and alarm system for a toxic gas which characteristically escapes accidentally rather than as a daily occurrence.
7. Basic investigation of radiant heat in a hot industry, to determine the primary sources and pattern of exposure, with a view

to the development of more effective control measures and further improvement of working conditions.

- x. Further investigation of silicosis hazards and other dust exposures to provide more meaningful methods for distinguishing between hazardous and nuisance dusts and to give more meaning to occupational history as an essential aid in the diagnosis of chest x-ray films.

## Industry-wide Studies

Of especial interest in our report last year was the number of projects undertaken on an industry-wide basis. Investigations of this type account for an even larger portion of the work this year. The procedure is entirely in keeping with the underlying function of the Foundation, which is to promote industrial health through the joint effort of its members. Furthermore, the returns are greater when investigations are planned and undertaken on the broader base of a joint undertaking. An outstanding feature of an industry-wide study is the advisory technical committee from the industry which is set up to take part in the planning of the investigation, selecting the plants for study, reviewing the data and collecting detailed information from the several plants in the group. There is greater utilization of the accumulated experience within industry in respect to a common problem. In a single investigation there is little opportunity to utilize this experience. What is more important, it is not possible to bring the varied experiences of different plants together for comparison and critical evaluation when plant studies are conducted separately.

The significance of these joint undertakings extends far beyond the enhanced value of the studies themselves. The free exchange of experiences, chemical and engineering data, and even details of manufacturing processes which has taken place in each case is a tribute to the sound policy and the high objectivity of the companies involved.

Mention has been made previously of the extensive studies conducted in potteries during the past three years. This year the Foundation was invited to visit all of the companies in the U.S. Potters' Association for the purpose of correlating the dust control work in that industry. Recently the Association conducted a Clinic on dust problems here at the Mellon Institute, the primary purpose of which was to discuss in considerable detail the dust control practices throughout the industry. Other industries may find this a worth while procedure and the Foundation will welcome the opportunity to assist in such meetings.

## Expenditures for Greatest Good

Industrial hygiene is concerned with relationships between the health of the worker and the stresses of his job and of the industrial environment. The actual practices of industrial hygiene are based upon the assumption, borne out by research and experience, that these relationships can be expressed in quantitative terms. That is to say, the effects of the industrial environment upon the workers' health can be determined from quantitative measurements of the levels of exposure to offending substances or other

deleterious forces present in the environment. The factual and objective basis of industrial hygiene not only justifies its existence as a technical specialty, but is of the greatest practical value, since, so far as possible, it aims to substitute facts for opinions. By means of quantitative analysis, major health problems are distinguished from minor ones. Important sources of trouble are identified so that, in the health program, money and effort can be expended for the greatest good.

A formidable array of instruments and analytical techniques have been developed which are capable of measuring environmental factors with considerable precision. An equally extensive list of standards of permissible exposure have been proposed which make it possible, in the appraisal of working conditions, to determine whether or not health hazards exist. These developments are the result of many years of research in the laboratory and in industrial plants. The record of accomplishments in the practical solution of health problems in industry, through the use of quantitative methods, speaks for itself and accounts for the increasing numbers of industrial hygiene services being set up within industry.

Because of the excellent record of accomplishment, there is danger that industrial hygiene methods may become too standardized and acquire a degree of scientific sanctity not justified by the researches upon which they are based. This can be avoided only by constant, critical review of the procedures and standards and continuing research. Only in this way can the practical usefulness of industrial hygiene be extended and strengthened.

## Research Needs

Research needs are emphasized by our day-to-day plant experiences where situations are repeatedly encountered which differ in many ways from those considered in the original studies upon which existing standards are based. The question constantly arises, therefore, as to the universal applicability of standards and procedures. The following examples may be taken from the work this year:

1. Shaver's disease—this is a pulmonary disease caused by fumes from the fusing of bauxite in electric furnaces for the production of synthetic abrasive. The causative ingredient in the fume is not known. Fume particles are sub-microscopic in size and cannot be studied properly by analytical methods in common use.
2. Asbestos dust exposures—a preliminary study of asbestos dust exposures, using the electron microscope and other advanced techniques, indicates the need for considerable further study of this problem and the development of new analytical techniques.
3. Silicosis—despite the many years of study of this disease much remains to be learned. Present criteria of the silicosis hazard are limited to the simple determination of dust concentrations and percentage of free silica in the dust. Little is understood about the importance of sub-microscopic particles not revealed by present analytical methods; no consideration is given to the possible influence of ingredients other than silica in a mixed dust; variation in the physical state of the air-borne dust which may alter the fate of the dust in the respiratory system is not now taken into consideration. Experienced roentgenologists emphasize

the non-specificity of lung changes seen in many chest x-ray films and depend upon the occupational history for confirming evidence of exposure to a hazardous dust before making a diagnosis of silicosis. This dependence upon an adequate history of the dust exposure emphasizes, in turn, the necessity for the most complete understanding of the etiology of the disease.

Research is needed in the engineering aspects of industrial hygiene as well as in respect to analytical methods and in the formulation of quantitative relationships between the worker and his environment. Major dependence is placed upon ventilation and other engineering measures for the control of occupational diseases. Despite the great progress that has been made, the design of industrial ventilating systems remains largely empirical, with little consideration given to the fundamental engineering factors which determine ventilation requirements. Too often, satisfactory results are obtained only because of over-design. In other cases, systems fail to perform satisfactorily, not because of deliberate curtailment of capacity but simply through routine, empirical following of past experience without considering basic differences in operation which alter the design requirements. Systematic study of the forces which cause the dispersion of contaminants into the plant atmosphere must form the basis of sound engineering design of industrial ventilating systems. Theoretical analysis, supplemented by engineering research, is required if this field of engineering design is to improve. Work in this direction has continued during the past year, but must be augmented by more extensive research facilities if any considerable progress is to be made.

## Atmospheric Pollution

Community concern over industrial atmospheric pollution is increasing rapidly. In the near future industry will be called upon to curtail many wastes which now escape into the atmosphere. Research in the field of atmospheric pollution must be accelerated. Existing community standards, based largely on smoke, are not adaptable to the industrial waste problem. Sound relationships must be established between the community standards and the amounts of polluting material which industries may discharge into the atmosphere. Basic research in the methods of waste collection and air cleaning is required to supplement the practical experience upon which much of the available commercial equipment is based. To avoid confusion and conflicting claims when community regulations are adopted, industry will do well to take an early inventory of its atmospheric waste problems and to embark upon the needed researches.

The technical work of the Foundation has a practical basis and there is no place in the program for research except as it serves this same practical end. On the other hand, continued dependence upon routine and standardized procedures results in little progress. The great variety of problems encountered in our field work constantly emphasizes the limitations of present methods of appraisal and of engineering design and consequent need for research to supplement the practical work in industry. A primary objective of the Foundation is to foster such research for the advancement of industrial hygiene. For industry it is a good investment, especially as it should be oriented toward the discovery and development of better and more economical methods for the control of industrial health hazards.

## INDUSTRIAL HEALTH PROGRAMS IN ACTION\*

HAROLD A. VONACHEN, M.D.

Medical Director, Caterpillar Tractor Company  
President-Elect, American Association of Industrial Physicians and Surgeons

Those of us who are devoting our professional lives to industrial medicine find it is a most pleasant, exciting, interesting, and absorbing specialty. From our established procedures, good health practices, daily and weekly experiences are built the "case histories" which go to make up our archives. To us it has opened new avenues of usefulness; to industry it has proven profitable; to the employee it has been highly beneficial.

I feel we are not fostering foolish fads nor indulging in vague humanitarianism. Today, the prospective employee sees industrial medicine not only as a profession that seeks to cure, but a profession that seeks to prevent. The attention and skills which are afforded employees creates in them a real incentive to improve their own health. Equally important, they carry these attitudes to their families, to their neighbors, and friends. They carry it to others. They are convinced that the program is for their benefit. Its influence extends into the community from which an industry draws its people. We have every reason to believe that our medical program has materially influenced the health standards of our community.

This is not looked upon by us as a philanthropy; above all, it is not paternalistic or done for its advertising effect or as a sop to the employees. Rather, it is an important function of management.

Disease prevention, you will agree, is modest and unassuming. Many industrial physicians may feel that they have prevented sickness or death in an individual, yet they are very often unable to prove it to others. Curative medicine, treatment, when successful is spectacular and highly convincing, although, even there, no one knows how much the recuperating power of the body and the mind or their resistance has helped to cure.

## Most of Benefits Immeasurable

The potentialities of an industrial health program cannot be interpreted into dollars and cents, because it frequently results in confusion. Who can calculate the value to our Company in the reduction of lost time by curbing sickness or epidemics? Furthermore, it would be most difficult to appraise the assets to our Company, or the economic savings accruing to our employees, resulting from adequate physical examinations. What about the many consultations, referrals, and medical opinions offered employees and those affecting their families, which are aired in the industrial physician's office

\* Report presented by Milton Kronenberg, M.D., Assistant Medical Director, Caterpillar Tractor Company

## MEMBERS OF INDUSTRIAL HYGIENE FOUNDATION

-- A --

Abingdon Potteries, Inc.  
Abrasive Division, U.S. Rubber Company  
Abrasive Grain Association  
Abrasive Products Company  
Allegheny Ludlum Steel Corporation  
Allegheny Pittsburgh Coal Company  
Allis-Chalmers Manufacturing Company  
Aluminum Company of America  
Amalgamated Anthracite Collieries, Ltd.  
American Abrasive Company  
American Air Filter Company, Inc.  
American Brake Shoe Company  
American Can Company  
American Cyanamid Company  
American Emery Wheel Works  
American Iron & Steel Institute  
American Mining Congress  
American Optical Company  
American Radiator & Standard  
Sanitary Corporation  
American Refractories Institute  
American Smelting & Refining Company  
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American Zinc Institute  
American Zinc, Lead & Smelting Company  
Arizona Copper Mining Company  
Anthracite Institute\*  
Arrow Mutual Liability Insurance Company  
Assn. of Casualty & Surety Companies\*  
Atlas Powder Company  
Austin Motor Company, Ltd.  
Automobile Manufacturers Association

-- B --

Ball Brothers Company  
Bartlett-Collins Company  
Bay State Abrasive Products Company  
Bethlehem Steel Company, Inc.  
Bird & Son, Inc.  
Bituminous Casualty Corporation  
Bridgeport Safety Emery Wheel Company  
Brush Beryllium Company  
Bunker Hill & Sullivan Mining &  
Concentrating Company

-- C --

The Carborundum Company  
Caterpillar Tractor Company  
Central Silica Company  
Chicago Wheel & Manufacturing Company  
Robert F. Coleman, Inc.  
The Colorado Mining Association  
Consolidated Mining & Smelting Company  
of Canada, Ltd.  
Cooper-Bessemer Corporation  
Corhart Refractories Company  
Corning Glass Works  
Cortland Grinding Wheels Corporation  
Crucible Steel Company

-- D --

Davison Chemical Corporation  
Deekers Creek Sand Company  
A. P. DeSanno & Son, Inc.  
Detroit-Star Grinding Wheel Division  
Diamond Alkali Company  
Dow Chemical Company  
R. E. Drakenfeld Company  
Dravo Corporation

-- E --

Eagle-Picher Company  
Eastern Gas and Fuel Associates  
Elasco Services, Inc.  
Electro Refractories & Alloys Corporation  
Eljer Company  
Ethyl Corporation  
Eureka Flint & Spar Company, Inc.  
Exolon Company

F

The Falk Corporation  
Federal-Mogul Corporation  
Firestone Tire & Rubber Company  
Firth Sterling Steel Company  
H. E. Fletcher Company  
Foote Mineral Company  
Ford Motor Company  
Foundry Supply Manufacturers Assn.  
Frazier-Simplex, Inc.  
Fuller Merriam Company  
The Funkhouser Company

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General Abrasive Company, Inc.  
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The Glidden Company  
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B. F. Goodrich Company  
A. P. Green Fire Brick Company

-- H --

The Hall China Company  
Hamilton Emery & Corundum Company  
Hampden Grinding Wheel Company  
Hawley Products Company  
Hazel-Atlas Glass Company  
Hercules Powder Company  
John W. Higman Company  
Mauricio Hochschild S. A. M. L.  
O. Hommel Company

-- I --

Imperial Chemical Industries, Ltd.  
Industrial Silica Corporation  
Inland Steel Company  
Interchemical Corporation  
International Business Machines Corporation  
International Nickel Company, Inc.

J.

Jackson Emery Mills  
Jamison Coal & Coke Company  
Johns-Manville Corporation  
Jones & Laughlin Steel Corporation

-- K --

Keashey and Mattison Company  
Kennecott Copper Corporation  
Keystone Emery Mills Company, Inc.  
Kimble Glass Company  
The Kirk & Blum Manufacturing Company  
Edwin M. Knowles China Company  
Koppers Company

-- L --

Homer Laughlin China Company  
Lava Crucible Company of Pittsburgh  
E. J. Lavino & Company  
Lead Industries Association

-- M --

Mackintosh-Hemphill Company  
Macklin Company  
Magma Copper Company  
Maryland Self-Insurers' Association  
Mayer China Company  
J. S. McCormick Company  
Metropolitan Life Insurance Company  
Mexico Refractories Company  
Mid-West Abrasive Company  
Mine Safety Appliances Company  
Monsanto Chemical Company  
Mutual Chemical Company of America

N.

National Association of Fan Manufacturers  
National Association of Mutual Casualty  
Companies\*  
National Crushed Stone Association, Inc.  
National Grinding Wheel Company  
National Industrial Sand Association  
National Lead Company  
National Pulverizing Company  
National Sand & Gravel Association  
National Slag Association  
National Steel Corporation  
National Supply Company  
The Neville Company  
New Jersey Pulverizing Company  
New Jersey Zinc Company  
North American Refractories Company  
Norton Company  
Norton Pike Company

O.

Ontario Mining Association  
Oriental Abrasive Company  
Ottawa Silica Company  
Owens-Corning Fiberglas Corporation  
Owens-Illinois Glass Company

## MEMBERS OF INDUSTRIAL HYGIENE FOUNDATION

— P —

Peninsular Grinding Wheel Company  
Penn-Riltton Company  
Pennsylvania Glass Sand Corporation  
Phelps Dodge Corporation  
Pittsburgh Coal Company  
Pittsburgh Coke & Chemical Company  
Pittsburgh Plate Glass Company  
Portland Cement Association  
Posture Research Institute  
Powers X-Ray Products, Inc.  
Precision Grinding Wheel Company, Inc.  
The Pullman Company  
Pyrene Manufacturing Company

— R —

Raybestos-Manhattan, Inc.  
Republic Steel Corporation  
Revere Copper and Brass, Incorporated  
Rialto Mining Corporation  
H. H. Robertson Company  
Robertson Manufacturing Company

— S —

Safety First Supply Company  
Sand Products Corporation  
Claude B. Schneible Company  
Scott Aviation Corporation  
Sharon Steel Corporation  
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Simonds Abrasive Company  
Simonds Worden White Company  
South West Box Company  
St. Joseph Lead Company  
Standard Lume & Stone Company  
The Standard Ultramarine Company  
Sterling China Company  
Sterling Grinding Wheel Division  
Sun Oil Company  
Sun Sand Company  
Sylvania Electric Products, Inc.

T

Tata Industries, Ltd.  
Taylor, Smith & Taylor Company  
Tennessee Copper Company  
Texas Gulf Sulphur Company  
Titan Abrasives Company  
Toledo Edison Company  
Trenton Potteries Company

U

Union Asbestos & Rubber Company  
Union Carbide & Carbon Corporation  
United States Potters Association  
United States Smelting Refining & Mining Company  
United States Steel Corporation of Del.  
Universal Sanitary Manufacturing Company  
Utilities Research Commission\*

V

Valley Mould & Iron Corporation  
Van Cleeef Bros.  
Vanadium Corporation of America  
Vesuvius Crucible Company  
Vitreous China Plumbing Fixtures Association  
Vitrified Wheel Company

W

Waltham Grinding Wheel Company  
Washington Mills Abrasive Company  
Wedron Silica Company  
Western Precipitation Corporation  
Westfield Grinding Wheel Company  
Westinghouse Air Brake Company  
Westinghouse Electric Corporation  
Whitehead Brothers Company  
Willson Products, Inc.  
Winthrop-Stearns, Inc.  
Wisconsin Abrasive Company  
Wolf's New Process Abrasive Wheel, Inc.

Y

Youngstown Sheet & Tube Company

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Navy Yard, Pearl Harbor, Hawaii  
Navy Yard, Philadelphia, Pa.  
Navy Yard, Portsmouth, N.H.  
Navy Yard, Portsmouth, Va.  
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Navy Yard, San Pedro, Calif.  
Office on Industrial Relations, Navy Dept.

#### Other Federal Agencies

Tennessee Valley Authority  
U.S. Civil Service Commission  
U.S. Public Health Service

Chicago San Francisco  
New York Washington

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|             |               |
|-------------|---------------|
| Alabama     | Montana       |
| California  | New Hampshire |
| Connecticut | New Jersey    |
| Georgia     | Ohio          |
| Idaho       | Oregon        |
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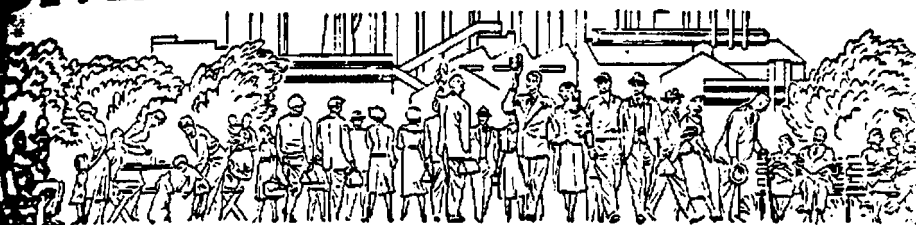
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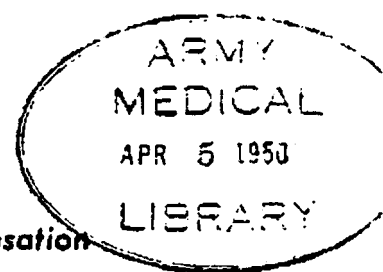
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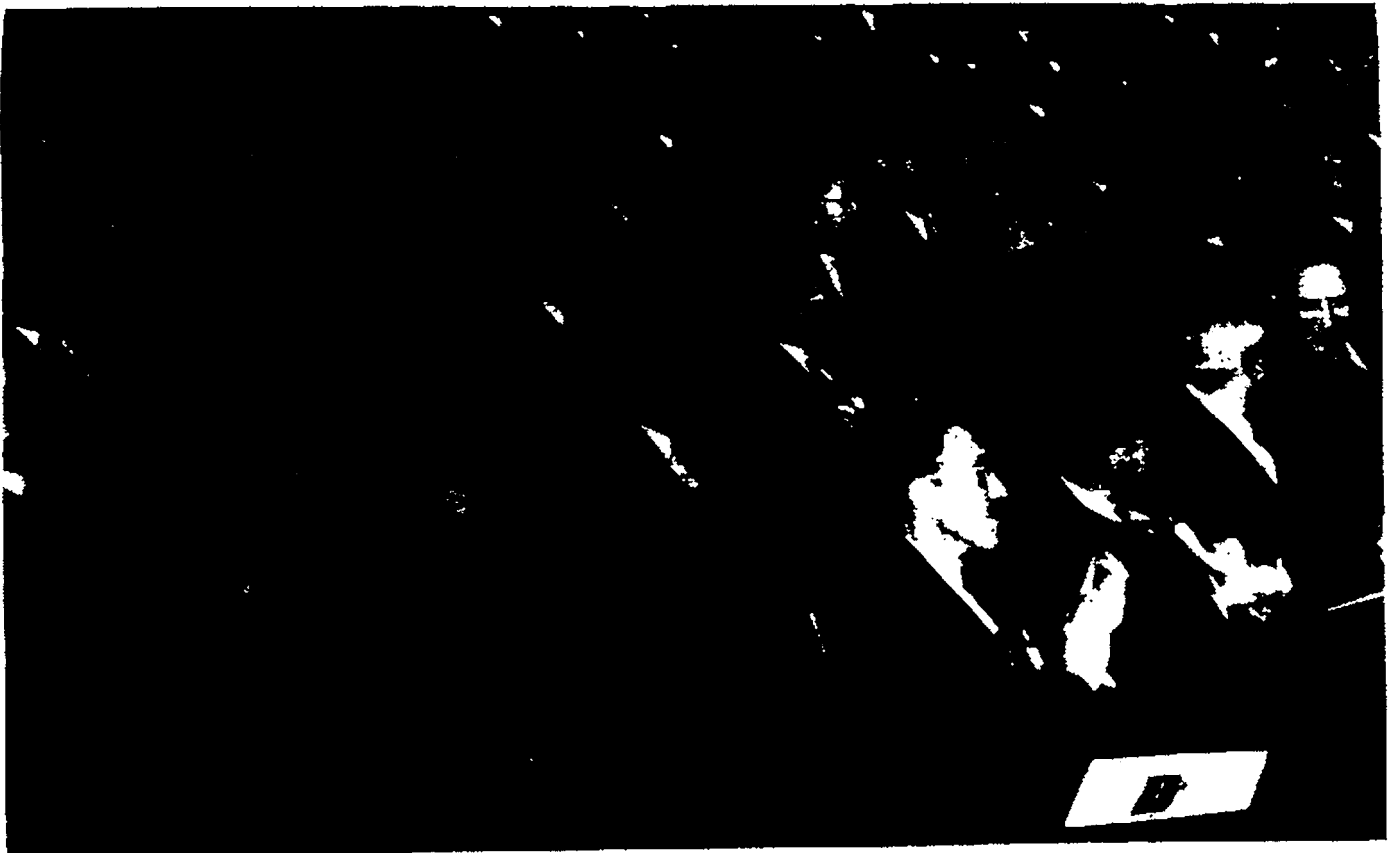
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FOURTEENTH ANNUAL MEETING

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, Inc.



November 17, 1949

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Partial view of the auditorium showing some of the members and guests attending the 13th Annual Meeting of Industrial Hygiene Foundation in Mellon Institute.

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14th ANNUAL MEETING

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●  
*Legislative Developments in Workmen's Compensation*

*Standards for Control of Occupational Diseases*

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*Trends in Health and Sickness Disability Benefits*

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*Transactions of*  
**LEGAL CONFERENCE**

**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, Inc.**



November 16, 1949

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A VIEW OF THE LEGAL CONFERENCE AT THE FOUNDATION'S 14TH ANNUAL MEETING.  
T. C. Waters, Chairman of the Foundation's Legal Committee, which sponsors the conference, is presiding.  
Seated at the speakers' table, left to right, are R. F. Hansen, J. J. Bloomfield, and Dr. J. J. Wittmer.

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**INDUSTRIAL HYGIENE FOUNDATION**



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**

**MARCH, 1950**

**(Vol. 14, No. 3)**

**INDUSTRIAL HYGIENE FOUNDATION**

**4400 FIFTH AVENUE -:- PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a non-profit association of industries for the advancement of healthful working conditions.

Vol. 12

March, 1950

No. 3

## Foundation Forms Air Pollution Committee

The Foundation announces formation of a committee on Air Pollution, recently authorized by the Board of Trustees. Members of the committee are:

|                      |                                                               |
|----------------------|---------------------------------------------------------------|
| Mr. Alex D. Bailey   | Vice President, Commonwealth Edison Company                   |
| Mr. Ward F. Davidson | Research Engineer, Consolidated Edison Co., of New York       |
| Mr. Henry F. Hebley  | Research Consultant, Pittsburgh Consolidation Coal Co.        |
| Dr. George R. Hill   | Dir., Agricultural Research, American Smelting & Refining Co. |
| Dr. Raymond Hussey   | Scientific Dir., Council on Ind. Health, American Med. Assn.  |
| Dr. L.C. McCabe      | Chief, Office of Air & Stream Pollution, U.S. Bureau of Mines |

The new committee takes its place with the other professional and technical committees in the Foundation's organizational structure, which are: Medical, Legal, Preventive Engineering and Chemical and Toxicological.

## ACS Holding Symposium on Industrial Health and Safety

A feature of the American Chemical Society meeting in Detroit, April 16-20, will be a panel on Industrial Health and Safety. Participants in the panel are:

|                                           |                                              |
|-------------------------------------------|----------------------------------------------|
| Dr. W.P. Yant, Mine Safety Appliances Co. | : "Course & Scope of Industrial Hygiene"     |
| Dr. H.F. Smyth, Jr., Mellon Institute     | : "Field of Chemical Hygiene"                |
| Mr. W.R. Bradley, American Cyanamid Co.   | : "Ind. Hyg. in Plant Location & Design"     |
| Mr. H.H. Fawcett, General Electric Co.    | : "Laboratory Safety"                        |
| Dr. J.N. Sterner, Eastman Kodak Co.       | : "Plant Health Control, Medical Aspects"    |
| Mr. W.A. Cook, Zurich Insurance Co.       | : "Plant Health Control, Engineering Phases" |
| Dr. D.D. Irish, Dow Chemical Co.          | : "Products, Their Use and Misuse"           |
| Dr. H.H. Schrenk, Ind. Hyg. Foundation    | : "Air Pollution"                            |

John F. McMahon, Managing Director of the Foundation, will preside.

News Briefs: Dr. Schrenk will speak on Pure Air for America in a broadcast over the Columbia Broadcasting System station, WTOP, from Washington, from 3:15 to 3:30 on Saturday afternoon, April 8. He will appear on the Adventures in Science program conducted by Watson Davis, Director of Science Service.

Field studies during the past month took members of the Foundation's technical staff to a New Brunswick, B.C., foundry, an Idaho smelter, a glass plant in Alabama, and an asbestos operation in Georgia.

John F. Knudsen has been appointed Director of the Industrial Hygiene Department, Kennecott Copper Corporation, Garfield, Utah. He succeeds R.T. Pring, who recently became Technical Director of the Dust and Fume Division, American Wheelabrator and Equipment Co.

extensive asbestosis. The author's direct attention to the disproportion between the gross features described and the awareness of trouble. The results prove the importance of prophylactic and therapeutic treatment and economic assistance to asbestos workers generally, particularly to those who apply insulating material. -- Condensed from Arch. Ind. Hyg & Occ. Med.

- 358 Pseudo-tumoral Pneumoconiosis, simulating Silico-Tuberculosis in a Bauxite Miner. A. Germain, P. Brugere, and P. Cluzel. Bull. Acad. Nat. Med. 133, 273-276 (1949) French.

The case is reported of a man who had been employed in mining bauxite for 20 years previous to 1938. He then left this work to be taken on at the French Arsenal, when an x-ray of his lungs showed no abnormalities. Nine years later the case presented a typical picture of silico-tuberculosis. Since the man had no exposure to dust except during the 20 years he was employed in mining bauxite, the claim is made that bauxite dust was the cause of his condition. Comment is made to the effect that a single case does not constitute proof. -- Condensed from Bull. Hyg.

- 359 Pneumoconiosis and Tuberculosis in Dockers Dealing with Grains and Seeds. L. Dunner. Brit. J. Radiol. 22, 717-722 (Dec. 1949).

One hundred dockers who had inhaled the dusts of grain, seeds, and chemical material were sent to a tuberculosis dispensary because of chest trouble and were examined. Of the 100, 22 showed pneumoconiotic lesions on x-ray films, 43 were found to be tuberculous, and 3 doubtful which of the two. Three were suffering from bronchial carcinoma. (Editor's note: There is no information on the extent of exposure or composition of the dust.) -- Condensed from Author's Summary

- 360 Pneumoconiosis after Exposure to Sulfur Dioxide Fumes and Dust from Coke Fires. L. Dunner, R. Hardy, and D.J.T. Bagnall. Lancet 257, 1214-1217 (Dec. 31, 1949).

Pneumoconiotic lesions have been found radiologically among workers in a group of workers whose common history was exposure to sulfur dioxide fumes and dust from coke fires. Chemical analysis of a fraction of the dust with a particle size of about two microns has revealed iron and siliceous matter. The authors' tentative conclusion is that this pulmonary disease arises from the sulfur dioxide or coke dust, or both. However, it is admitted that the evidence now at hand is not conclusive. No dust counts or gas concentrations are given. (Discussion of the paper appears in Lancet, Jan. 14, 1950, and Dr. Dunner's reply, Feb. 11, 1950.)

- 361 The Morphology of Bauxite-Fume Penumoconiosis. J.P. Wyatt and A.C.R. Riddell. Am. J. Path. 25, 447-465 (May, 1949).

A description is given of the pathological characteristics found in six fatal cases of this disease, together with a short description of the manufacturing process with which the disease is etiologically connected, and notes on the history and clinical findings in each case. The disease



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

**MEDICAL**

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**LEGAL . . . decisions and trends**

**JULY, 1950**  
**(Vol. 14, No. 7)**

**INDUSTRIAL HYGIENE FOUNDATION**

**4400 FIFTH AVENUE . . . PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a non-profit association of industries for the advancement of healthful working conditions.

Vol. 12

July, 1950

No. 7

Here is an up-to-date listing of the Board of Trustees of Industrial Hygiene Foundation, together with the business connections of Board members:

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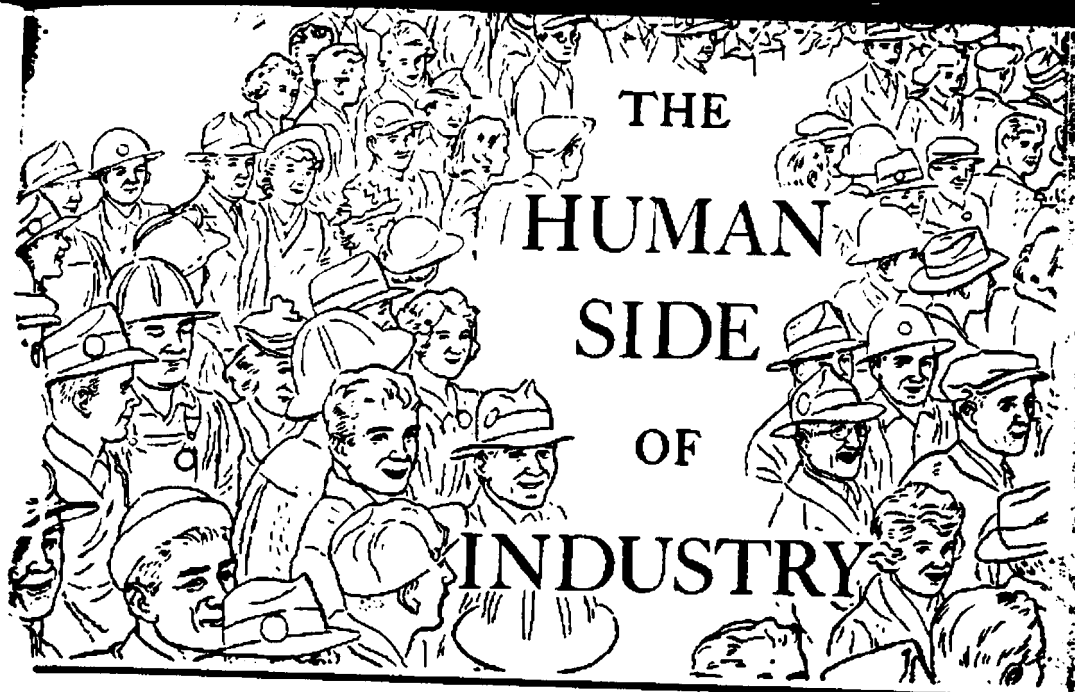
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Mine Safety Appliances Co.,  
Pittsburgh, Pa.

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**Foundation Facts**

**Human Side of Business**

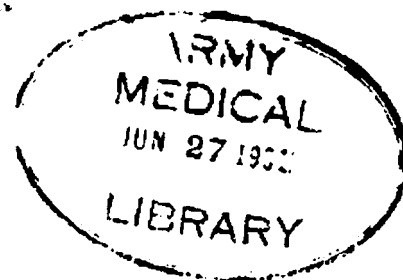
**Teamwork for a Better Workplace**

**Auditing Industry's Medical Departments**

**Cost of Employee Disability**

**Atomic Emergency Protection**

**Member Companies Sick Absenteeism**



Transactions Bulletin No. 15  
1950

**INDUSTRIAL HYGIENE FOUNDATION**

MELLON INSTITUTE

4400 FIFTH AVENUE

PITTSBURGH 13, PA.

TRANSACTIONS  
of  
FIFTEENTH ANNUAL MEETING



INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, Inc.

NOVEMBER 16, 1950

Partial view of the auditorium showing some of the members and guests attending

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Industrial Hexahene Foundation of America, Inc.  
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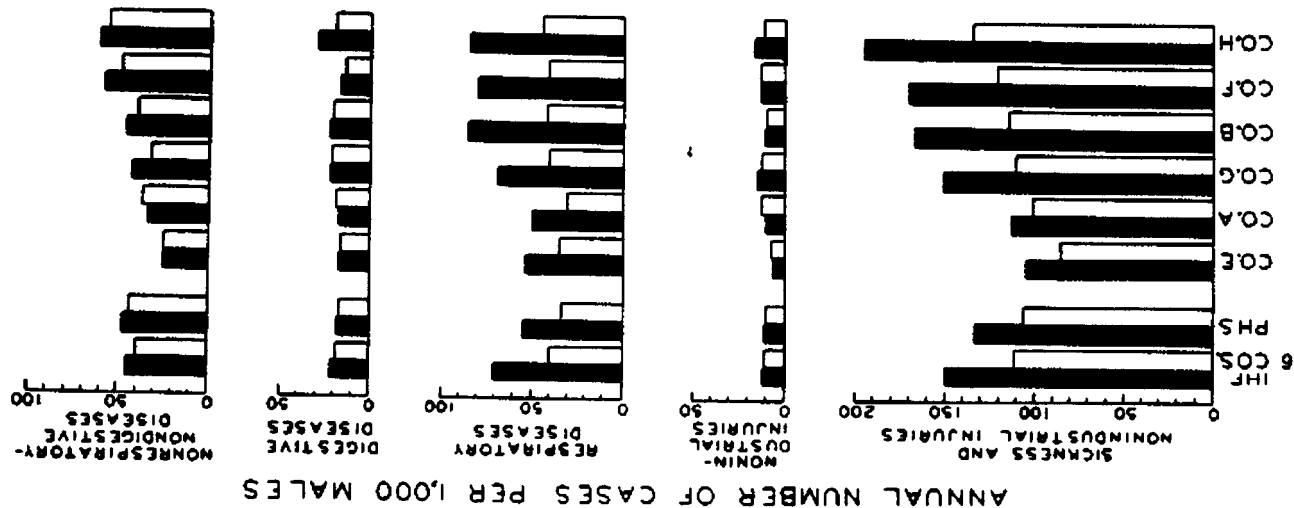


Figure 1.—Frequency, among males, of cases of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, beginning during 1942-45 (war period) and 1946-49 (post-war period), inclusive, by company and broad cause group; experience of 6 companies reporting to Industrial Hygiene Foundation and of a group of companies reporting to Public Health Service.

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| W. P. Yant, Sc.D.                   | Mine Safety Appliances Company, Pittsburgh  |

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—16<sup>th</sup> ANNUAL MEETING—  
**LEGAL CONFERENCE**  
—1951—

**Industry's Interest in Water-Pollution Abatement**

**Compensation: Current Legislative Developments**

**Exclusive Remedy Provided by Compensation Statutes**

TRANSACTIONS BULLETIN NO. 21  
1951

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**INDUSTRIAL HYGIENE FOUNDATION**

MELLON INSTITUTE

4400 FIFTH AVENUE

PITTSBURGH 13, PA.

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Industrial Hygiene Foundation of America, Inc.  
Pittsburgh, Pa.

**TRANSACTIONS**  
**of**  
**LEGAL CONFERENCE**  
**SIXTEENTH ANNUAL MEETING**



**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA, Inc.**

**WEDNESDAY, NOVEMBER 14, 1951**

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| L. C. McGee, M.D. . . . .                 | Hercules Powder Company, Wilmington, Del.          |
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| R. R. Sayers, M.D. . . . .                | City Health Department, Baltimore, Md.             |
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| W. P. Shepard, M.D. . . . .               | Metropolitan Life Insurance Company, San Francisco |

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| W. C. L. Hemeon, Secretary . . . . .      | Industrial Hygiene Foundation, Pittsburgh                      |
| A. E. Abel . . . . .                      | Valley Mould & Iron Corporation, Hubbard, Ohio                 |
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### 17th ANNUAL MEETING INDUSTRIAL HYGIENE FOUNDATION

*Foundation Facts*

*Greater Industrial Health*

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*Seventeenth Annual Meeting*  
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# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**

**SEPTEMBER, 1952**

**(Vol. 16, No. 9)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE -- PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

Volume 14

September, 1952

No. 9

## KEYNOTE SPEAKER

Mr. L. R. Boulware, Vice President of General Electric Company, will be the keynote speaker at the 17th Annual Meeting of Industrial Hygiene Foundation. His address will be given on November 20 at the General Meeting, which emphasizes management aspects. Mr. Boulware has taken a keen interest in the welfare of employees both in the plant and in the community.

## NEW ADDITIONS TO FOUNDATION MEMBERSHIP

The following companies have recently affiliated with the Foundation:

Cobalt Chemicals Limited  
Eaton Manufacturing Company

Kennametal, Inc.  
Michigan Iron & Coke Company  
Warner Company

## STAFF MEMBERS ATTEND SARANAC SYMPOSIUM

The Seventh Saranac Symposium is being held September 22-26 at The Saranac Laboratory of the Edward L. Trudeau Foundation, Saranac Lake, N. Y. Two of the Foundation's Staff Members will attend. T. F. Hatch, Laboratory Director, will serve as Chairman of a discussion on "The Inhalation of Certain Industrial Substances," at the Monday, September 22 afternoon session. D. C. Braun, Medical Director, will present a paper entitled "The Presentation of Medical Evidence in Controverted Compensation Cases" on the morning of Friday, September 26.

## REPRINTS AVAILABLE

Reprints of the paper "A Rational Approach to Air-Pollution Legislation," by George E. Best, are now available to member companies upon request. This paper was presented at the 16th Annual Meeting of the Foundation.

17th ANNUAL MEETING, Nov. 19-20

at Mellon Institute, Pittsburgh

- 1007 Findings of Bronchoscopy in Silicosis and Silico-Tuberculosis.  
E. Concina and O. Orlandi. *Rass. med. ind.* 20, 424-426  
(Nov.-Dec. 1951) Italian.

The importance of the existence of bronchial lesions in silicosis has been underestimated. Bronchoscopy allows direct observations of changes in the tracheal and bronchial mucous membrane, deviations in the trachea and main bronchi, and modifications in the orifices of the lobes and segments. Lavage, aspiration of the bronchial section, and endo-bronchial administration of adrenaline and antibiotics may be conducted during the process. Inflammation of the mucous membranes and other changes characteristic of silicosis are disclosed by this method. Findings in 25 patients are reported.

-- Cond. from Bull. Hyg.

- 1008 The Value of the Electrocardiograph for Examining Anthraco-Silicotics.  
F. Lavenne. *Institut d'Hygiene des Mines, Hasselt, Belgium,*  
Communication No. 90, 5pp. (1951). French.

The author used the electrocardiograph to examine 11 cases of anthraco-silicosis with clinical signs of loss of compensation of the right ventricle, and 200 cases of anthraco-silicosis, compensated for invalidity but still ambulant, who were doubly classified according to the extent of fibrosis present and according to the amount of emphysema. The findings are presented in somewhat cryptic symbolism. They are held to justify the claim that the electrocardiograph may be of considerable value in establishing early strain on the right side of the heart.

-- Bull. Hyg.

- 1009 Asbestosis Associated with Bronchiogenic Carcinoma. R. Stoll, R. Bass, and A. A. Angrist. *Arch. Intern. Med.* 88, 831-834 (Dec. 1951) German.

Data for statistical proof of any association of asbestosis with pulmonary carcinoma are hard to collect, but three investigators have found carcinoma in 7.5 to 14.8% of cases of asbestosis. A case is reported in which a worker had been exposed to asbestos for 6 years and had refused to wear a respirator. He came under notice with weakness and a persistent cough. Clumps of malignant cells were seen in the bone marrow, and x-ray showed generalized large discrete oval shadows indicative of pulmonary metastases. After death, modules varying to 4 cm. in diameter were found scattered throughout both lungs, with interstitial fibrosis. Large areas of necrosis existed throughout the lungs, and typical asbestos bodies were seen inside and outside the tumor areas. Metastases were found in the kidneys, brain, and liver. The opinion is suggested that the silicate in asbestos must itself be directly carcinogenic. It establishes an additional reason for preventive measures in the use of asbestos.

-- Cond. from Bull. Hyg.

I-H-F

18<sup>th</sup> ANNUAL MEETING  
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**CONFERENCE TRANSACTIONS**  
**OF**  
**EIGHTEENTH ANNUAL MEETING**  
**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA**

—Medical

—Legal

—Joint Medical-Legal

—Engineering

—Chemical-Toxicological

HELD AT

**MELLON INSTITUTE**  
PITTSBURGH, PA.

**WEDNESDAY, NOVEMBER 18, 1953**

## INDUSTRIAL HYGIENE FOUNDATION

*A Research Association of Industries for  
Advancing Industrial Health and  
Improving Working Conditions*

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I-H-F

## MEDICAL CONFERENCE

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Marquette University School of Medicine;  
Chairman, Medical Committee,  
Industrial Hygiene Foundation

# DUST CONTROL DEVELOPMENTS IN ASBESTOS SCREENING OPERATIONS AND JUTE BAG STORAGE

H. ROZOVSKY  
Senior Ventilation Engineer,  
Canadian Johns-Manville Company, Ltd.

## I. INTRODUCTION

### General

The Jeffrey Mine is operated by the Canadian Johns-Manville Company at Asbestos, Quebec. This location is 100 miles east of Montreal and 75 miles north of the international boundary.

This paper deals with dust control improvements made in two separate departments of this large asbestos mining operation. Asbestos screening operations are part of the milling process itself whereas jute bag storage is a service department to the mill, and its problems in dust control are isolated and have no direct relationship to milling.

Milling of asbestos ore is a dry process and therefore very different from most usual metallurgical separation methods. Considerable handling is involved in the process which carries the ore through numerous stages of crushing, screening and fiberizing and finally aspirating, cleaning and blending of fibers.

The very nature of both the ore and the product, and the methods used in handling everything in the dry state lend themselves to the creation of airborne particles and fiber.

### Air Flow Through Mills

A cross-section of the mills (Figure 1) would show us that all fans exhaust their dusty load from collectors and dust control systems to a series of dust chambers located in the upper floors of the mills. The drop in pressure due to expansion causes considerable heavy material to settle out. Positive pressures in these chambers vary from 0.55" wg to 0.70" wg.

Air then moves down two rectangular airways each 20' x 20' at 2000 fpm into a dust shed 200 feet wide and 60 feet high. Baffles at the entrance help to reduce air movement. Additional drop in pressure reduces velocity to 125 fpm and about 140 tons of dust particles and fiber are precipitated out per day in the dust shed.

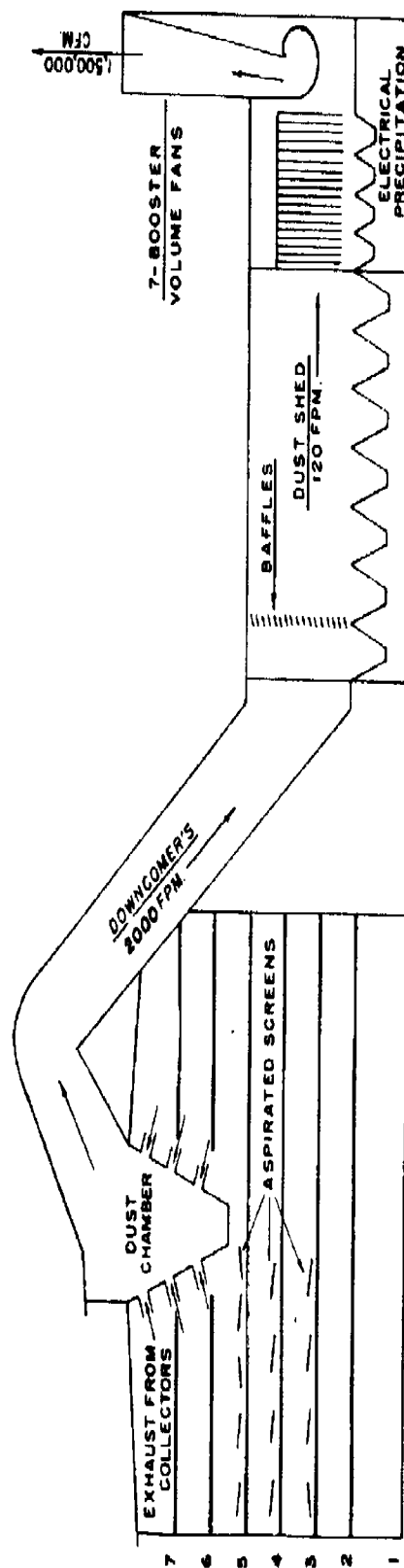


Figure 1.—Cross Section of Mills.

Seven large booster fans at the end of the building draw the dust shed air through electrical precipitators before being expelled to atmosphere. Approximately 60 tons of fine dust are precipitated electrically each day. A negative pressure in the dust shed of 0.10" wg to 0.35" wg is maintained.

By actual tests made on the seven fans over a two-month period, over 1,500,000 cfm was being drawn through this system. This is 3,300 tons of air per hour. The total volume of air used in all the mills for drying, aspirating and dust control is 2,000,000 cfm or 4,400 tons of air per hour.

On the basis of an average production of over 500 tons of dry ore per hour we find that we are using 9 tons of air for every ton of rock milled. By the same token we are using 60 tons of air for each ton of asbestos fiber produced.

It is of importance to note at this point that no air is being returned to the mills and that all replacement air must come in through open windows, doors or louvres.

## II. DUST CONTROL DEVELOPMENTS AT SCREENING OPERATIONS

### Distribution of Screens

Milling at the Jeffrey Mine is carried on in four mill buildings. This is exclusive of drying, crushing or storage of rock and fiber.

The 4B Mill handles the initial feed from dry rock storage after a third stage of crushing. The rejects from this mill are sent to 4A Mill which repeats the first process and makes further fiber extraction. The mill known as the Cement Plant makes special products of Cottrell precipitator and dust shed materials. The Mill 3 building regrades fibers or brings up to specifications fibers that may be slightly off requirements.

In all cases screening is an extremely important operation and offers the greatest source of air-borne contamination. In all the mills we have a total of 234 screening units of which 106 are the non-aspirated type. These act as cleaners and graders and are the biggest dust producers. The other 128 screens are under aspiration. Each aspirator draws an average of 7,000 cfm near the discharge end and therefore offers partial control of escaping dust and fiber.

### Screen Description

The standard screening unit is 5' wide by 11' long having a slope of 1 1/4 inch to the foot. Rotation is provided at one upper corner by a 5 h.p. motor and geared down to approximately 200 rpm. Movement

is attained by a 2" off-center wheel to give a total maximum motion of 4 inches at the one corner of the screen. The other three corners of the screen are supported by chains or cables. At the discharge end of the screen, movement is restrained by a pitman so that movement at this point is almost a forward motion only as compared to a circular or parabolic motion at the top.

Ore is fed through a feed spout onto a 24" diameter distributor plate at the top of the screen. Feed load may vary from 60 tons of rock per hour down to 2 or 3 tons of fiber per hour. Material down the feed spout may carry entrained dusty air up to 250 cfm depending upon the load, but most dust is created by the distributor, the action of the panels around the screen, and also by the rotating rolling action of material on the screen. Combining all these actions the volume of air-borne dust and fiber created can be very great.

Another type of screen is also in use. This is suspended from four cables but is driven from the center one-third the way down. The motion is approximately the same but more gentle with greater rotating action over the whole area. From a dust control point of view both types will be handled the same way.

### Primary Methods for Non-Aspirated Screen

All primary methods used in preventing the escape of dust and fiber from screens involved tight-fitting enclosures fastened down to the moving screen. Although many of these covers were effective in arresting dust, obvious changes had to be made, as will be noticed in the description of these primary covers.

1. The one-piece flat metal cover reinforced with angle iron completely enclosed the top of the screen and contained plexiglas doors and later metal doors. Material was fed through a canvas housing and at a later date a specially designed accordion circular gum rubber sleeve. Angle iron frame and sheet metal showed signs of breaking up after one month although many units lasted over six months before repairs were required.

Canvas connections usually lasted three months, but the experimental rubber connection showed signs of deterioration at 13 days. Increasing the gauge of metal on the cover increased its life, but also increased the load on the motor, driving mechanism and screen framework.

2. A similar cover was tried and made of three interlocking sections, each with separate inspection doors. No angle iron was used. Each third was of one piece similar to a wall

panel. Metal buckles held them together. Many of these units lasted over a year and when replacement was required, it was usually the lower two sections that were involved. The problem at the feed end was the same.

3. The next cover developed was the same as the sectional one except that the gauge was increased and the feed end section was humped to give strength, in order to allow more room for the distributors. This further increased the life of the cover, but did not solve the feed end problem.
4. To remove the maintenance problem at the feed end a similar tri-sectional unit with the upper humped section similar to the last was devised except that the feed spout had a retractable section that fed its product through two parallel plates spaced less than  $\frac{1}{2}$  inch apart. The retractable section at the end of the feed spout hung on spring-loaded bolts which could be adjusted to increase or decrease the space between the stationary upper plate and the moving lower plate.

Air space between the plates prevented the escape of dust. Many of these units were still in operation after two years without servicing.

The main objections to covers fastened to the screens were:

1. It was impossible to inspect the product or conditions of the screening action without shutting down the unit.
2. Even in the most successful of covers there was the problem of maintenance; if not the cover, it was the poor accessibility to the screen itself for replacement or repair.
3. No really positive method of dust control was possible without the use of air exhaustion.

The use of large amounts of additional exhaust air was prohibitive due to the fact that the dust shed and precipitation areas were at their maximum capacity, but in view of the fact that there were still several places throughout the mills that air was available further experiments were carried on for eventual use in new mill developments.

### Suspended Hood for Non-Aspirated Screen

With considerable air to be available for dust control work in the new mill and with many excellent locations for experimenting in the present mills, the possibilities for developing a unit to give 100 per cent control looked good.

A suspended type of hood was developed and in its simplest form consisted of two main sections. (Figures 2 and 3.) First, there is a fixed suspended section 4 to 5 feet long located over the feed end. This section is 12" high and hung 3" above the top of the screen giving a total of 15" clearance inside. The feed spout has a flanged removable section that projects into the fixed hood.

A 7" to 8" inch diameter exhaust pipe is flared out to a 5' x 10" transition piece, fastened to this hood either in front or behind the feed.

The second section of this hood is a hinged counterweighted unit fastened to the fixed cover. The depth of this hood is reduced from 12" to 3". The complete perimeter of the two parts of this hood is covered with 8" wide -  $\frac{1}{8}$ " thick rubber and extends to 3" below the top of the screen, thus giving the least opening between hood and screen during movement. All parts of the unit are made of aluminum except the counterweighting material and turnbuckle supports.

When installed properly to suit screen movement, advantages were found to be many.

1. Maintenance of unit was considered zero.
2. Control of dust over the 5' x 11' area was 100 per cent.
3. Inspection of screen, its load and operation was possible at all times.
4. During shutdown and repair periods no interference was found by the suspended hood.

Suitable air volumes and velocities were found to be as follows:

1. A 7" to 8" diameter exhaust pipe carrying a velocity of 3,500 fpm to 4,000 fpm.
2. Total air required not over 1,000 cfm.
3. Velocities at top of fixed hood about 250 fpm.
4. An approximate intake velocity at the perimeter of the screen of 100 fpm. All volumes and velocities may be slightly reduced depending on the load on the screen.

### Primary Methods Tried for Aspirated Screens

Screens under aspiration did not offer the dust problem that other screens did due to the large volume of air being drawn off the screen. The aspirated screen is usually a heavily loaded screen and dust problems were still in existence at the feed spout and distributor. The

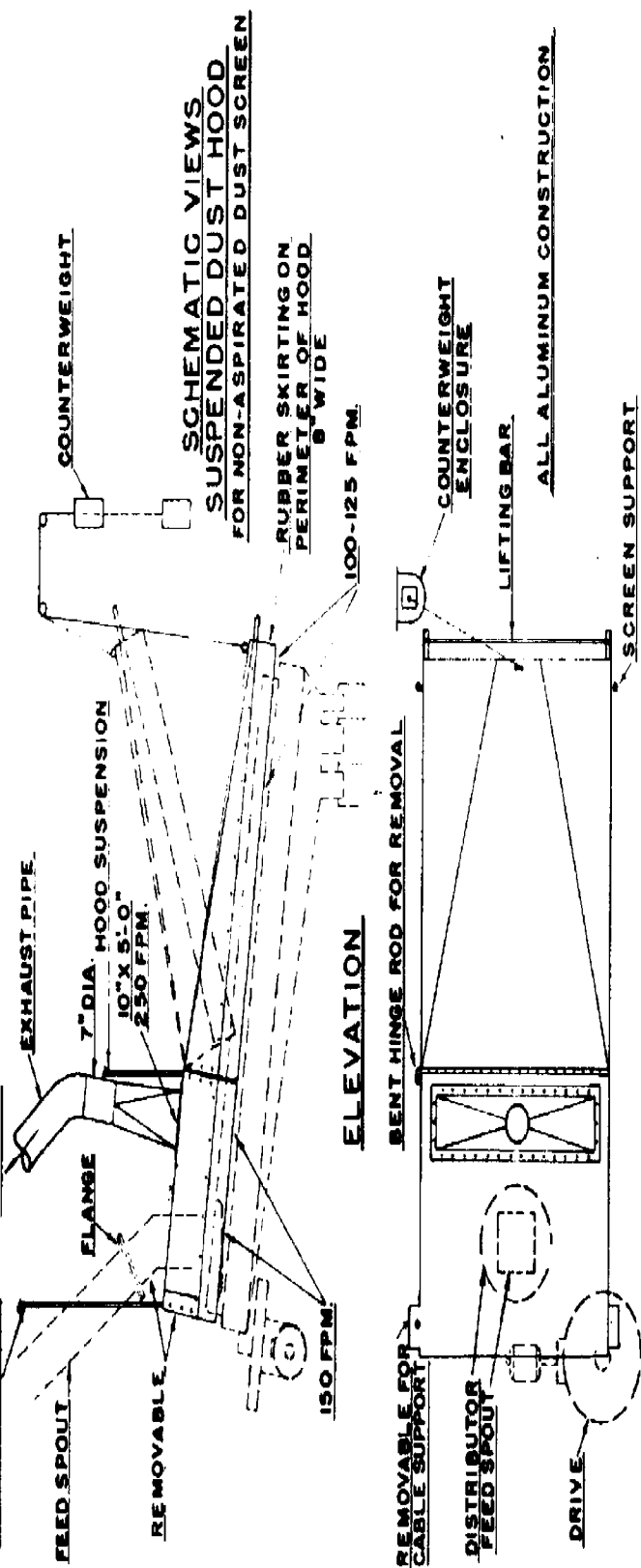


Figure 2. Aluminum Suspended Dust Control.

aspirator handling an average of 7,000 cfm took care of dust on the lower half of the screen.

Two methods were commonly used here:

1. A concave-shaped hood over the feed end with the large opening facing the feed spout and distributor induced a flow of air over the upper half of the screen. This was effective particularly when the feed spout faced downstream on the screen. When feed was upstream or sideways and load great there was considerable spillage and backlash of material. The exhaustion of the aspirator then had little effect at the top of the screen.
2. The more effective method was achieved by the hanging of side panels from the ceiling on each side of the screen or if the ceilings were too high a metal canopy was installed over the screen with side panels of metal or weighted canvas used. Velocities at the top of the screen were about 300 to 500 fpm. This served to control most dust.

### Suspended Hood for Aspirated Screens

In order to standardize covers for all screens and to get complete control, an aluminum hood similar to the non-aspirated screen was used, the only difference being that the counterweighted section was shortened so as to fall just above the aspirator which induced a draft throughout the whole aluminum hood. (Figure 4). No exhaust pipe is then required and control of escaping dust and fiber was 100 per cent.

## III. DUST CONTROL DEVELOPMENTS IN JUTE BAG STORAGE

### General

The production of hundreds of tons of finished asbestos fiber per day at the Jeffrey Mine calls for a large number of containers for shipping. Nearly all shipments are made in 100 lb. bags either of paper or jute. Paper bags are filled by the valve bag method or by pressure packers, but the jute bags must be filled by bagging machines or from feed spouts. Between 35,000 and 40,000 bags of all types must be available each day.

In order to assure sufficient containers in good condition a special department to handle bag storage, cleaning, repairing and distribution is maintained.

A total of 1,000,000 bags are handled each month. Approximately one third are of paper, one third are new jute bags and the balance of



Figure 3--Aluminum Suspended Dust Hood

used jute bags. The latter requires considerable handling before being placed into service. It is the handling of the used bags that constitutes the contamination problem both from asbestos fiber and dust and also from the jute.

The health of the 51 employees in this department is protected by means of two very effective dust collecting schemes. All dust and air movement is handled by two completely separate systems. One is for cleaning bags and one for sorting and repairing.

In each case the air is filtered by a bag filter and returned to the proper area after preheating. Of the total staff required, fifteen are in the sorting and repairing part of the building; sixteen in the cleaning end; seventeen are required for printing, bag checking, storing and distribution; and the balance of three for supervision and office--making a total of 51 people.

### Bag Cleaning

Bag cleaning is served by one filter unit and all other operations are taken care of by a second unit.

The bag cleaning arrangement located on the receiving floor has six cleaning nozzles each with a 12½" diameter opening. Each has a foot-controlled valve which when released shuts off air automatically, but allows a small amount of air to flow past for heating and ventilation, at all times. Nozzles are arranged in pairs, each two being exhausted by a 19" centrifugal fan operated by a 10 h.p. motor. Capacity of each fan is 7,000 cfm. There are three such units, each exhausting its load to a settling hopper located on the roof of the building.

Heavy material is removed by screw conveyor and protected by air locks. Air from the bin and hopper is drawn through an envelope-type cloth filter by a 15,000 cfm fan and 25 h.p. motor. Air to cloth ratio is 2.35 to 1. Air is recirculated to the cleaning and storage area on the lower floor of the building. Air is preheated in the winter. The 15,000 cfm fan acts as a pull-through unit and equalizes pressures built up by the cleaning fans.

The amount of material removed in the cleaning of bags averages less than 1/5 pound per bag cleaned. This material is sent to waste and averages about 10 tons of material a week.

During the first six months of 1953 over 2½ million bags went through the cleaning process or about 20,000 per operating day. All cleaned bags are sent by elevator to the floor above for sorting.

This brings us to the second filtering unit which is used specifically for dust control, heating and ventilation only.

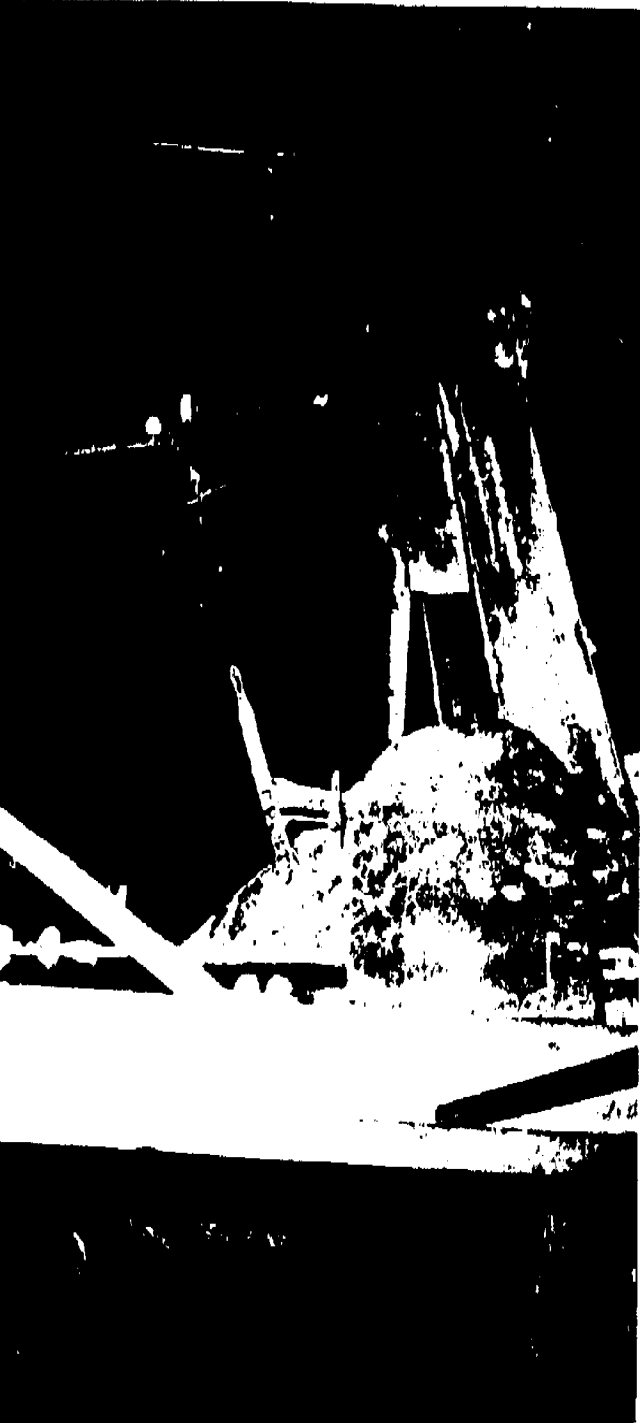


Figure 4.—Aluminum Suspended Hood for an Aspirated Screen (Closed).

### Bag Sorting

The total number of cleaned bags are delivered to a sorting room where bags are graded as to numbering on the bags and those required for repairs. The sorting crew of 8 men handle about 20,000 bags per day. The movement of materials offers a tremendous fiber hazard which was solved by hooding the operation and utilizing large amounts of air. This was accomplished by the design of special tables with screened traps. (Figure 5).

All air movement is away from the operator and downward and around the bags. Heavy particles drop through the screen into the trap which is located between the exhaust section at the back of the table, and the operator. The trap is equipped with a slide gate for cleaning and catches the major portion of material, thus allowing only the fine fiber and dust to go to filtration. An opening between the trap and the exhaust downdraft hood keeps dust on the move around the surface of the table.

Actual air velocities are about the same as originally designed for. At the employee, movement is 100 fpm. The perimeter of the hood velocities are 150 fpm. At the top of the trap it is 250 fpm and at back of hood over the screen it is 350 fpm. Similar velocities and designs are found in the tying tables also.

### Bag Repairing

Over 360,000 jute bags were repaired during the first six months of 1953. This is about 15 per cent of all bags cleaned and sorted—about 2,800 bags per day or 450 bags per machine per day. Six sewing machines are required to do the job. Although bags have been cleaned because of the closeness of the operator to the machines and material and the large number of bags moving through one room, considerable fine fiber and dust is released at close quarters.

The problem here involved a proper installation without affecting the operation or producing too much draft for the employees. It is also important to note that in the repair department, as in the sorting and cleaning departments, employees are all on incentive, and installations at best should not interfere with the operation in any way.

Previous methods included exhaust hoods over the work which only lifted dust upward to the operator's face. Plastic headgear with compressed air attachments were uncomfortable.

The exhaust unit designed for this job was located between the two rows of machines and contained 9 wall type registers with control gates on each side all facing the machines (Figure 6). Arrangement

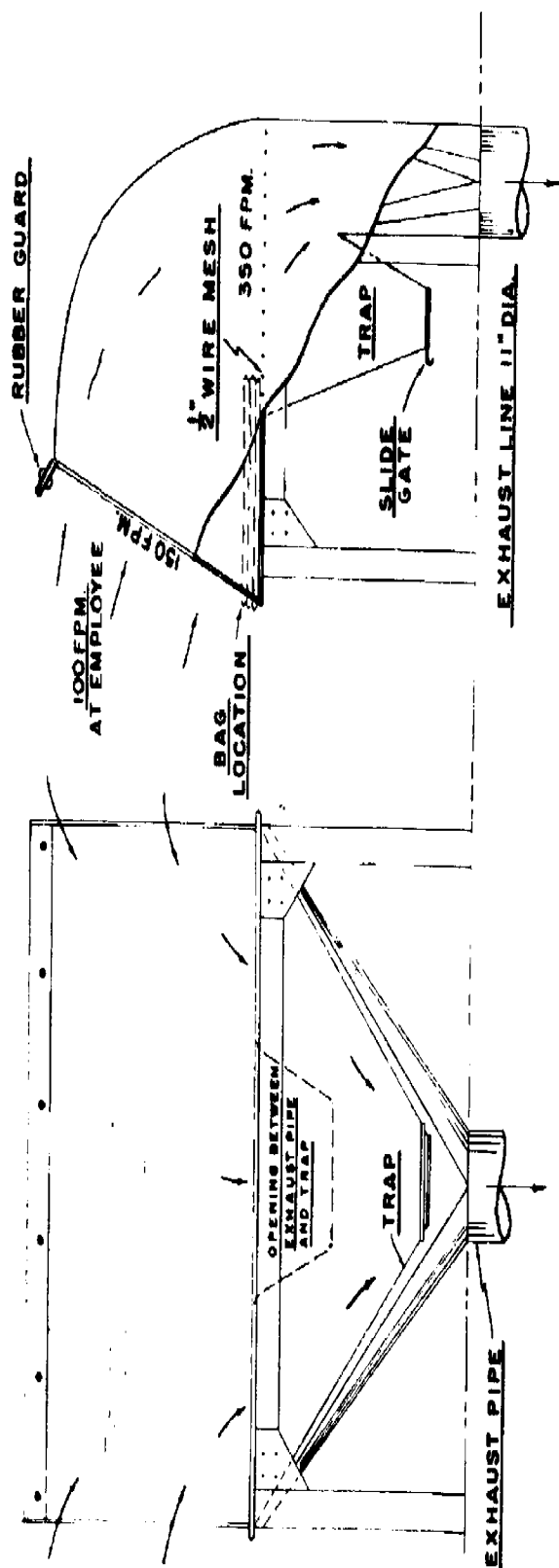


Figure 5.—Sorting or Tying Hood.

was such that louvres were only a few inches from needle area and high enough for the sewn bag to pass under the louver.

In this way the greatest velocities were obtained at the dustiest location and air was drawn downward and away from the operator's face. The location of the rectangular unit with its louvres did not interfere with the operations. Air was drawn from each end of the rectangular pipe and downward towards the filter.

Control of air movement had great flexibility due to the large number of openings with numerous valves.

Readings taken showed maximum velocities of 1,000 fpm at louvres and if all vents are left open a maximum air velocity of 500 fpm was obtained. Air velocities at the sewing machine needle are 150 to 200 fpm and velocity of air at the employees' shoulders was 50 to 75 fpm. From reports in the department colds due to drafts were at a minimum.

### Printing and Storage

Printing and storage operations are on the same floor as cleaning. Due to large volumes of air moving through this area from cleaning operations very few dust problems are encountered here. Printing of bags is not a violent operation and little disturbance is found. Nevertheless a hooded table with a trap is provided for tying after printing. This has arrested any dust that might be thrown into the atmosphere.

An additional open-flared hood is provided near truck loading to pick up fine dust created from the transfer of bundles. These two hoods are handled by the same system as the bag sorting and repairing.

This bag filtering unit is a 22' long envelope type cloth filter and exhaustion is provided by a 21,000 cfm exhaust fan which uses the pull-through method and discharges through coil heaters into the top floor area. Filters are shaken each shift. Fine fiber and dust collected under the filter amounts to 300 pounds per month, but the traps under the tables collect large amounts of fiber, lint and string which does not reach the filter.

### Atmospheric Dust Concentrations

Industrial hygiene surveys have been made at each operation as well as in adjacent offices and rest rooms. The Greenburg-Smith impinger sampling method was used, and counting was done by the light field technique. Because of their hygienic importance, particular attention was given to fibers of 10 microns and longer. The average count of these was 1.27 thousand fibers per cubic foot of air, far below our tentative maximum allowable concentration. The dust counts (par-

12" X 6" INTAKE REGISTERS WITH SINGLE SHUTTERS VALVES (9) ON EACH SIDE

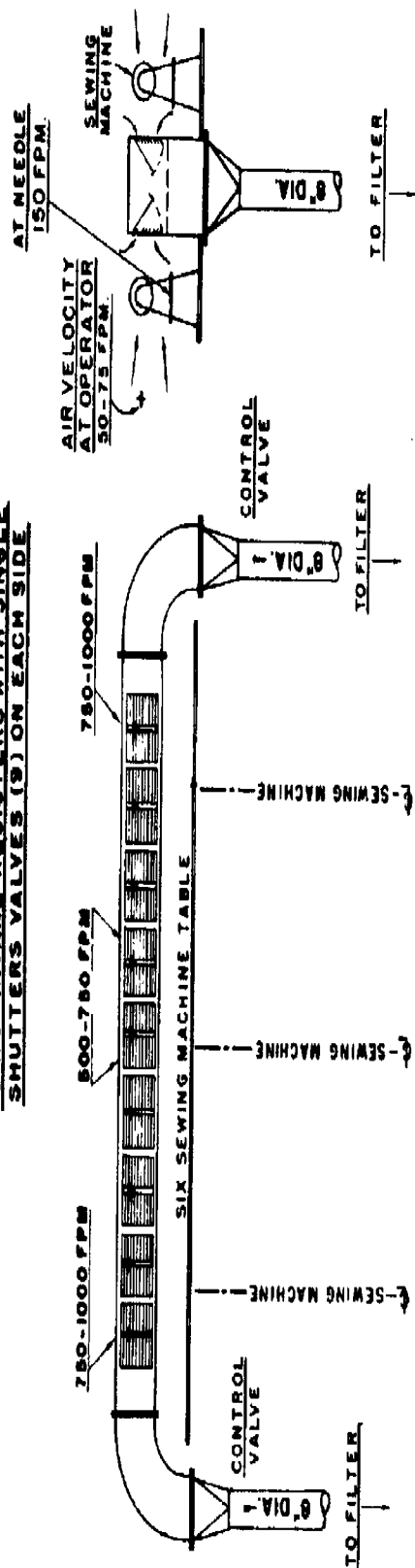


Figure 6.—Sewing Table Exhaust Unit.

ticles less than 10 microns) average 1.54 million particles per cubic foot. Both counts indicate excellent control.

#### IV. CONCLUSIONS

The description of the two dust control developments at this location is only part of a very large dust control program presently being carried out throughout the numerous departments of this large asbestos plant.

The objects of the dust control program are two-fold in that atmospheric fiber and dust concentrations be reduced in order to improve working conditions for the employee. By the improvement of working conditions a more efficient operation is obtained and by the elimination of excess dust a better product is produced.

At the present time a new asbestos mill is in the process of construction. This structure will be large enough to replace all present mill buildings. The very latest procedures in asbestos milling and dust control will be used and there will be more than ample air available for dust control work. The all aluminum suspended dust hood is to be used on screens.

As far as jute bags are concerned, it is possible that the greater portion of jute bag handling may eventually be superseded by the automatic packaging of asbestos in paper bags.

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# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

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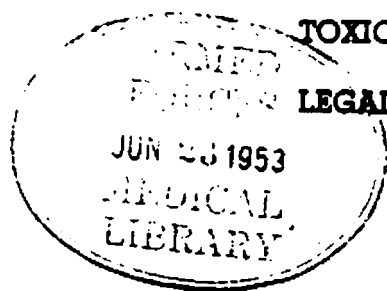
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**JUNE, 1953**  
**(Vol. 17, No. 6)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE -- PITTSBURGH 13, PA.**

siderosis, berylliosis, asbestosis, and the organic dust diseases are discussed briefly in relation to diagnosis. The importance of personal and occupational history is emphasized. The factors to be considered when deciding whether a man should be taken from his job are discussed.

44 The Clinical Picture and Pathology of Asbestosis. W. Lehrens, Jr.  
Z. Unfallmed. u. Berufkrankh. 45, 129-140 (June 15, 1952); 179-189  
(Sept. 15, 1952). German.

This paper presents an extensive review of literature on asbestosis including distribution and types of asbestos, its mining, treatment, and use, dust hazards, and effects of length of exposure of the dust in different concentrations. Symptomatology, diagnosis, and x-ray findings in the different stages of asbestosis are described. Special mention is made of the association of asbestosis with carcinoma, which is much more frequent than that of silicosis. Post-mortem reports from the literature indicate that in 309 cases of asbestosis there were 44 lung carcinomas (14.2%), whereas in 2,204 cases of silicosis only 32 carcinomas were found (1.4%). The experience of the association of tuberculosis and asbestosis varies greatly in different countries. English investigators have recorded a high rate of tuberculous infection in asbestos workers, but it is a rare complication in America and the rate is low in Germany. The macroscopic and microscopic appearances of the lungs are described, and the nature and significance of asbestosis bodies are discussed and an extensive reference list dealing with that controversial subject is given.

-- Cond. from Bull. Hyg.

45 Lung Carcinoma Caused by Asbestos Inhalation. F. Boemke.  
Med. Monatsschr. 7, 77-81 (1953) German.

The relation between fibrotic changes caused by asbestos deposits in the lung and carcinoma is discussed. The lower lobe is the site of predilection. Characteristic are the multicentered developments of flat epithelioma carcinoma.

-- Chem. Abstr.

## PHYSICAL ASPECTS OF THE ENVIRONMENT

46 Carbon Dioxide and Respiratory Regulation at Altitude. F. G. Hall.  
J. Appl. Physiol. 5, 605-606 (April 1951).

Fourteen young men exposed to a simulated altitude of 22,000 feet breathed gas mixtures with varying partial pressures of oxygen and carbon dioxide. The results are discussed in relation to the physiological adaptation to high altitude.



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

Volume 15

June, 1953

No. 6

## COMMITTEE MEMBER ACCEPTS APPOINTMENT

Mr. Warren A. Cook, a member of the Foundation's Chemical-Toxicological Committee, will head a newly established Bureau of Industrial Hygiene at the School of Public Health, University of Michigan, Ann Arbor, where he has accepted appointment as Associate Professor of Industrial Health and Hygiene, effective July 1, 1953. Mr. Cook for the last 15 years has been Director of the Division of Industrial Hygiene and Engineering Research of the Zurich - American Insurance Companies, Chicago.

## BOARD MEMBER DIES

Mr. J. W. McLaughlin, Vice President of Union Carbide and Carbon Corporation and a member of the Foundation's Board of Trustees, died suddenly on May 15.

## NEW BOARD MEMBER APPOINTED

Mr. A. D. Ross Fraser, President, Rome Cable Corporation, was elected to the Board of Trustees at the Spring meeting in New York on May 27 to fill the vacancy created by Mr. R. E. Zimmerman's retirement from the Board.

## STAFF MEMBERS PRESENT PAPERS

Dr. C. Richard Walmer, Managing Director of the Foundation, was a speaker at the Convocation-Commencement Exercises of Washington and Jefferson College in Washington, Pa., on June 5. The subject of his discussion was "Prerequisites of Medicine."

Mr. W. C. L. Hemeon, Engineering Director presented a paper on "Determination of Haze and Smoke Concentration by Filter-Paper Sampling" at the Air Pollution Control Association meeting in Baltimore on May 25. The paper was authored by Messrs. Hemeon, George Haines and Harold Ide.

## NEW REPRINT AVAILABLE

Reprints of a paper presented by W. C. L. Hemeon at the Conference on "Instrumentation for the Iron and Steel Industry" in April, 1952, Pittsburgh, are ready for distribution. The article appeared in the April, 1953, issue of Instruments.

I - H - F



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

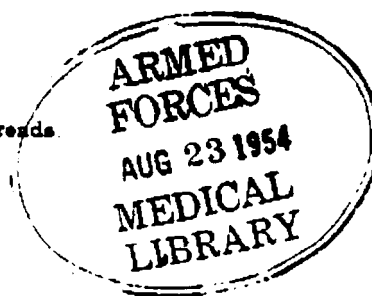
**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends.**



**AUGUST, 1954**

**(Vol. 18, No. 8)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE ··· PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

Volume 16

August, 1954

No. 8

## WALMER ON CIVIL DEFENSE COMMITTEE

Dr. C. Richard Walmer, Managing Director of Industrial Hygiene Foundation, has been made a member of the advisory committee to study the civil defense problem in Pittsburgh and Allegheny County and to aid in civil defense activities.

## LANZA MADE PROFESSOR EMERITUS

Dr. Anthony J. Lanza, a Trustee of the Foundation and a prominent figure in the field of industrial medicine, has been made professor emeritus of New York University--Bellevue Medical Center's Post-Graduate Medical School, from which he is retiring at the end of the academic year. A faculty member since 1947, he has served as professor and chairman of the department of industrial medicine and director of the Medical Center's Institute of Industrial Medicine. He will continue as consultant for the Institute. Dr. Lanza has been active in the field of industrial medicine and hygiene since 1906 and has contributed much to its advancement while serving in important government and industrial posts.

## NEW PERSONNEL

Miss Ethel Tolker has been added to the staff of the Foundation's toxicology laboratory as research assistant. One of her main duties will be the preparation of tissue specimens for microscopic examination. Miss Tolker is a graduate of the University of Maryland and was formerly associated with St. Joseph's Hospital in Pittsburgh.

## CHEMICAL-TOXICOLOGICAL COMMITTEE APPOINTMENTS

Two new members appointed to the Chemical-Toxicological Committee are: N. V. Hendricks, Head of the Industrial Hygiene Section, Esso Laboratories, Standard Oil Development Company; and H. E. Stokinger, Chief Toxicologist, Division of Special Health Services, U. S. Public Health Service, Cincinnati.

## NEW REPRINT AVAILABLE

Reprints are available upon request of a paper on "A New Apparatus for the Partitioning of Expired Air of Small Animals", by Paul E. Palm, Kenneth M. Cook, Jack H. U. Brown, and Theodore Hatch, published in the Review of Scientific Instruments Vol. 25, No. 6, 576-579, June, 1954.

I-H-F

upon the PH. From albumin solutions having a concentration comparable with plasma only about one-tenth of the available adsorption sites on a quartz surface are filled at PH 7.4. The adsorption of proteins upon the quartz surface is not considered to be an important aspect of the silicosis problem.

-- Authors' conclusions

- 905 The Presence of Asbestos Fibers in Urine of Workers Exposed to Asbestos Hazard. V. Wyss. *Rass. med. ind.* 22, 55-56 (1953). Italian.

In urinary sediment of two asbestos workers asbestos fibers were seen; the same finding was detected in urine of two female patients suffering from asbestosis, who had left their work seven years before.

-- Biol. Absts.

### PHYSICAL ASPECTS OF THE ENVIRONMENT

- 906 Some Practical Aspects of Industrial Noise Measurement. L. J. Proulx. *Arch. Ind. Hyg. & Occ. Med.* 9, 496-502 (June 1954).

Some of the instrumentation problems faced by an engineer who must evaluate industrial noise environments are discussed. An array of equipment which includes a sound level meter, octave band analyzer, tape recorder, dynamic microphone, audio oscillator, vacuum tube voltmeter, high-fidelity crystal headphones, cathode ray oscilloscope, and a good quality loudspeaker is described. The use of the tape recorder and oscilloscope for measuring impact noises is given particular attention. Various calibration checks are described.

- 907 The Locus of Short Duration Auditory Fatigue or "Adaptation." J. D. Harris and Anita L. Rawnsley. *J. Exptl. Psychol.* 46, 457-461 (1953).

Auditory adaptation, defined as a reversible shift in threshold following very mild acoustic stimulation, was distinguished from true auditory fatigue by four criteria: (1) the non-cumulative effect of stimulus duration; (2) the temporal course of return to normal threshold following stimulation; (3) the relative frequency region of maximum threshold shift following pure tone stimulation; and (4) the shape of the curve of loudness (recruitment.) This experiment sought to throw light upon where, in the auditory system, adaptation occurs. By the technique of simultaneous binaural loudness balancing between one normal ear undergoing a threshold shift of a preceding adapting stimulus, it was possible to demonstrate an accelerated growth of recruitment in the adapted ear. The intimate



# 19<sup>TH</sup> ANNUAL MEETING

— 1954 —

## INDUSTRIAL HYGIENE FOUNDATION

TRANSACTIONS BULLETIN NO. 28

INDUSTRIAL HYGIENE FOUNDATION OF AMERICA  
MELLON INSTITUTE

500 FIFTH AVENUE

PITTSBURGH 13, PA.

**NINETEENTH ANNUAL MEETING**  
**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA**

HELD AT  
**MELLON INSTITUTE**  
PITTSBURGH, PA.

**NOVEMBER 17-18, 1954**

**TRANSACTIONS OF**  
**The General Meeting**

**AND**

**The Conferences—**

**—Medical**

**—Legal**

**—Joint Medical-Legal**

**—Chemical-Toxicological**

**—Engineering**

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Pittsburgh, Pa.

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# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

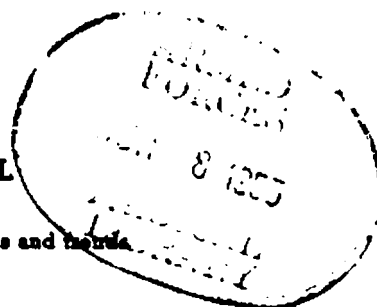
**MEDICAL**

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**LEGAL . . . decisions and trends**



**MAY, 1955**  
**(Vol. 19, No. 5)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE • PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

June 17

May, 1955

No. 5

## DR. WEIDLEIN ON EUROPEAN MISSION FOR FEDERAL GOVERNMENT

At the request of the Federal Government's Foreign Operations Administration, in cooperation with the European Productivity Agency, Dr. Edward R. Weidlein, President, Mellon Institute, departed for Europe on April 29 to lead scientific research seminars in France, Belgium, Norway, Italy, and Austria.

## MORGAN APPOINTED HEAD OF RAILROAD INDUSTRIAL HYGIENE SECTION

James F. Morgan, formerly head chemist of Industrial Hygiene Foundation, has been appointed to head the newly established section of industrial hygiene in the medical department of The Pennsylvania Railroad. An extensive environmental survey made by the Foundation for The Pennsylvania Railroad served as a basis for setting up this section, the first of its kind to be established by an American railroad. Morgan's experience with the Industrial Hygiene Foundation in the maintenance of healthful conditions in many occupational fields will be a valuable asset in carrying out this important development.

## NEW MEMBERS

The Foundation is pleased to welcome to membership:

The Bausch & Lomb Company  
The Chrysler Corporation  
Grain Processing Corporation

## TECHNICAL PAPER PRESENTED BY STAFF MEMBER

Dr. H. H. Schrenk, Research Director of the Foundation, presented a paper at the Industrial Health Conference held in Buffalo, N. Y., April 27, 1955, at the American Industrial Hygiene Association on April 27. The title of the paper was "Pitfalls in Using Maximum Allowable Concentrations."

## HEMEON ON AIHA PROGRAM COMMITTEE

W. C. L. Hemeon, Engineering Director of the Foundation, has been made a member of the Program Committee of the American Industrial Hygiene Association for the coming year.

I-H-F

the arthritis in these patients is associated with a high erythrocyte sedimentation rate and marked resistance to treatment. The radiographic changes called by Caplan "rheumatoid" were not found to be important in Ruhr miners. Tuberculosis as a complication of silicosis did not appear to be more frequent in arthritics than in non-arthritics. It appears that there is some causal relationship between progressive silicosis and polyarthritis.

-- Cond. from Bull. Hyg.

52 Symposium on Occupational Diseases of the Lungs. Arch. Ind. Health 11, 183-211 (Mar. 1955).

The following papers were presented at the Symposium on Occupational Diseases of the Lungs, sponsored by the Massachusetts Medical Society in cooperation with the Institute of Industrial Medicine of New York University, at Post-Graduate Medical School, Boston, Oct. 28, 1953. Asbestosis is the main theme of the papers.

Recent Trends in Industrial Health. A. J. Lanza.

This short address serves as an introduction to the scientific papers and emphasizes the need of continued progress in the study of dust diseases.

Pathology of Asbestosis. K. M. Lynch.

The pathological appearances of asbestosis are described and illustrated. It appears that asbestos crystal fragments may traumatize living tissues by their physical qualities, and the present belief is that the larger particles do the damage, in contrast to the chemical action of silica and the harmful effects of the smaller particles.

Roentgenologic Aspects of Silicosis and Asbestosis. L. J. Bristol.

Typical roentgenograms show the appearance of silicosis and of asbestosis in the three stages of each and of silicosis with tuberculosis. The functional impairment in silicosis is due to diffuse obstructive emphysema, and x-ray examination in full expiration aids in evaluating the presence or absence of this complication. On the other hand, not all cases of asbestosis have a breathing problem. Expiration films are not of much value in determining the presence or absence of respiratory impairment in these cases. Some persons with slight x-ray changes indicating asbestosis, show definite functional impairment. This situation does not occur in silicosis.

Functional Abnormalities of Industrial Pulmonary Fibrosis. G. W. Wright.

54) The author describes the function of the respiratory and cardiocirculatory apparatus in a simplified form for the benefit of lay persons, and discusses the methods of quantitating some of the physiologic aspects of the respiratory and circulatory systems. He shows how the results of these methods indicate silicosis in its various stages. The typical appearances and clinical conditions in asbestosis are then described and contrasted with those in silicosis. As in silicosis, there is a gross correlation between intensity and duration of exposure, but no evidence is found on the least exposure necessary to produce asbestosis. The physiologic abnormalities are recognizably different in the earlier stage of the two diseases, but in the terminal stage the distinction may not be entirely clear and may lead to confusion. A further difficulty in diagnosis is the frequent coexistence of the diseases. Both may be roentgenologically manifest without recognizable physical impairment.

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Some Clinical Observations of Asbestosis in Mine and Mill Workers.  
P. Cartier.

Statistics and comments are presented on 128 cases of asbestosis observed by the author over a period of eight years. In his experience, no cases of asbestosis of clinical importance have been diagnosed by the pathologist without previous detection by the roentgenologist. The wide discrepancy in the appreciation of the degree of asbestosis by different pathologists leads to confusion, especially before a compensation board. The limitations of the table are obvious, but it shows that the clinical status of 43 cases is good and that 59 employees in the early stages of asbestosis are able to work without discomfort. For the remaining 29 cases, no good correlation between degree of asbestosis and clinical status has been found.

Asbestosis as Differentiated from Other Pneumoconioses. O. A. Sandberg. Difficulties in differential diagnosis are considered. All possible causes of the pathology revealed by the chest film must be considered. Poorly studied cases result in misdiagnoses which not only are embarrassing to the physician but which may cause irreversible harm to the patient. Every obscure case should be thoroughly investigated so that such unfortunate situations do not arise.

- 573 Talcosis of Unusually Rapid Development. G. P. Alivisatos, A. E. Pontikakis, and B. Terzis. *Brit. J. Ind. Med.* 12, 43-49 (Jan. 1955).

Eight cases of talcosis occurring in mill workers and developing after an unusually short exposure to talc are described. The radiological and clinical findings in these cases were similar to those found in silicosis. The chemical analyses of samples of talc powder did not reveal the presence of free silica. It was evident that the gross pollution of the air in the factories and the small diameter of the talc particles were the main contributory factors in the production of talcosis. Talcosis may be considered a type of fibrotic pneumoconiosis accompanied by functional disturbances.

-- Authors' summary

- 574 Experimental Research into the Harmful Nature of Feldspar Dusts. A. Policansky and A. Collet. *Arch. maladies profess.* 15, 343-350 (1954). French.

Three feldspars were used in the investigation: orthoclase (potassium aluminum silicate); albite (sodium aluminum silicate); and labradorite (sodium calcium aluminum silicate). In the experiments 100 mg. of each in fine particles of less than 5 microns were injected peritoneally into rats. After one month, up to 4 1/2 months, the consequent reactions were observed. They are shown in photomicrographs. A certain amount of fibrosis was observed, increasing with time after the injections; it was most marked for labradorite, and least for orthoclase. With albite the lesions formed more quickly and were richer in collagen. Compared with that produced by feldspars, the fibrosis caused by silica is always more intense, and the formation of collagen is more abundant. The authors consider the feldspars more harmful than kaolin and the micas, but less so than fluorspar or silica.

-- Cond. from Bull. Hyg.



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

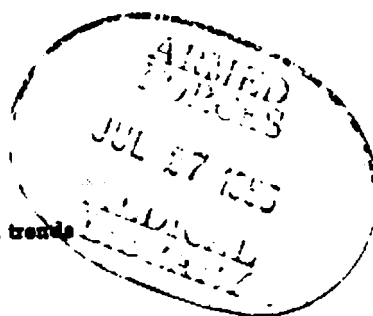
**MEDICAL**

**ENGINEERING**

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**LEGAL . . . decisions and trends**



**JULY, 1955**  
**(Vol. 19, No. 7)**

**INDUSTRIAL HYGIENE FOUNDATION**

**4400 FIFTH AVENUE •• PITTSBURGH 13, PA.**



# FOUNDATION FACTS

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Volume 17

July, 1955

No. 7

## ANNOTATED NOISE BIBLIOGRAPHY PUBLISHED BY I-H-F

Months of painstaking search and review went into the preparation of An Annotated Bibliography on Noise, Its Measurement, Effects and Control, publication of which was recently completed by Industrial Hygiene Foundation. The 364-page bibliography covers 2,336 articles and other literature, and is intended as a useful reference for engineers, physicians, executives and others who may be concerned with problems resulting from excessive noise.

The proper approach to an understanding of the problem of noise and its solution necessitated a systematic survey of the knowledge of the subject. Preparation and printing of this issue of the Bibliography was made possible by funds contributed by various organizations. Therefore it was decided to distribute a limited number of copies to member companies of Industrial Hygiene Foundation. If requests for additional copies indicate that the Bibliography is of value, they can be furnished to members of the Foundation.

## NEW ASSOCIATE OF FOUNDATION DIES

Dr. E. E. Zimmerman, a long-time associate of Industrial Hygiene Foundation, died on June 10 in Summit, N. J. Dr. Zimmerman was a member of the Foundation's Board of Trustees from 1948 to 1954. He was also a member of the Board of the United States Steel Corporation. He was the Chairman of the Foundation's Research Advisory Council.

## NEW COMMITTEE MEMBERS

Recent additions to the Medical Committee of the Foundation are Dr. Melvin N. Roberts, Medical Director, The Pennsylvania Railroad, and Dr. E. E. Smith, Medical Director, Johns-Manville Corporation.

Added to the Legal Committee is James Hill, Compensation Department, Ford Motor Company.

## PATHOLOGY YEAR BOOK INCLUDES FOUNDATION LITERATURE

The Year Book of Pathology and Clinical Pathology for 1954-55 contains an abstract of the paper on "Permeability of Lung Parenchyma to Particulate Matter," by Dr. Paul Gross and Dr. Marian Westrick of the Foundation's toxicology laboratory. The year book outlines the significant advances in path-

(Cont. on next page)

silicic acid with a high degree of polymerization distinctly inhibited mobility and phagocytosis, that freshly prepared polysilicic acid had very little effect, and that monosilicic acid had no effect at all on phagocytosis.  
-- Bull. Hyg.

- 854 The Reactivity of Finely Ground Quartz. C. Claeys and E. Quinot. Staub, No. 37, 393-403 (Sept. 15, 1954). German.

The surface layers of finely ground quartz and of silica were dissolved in distilled water. Optical, electrical, and chemical properties of the solutions were investigated, and their visible and ultraviolet absorption spectra were examined. Anomalies in the quartz spectra are attributed to carbon dioxide. The carbon dioxide content of the solution, estimated by Van Slyke's method, was greater than could be accounted for by carbon dioxide dissolved in the distilled and degassed water used in the experiments. The abnormal reactivity of finely ground quartz particles is ascribed to the presence of carbon dioxide, in the shape of carboxyl groups forming a complex with the silica. It is claimed that several biological effects of fine quartz may be explained by means of this hypothesis.  
-- Cond. from Bull. Hyg.

- 855 Primary Cortical-Cell Tumor of the Peritoneum in a Case of Asbestosis. F. Leicher. Arch. Gewerbepath. Gewerbehyg. 13, 382-392 (1954). German.

A case of asbestosis following long exposure to asbestos is described. In addition to typical symptoms and findings, leptomeningitis was present and tubercle bacilli were found in the spinal fluid. The patient died with cachexia. Autopsy showed tuberculosis of the lumbar spine with bilateral psoas abscess and mixed infection in both lungs. Asbestosis, stage two, was found in the lungs with definite fibrosis; there was slight asbestosis in the lymphatic glands, and asbestos bodies were found in the spleen. On the peritoneum of the mesentery and over the peritoneal cavity there were thickened patches and many small nodules; a flat tumor, half the size of a hand and 1 cm. in thickness, was attached to the peritoneum on the under side of the diaphragm. The results of the examination of the tumor are fully described and illustrated. Asbestos was found in the tumor tissues by x-ray diffraction. It is uncertain how the asbestos reached the peritoneal cavity; the most probable route was thought to be by direct penetration of the asbestos fibers from the lung through the pleura and thence through the diaphragm.



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

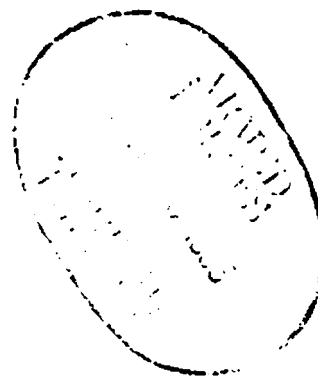
**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**



**SEPTEMBER, 1958**

**(Vol. 19, No. 9)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE -- PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news-letter issued to industrial concerns holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

Volume 17

September, 1955

No. 9

## DR. WALMER PARTICIPATES IN CONFERENCE

Dr. C. Richard Walmer, Managing Director of the Foundation, presented a paper on "Who Are Mentally and Physically Handicapped Workers?" at a Conference on "Industry's Stake in the Handicapped" on September 8. The conference was part of a course for management offered at the Management Center, School of Business Administration, Marquette University.

## NEW REPRINTS AVAILABLE

Two reprints on a broad "Toxicologic Study of Calcium Phosphate Phosphore and Antimony Trioxide" are available. Part I, takes up Acute and Chronic Toxicity and Some Pharmacological Aspects; Part II is concerned with Pulmonary Studies. The study is based on investigations conducted in Industrial Hygiene Foundation Toxicology Laboratory by Paul Gross, M. D., R. M. G. A. Martin, L. Westrick, Ph. D., Raymond F. Smith, Ph. D., and Theodore J. Hatch. The articles were published in *Journal of Occupational Health*, June 1955, vol. 11, pp. 171-176.

Dr. Walmer's paper on "Biologic Testing of Airborne Particulate Matter" presented by Paul Gross, M. D., was published in the *Journal of Occupational Health*, June 1955, vol. 11, pp. 177-180.

## 1955 ANNUAL MEETING OF I-H-F

The 1955 Annual Meeting of the Industrial Hygiene Foundation is being held at the Hotel Statler in New York City on November 16-17. We are proud to bring together such a group of speakers to discuss for you major industrial health problems facing management today. Complete preliminary programs will be sent to representatives of member companies in October, and we hope each company will designate personnel to attend the management sessions and technical conferences, which include Medical, Legal, Engineering, and Chemical-Toxicological sessions. Innovations this year are the Joint Medical and Chemical-Toxicological and the Joint Engineering-Legal sessions. **REMEMBER THE DATES—NOVEMBER 16-17, 1955**

I-H-F

the common aspects of tuberculosis were seen instead of the features characteristic of silicotuberculosis. It is suggested that the term "tuberculosilicosis" be used for such patients. Active tuberculosis was found in eight patients with stage 3 silicosis, but most of the patients in that stage did not show signs of tuberculosis or other infection. The authors conclude that the transition from the nodular to the massive stage can take place without the superimposition of infection.

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

- 1113 Mortality from Lung Cancer in Asbestos Workers. R. Doll. Brit. J. Ind. Med. 12, 81-86 (Apr. 1955).

In necropsies of 105 persons who had been employed at an asbestos works, lung cancer was found in 18 instances. In 15 cases asbestosis was also found. These 15 workers were employed at least nine years before 1923, when dust control regulations became effective. An additional 113 men who had been exposed to asbestos dust for 20 years were followed up and their mortality was compared with that of the whole male population. Thirty-nine deaths occurred in the group whereas 15.4 were expected. The excess was entirely due to excess deaths from lung cancer (11 against 0.8 expected) and from other respiratory and cardiovascular diseases (22 against 7.6 expected). All the cases of lung cancer were confirmed histologically and all were associated with asbestosis. From the data it is concluded that lung cancer is a specific hazard of asbestos workers and that the average risk among men employed for 20 years or more has been of the order of ten times that experienced by the general population. The risk has become progressively less as the duration of employment under the old dusty conditions has decreased.-- Cond. from author's summary

- 1114 Primary Lung Cancer in South Wales Coal Workers with Pneumoconiosis. W. R. L. James. Brit. J. Ind. Med. 12, 87-91 (Apr. 1955).

Primary lung cancer was found at necropsy in 3.3% of 1,827 South Wales coal miners and in 5.4% of 1,531 South Wales non-miners. In 12 cases with massive pneumoconiosis the tumor was in the mass, or touching it, in five. In the other seven the tumor was remote. Lung cancer in South Wales miners is similar to that in non-miners with respect to the ages at death, the distribution of the histological variants of the tumor, and the distribution of metastases. The significance of these findings is discussed. Attention is drawn to the difficulty of diagnosing lung cancer in the presence of massive pneumoconiosis.

-- Author's summary



# *Industrial Hygiene Digest*

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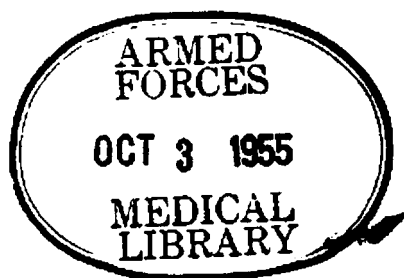
**MEDICAL**

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**OCTOBER, 1955**  
**(Vol. 19, No. 10)**

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October, 1955

No. 10

## CLOSE ASSOCIATE OF FOUNDATION DIES

Carl M. Peterson, M.D., Secretary of the Council on Industrial Health of the American Medical Association, Chicago, died on September 27, 1955, of injuries received a day earlier in the crash of a private plane on a wooded ridge near Asheville, North Carolina. His untimely death means a great loss to the Council on Industrial Health, a loss which will be felt by the Industrial Hygiene Foundation, on whose Medical Committee he served.

- 1237 Adsorption of Serum Proteins at the Surface of Silica; Its Possible Importance in the Genesis of Silicosis. B. Pernis and M. Battigelli. Med. lavoro 46, 1-13 (Jan. 1955). Italian with English summary.

A series of recent hypotheses on the pathogenetic mechanism of silicosis is based on the adsorption of proteins by silica. The research described was undertaken to determine which proteins are most likely to be thus adsorbed. Experiments were made in which serum albumins, gamma-globulins, and whole human serum were adsorbed on carbon, quartz, and Aerosil powder. The experiments show that human serum globulins, and particularly gamma-globulins, have a high tendency to be adsorbed on silica. It is held probable that the adsorption on quartz is followed by a denaturation of the adsorbed proteins and that this phenomenon could have an importance in the genesis of silicosis. -- Cond. from English summary (Bull. Hyg.)

- 1238 Rheumatoid Arthritis in Males: An Epidemiological Study of a Welsh Mining Community. W. E. Miall. Ann. Rheumat. Diseases 14, 150-158 (June 1955).

It has been shown (IHF Absts. 180, 181, Feb. 1954) that some coal miners with rheumatoid arthritis and with pneumoconiosis have characteristic chest x-rays. To determine whether the progressive massive fibrosis was a causal factor in arthritis, a survey of rheumatoid arthritis patients was undertaken in a Welsh mining valley, in which progressive massive fibrosis was common among the miners. The survey showed that, though the prevalence of rheumatoid arthritis among all patients with massive fibrosis is about 2.7%, compared with 0.6% among miners without massive fibrosis, the prevalence of the disease in miners does not differ significantly from that among non-miners, and therefore it is unlikely that massive fibrosis predisposes to rheumatoid arthritis. It is concluded, therefore, that neither exposure to dust nor the lung changes of complicated pneumoconiosis play a causal role in rheumatoid arthritis. Heredity seems to play a causal role in rheumatoid arthritis, in Caplan's syndrome, and in Caplan chest x-ray findings without arthritis. -- Cond. from J. Am. Med. Assn.

- 1239 Pulmonary Disability in Asbestos Workers. K. W. Smith. Arch. Ind. Health 12, 198-203 (Aug. 1955).

Respiratory disease experience among several thousand male and female asbestos workers in the United States and Canada is reported. Of all workers exposed to the fibers, very few develop asbestosis. This disease is insidious in onset and progresses slowly with continued exposure, causing respiratory embarrassment and cardiac failure. Expansion of the lung is difficult, and there is impaired gas transfer through the lung. Diffuse, obstructive emphysema is not common. The typical x-ray pattern

cannot be confused with other pneumoconioses. An x-ray survey of 708 employees in a milling operation showed that the majority had normal x-ray patterns, that ten or more years of exposure were necessary to produce x-ray changes, and that no cases of asbestosis were found who had worked less than 20 years in the dust. The incidence and duration of nonoccupational respiratory disease were not increased by exposure. Asbestos does not predispose to tuberculosis, nor does it aggravate an apparently healed lesion. There are several reasons for different opinions expressed concerning the relationship of asbestosis and bronchogenic carcinoma. Differences in asbestos fibers were noted.

-- Cond. from author's summary

- 1240 The Effects of Inhaled Talc-Mining Dust on the Human Lung. G. W. H. Schepers and T. M. Durkan. Arch. Ind. Health 12, 182-197 (Aug. 1955).

The talc mined in Northern New York State consists of a mixture of talc, tremolite, and anthophyllite. Quartz is also present in moderate amounts in the dust generated in mining and processing. The three constituents of the talc were present in the lungs of deceased employees. Quartz was present in significant amounts only when the men had been additionally exposed in other mining industries. The histological features suggest that tremolite may be the main pathogenic agent in provoking the characteristic "talc" lung lesion. The roles of talc and of anthophyllite have not been wholly excluded. The presence of quartz modifies materially the nature of the "talc" reaction, and the presence of "talc" dust in the lungs modifies both the response to quartz dust and the course of associated infection. Marked pulmonary vascular damage was present in cases where the quartz content of the lungs was highest, and this feature is in harmony with the tendency to cardiac deaths. Bronchitis, bronchiolitis obliterans, and bronchiolectasis are associated major findings in this series.

-- Cond. from authors' summary

- 1241 Disabling Pneumoconiosis from Limestone Dust. A. T. Doig. Brit. J. Ind. Med. 12, 206-216 (July 1955).

Attention is drawn to the occurrence of cases of pneumoconiosis in limestone workers. This pneumoconiosis is associated with fibrosis of the lungs and, in advanced cases, with disability. The lesion produced is almost certainly silicosis, due to the free silica content of the limestone. The pneumoconiosis hazard, in the mining and grinding of at least certain limestones, is considerable, in spite of the relatively low free silica content. Whether or not calcium carbonate can modify the action of silica, it would not apparently, judging from these observations, have any inhibitory effect.

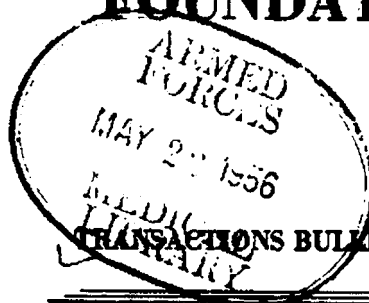
-- Author's summary



1955

*20th*  
**ANNUAL MEETING**

**INDUSTRIAL  
HYGIENE  
FOUNDATION**



TRANSACTIONS BULLETIN NO. 29

**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA  
MELLON INSTITUTE**

4400 FIFTH AVENUE

PITTSBURGH 13, PA.

# **TWENTIETH ANNUAL MEETING**

## **INDUSTRIAL HYGIENE FOUNDATION OF AMERICA**

*HELD AT*

**MELLON INSTITUTE  
PITTSBURGH, PA.**

**NOVEMBER 16 and 17, 1955**

**TRANSACTIONS OF  
The General Meeting**

*AND*

**The Conferences—**

**—Medical**

**—Chemical-Toxicological**

**—Joint Medical and Chemical-Toxicological**

**—Legal**

**—Engineering**

**—Joint Engineering and Legal**

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Pittsburgh, Pa.

# THE ECONOMICS OF INDUSTRIAL HEALTH

A. R. FISHER

President, Johns-Manville Corporation

As a trustee of the Industrial Hygiene Foundation, it is only natural, I suppose, that I should be quite enthusiastic about its aims and its accomplishments during its twenty years of service to industry. To me, the Foundation exemplifies what is being done by privately supported institutions to improve the health of the nation.

When I use the word "health," I do not restrict it to its physiological sense. My concept of it is much broader than that. And I am sure yours is too. Nowadays when we speak of health, we do not think only about diseases and injuries that afflict mankind. Equally important are the mental well-being and the personal dignity of man and the members of his family.

Throughout the ages man's well-being has been his chief concern. Since the dawn of civilization, man has sought protection against common ailments and dreaded epidemics. But for the most part, man's efforts were individual and inspired by his instinct for self-preservation. Neither the ruling classes nor private groups paid much attention to the health of the community.

Our world is many thousands of years removed from primitive man who first sought shelter in a cave and who later relied on a fanatical medicine man to cure his physical and mental ills. And yet, in many regions of the globe, millions of people exist under conditions not too unlike those of primitive man. Poverty, ignorance and superstitions prevail. Disease is rampant. The death rate is high. In many areas, human life is considered cheap and expendable. It is a burden to be cast off.

## The Most Effective Approach

It is only in our Western civilization that real progress has been made. And the greatest progress has been recorded in the United States and Canada. Perhaps there is a definite reason for this. Ours is the middle approach. We do not leave the problem of the nation's health entirely to the government. We do not leave it entirely to private groups. Nor do we neglect it or merely pay lip service to it. Through experience, we have found our way to be quite effective.

Other countries may not agree with the way the nation's health is handled in the United States and Canada. In this connection, I

read an editorial in the Wall Street Journal. It dealt with England's cradle-to-grave security. It happened that a man in England went in swimming and lost a set of false teeth he had obtained under Britain's National Health Program. The man's application for a second set of false teeth was turned down by the city's health council on the ground that he had—and I quote—"exercised lack of care by swimming in a rough sea." This raised some interesting questions. Was the sea rough when the false tooth man first went in or did it become so later? Is that particular sea always rough and are the nearby beaches to be denied all wearers of false teeth?

To rule that a man should be denied a second set of false teeth is to say that government responsibility in the matter of false teeth should go so far and no further. But to say that about false teeth is to question the whole scheme of socialized medicine. For someone is bound to ask, as in the case of the false tooth man, how did he lose his own teeth in the first place?

Our approach to the health of the nation is different from that of England. Ours is neither a government-controlled health program nor one completely dominated by private enterprise. It is an excellent example of state health agencies and private enterprise working together for the common good.

There are many private organizations in the United States and Canada, all supported by individual contributions and dedicated to promoting the health of the public of both nations. There are also health departments in every state and city. And there are organizations devoted to improving the health of those engaged in industry. Our Industrial Hygiene Foundation is an outstanding example.

In addition to these privately supported, local and state government groups, there are several federal health agencies doing wonderful work. There is, for example, the United States Public Health Service. In my opinion, this excellent organization has been most helpful and cooperative in collaborating with us in industry to solve our many, and at times, complex problems in health.

This is a typical American way of doing things. Our private groups utilize the services of the government and our government agencies work with us. In this way, we retain our freedom and our initiative.

## Concern for the Individual's Welfare

As a result, private industry promotes the well-being of the individual. Indirectly, we have our so-called cradle-to-grave security without the heavy hand of government. Directly we in industry are

interested in the employee from the day of employment to retirement. And that covers a good measure of the span of life of most of us. As you all know, industry does this through carefully planned programs based on maintaining a sound mind in a sound body. We need only refer to a few statistics to realize how the nation's health has improved through the combined efforts of state, industry and private groups. In 1909 the life expectancy of the industrial population was 46 years. For the general population it was 52 years. In 1954 the life expectancy of the industrial population was nearly 70 years or an increase of 24 years. And for the general population the life expectancy was also about 70 in 1954, an increase of only 18 years. There are truly significant figures. They show that the life expectancy of the general population has increased roughly a third during the last 45 years. And they show that the life expectancy of the industrial population has increased more than a half in this period.

These advances have been due to a considerable extent to the amazing achievements of our modern scientists.

The figures also show the important part played by industry in improving the health of the nation. It has done so because industry today is directed by enlightened professional managers who realize their obligations and responsibilities to their employees, customers, stockholders and the public.

This concern for the individual's welfare, of course, is a relatively modern idea. At the start of the Industrial Revolution 200 years ago, no one gave a thought to man's health or his dignity. All too frequently employees were looked upon as mere chattels or commodities. Men, women and children were transplanted from homes to factories and mines. Sweatshop conditions prevailed.

What little progress there was could hardly be detected. For example, what was considered a milestone in industrial relations occurred in 1842, almost a century after the start of the Industrial Revolution. At that time Massachusetts passed a law forbidding children under 12 years of age from working more than 10 hours a day in manufacturing establishments. I mention this merely to point out that the capitalism of a century ago is a far cry from the progressive capitalism existing in the United States and Canada today.

Admittedly, early capitalism was primitive, crude and, on occasion, inhuman and ruthless. Very little, if any, thought was given to the health, working conditions and general welfare of the employees. Nor was any thought given to the effect on the community of fumes, polluted streams, environmental and occupational health hazards and other nuisances of the factory and mine.

Amazing progress has been made in eliminating such conditions.

But past evils are difficult to live down. Even in this enlightened era of ours the memory of former wrongs still haunts the word capitalism.

Those who would undermine our system of private enterprise still build up their strawmen or tilt at fictitious windmills as they continue to hurl their reckless charges about the exploitation of the common man. Fortunately they are fast becoming a woefully weak minority. The falsity of their claims is too apparent. Industry has shocked and stunned them by its amazing strides.

To be sure, industry's awakening was a slow one. Fifty years ago a few leaders in industry attempted to improve the health and working conditions of employees. But it was just an attempt. The few efforts that were made were crude and isolated. And precious little financial support was offered. It is not surprising that progress was slow. Then the public's voice was heard. The public's growing concern for the health of the employee was forcibly brought to the attention of industry. There were just too many occupational diseases, too many tragedies in the mines, mills and factories. And to the great credit of industry, the problems were recognized.

Industry no longer considered an employee to be a mere chattel or commodity to be put on the block and auctioned off to the highest bidder. His dignity as a human being was acknowledged.

Public-spirited men of wealth endowed research institutions to probe into occupational hazards and diseases and to develop methods and procedures to improve the health of the individual, of the employee in industry and conditions in the community.

Progressive-minded companies established medical clinics. They pushed ahead with health and safety programs. The programs were, and still are, based on taking care of the physical and mental well-being of employees, helping and protecting the consumer and promoting the common good.

### From Defensive to Offensive

In the early days, of course, industrial medicine was essentially on the defensive. For the most part its programs were confined to treating injuries and diseases. But in recent years industrial medicine has taken the offensive. Its programs are positive. They are directed at the preventing disease and maintaining good health.

In its sincere concern for employees, industry has truly covered the field. Its entire resources have been mobilized to this end. The talents of engineers, doctors, scientists, chemists and personnel men have all been enlisted in the cause. Through the efforts of industry,

occupational diseases, accidents and other causes of absenteeism have been reduced amazingly.

It has been said that each year about a half a billion man days are lost to industry. But of these, only 10 per cent are due to occupational causes. The problem of industry, therefore, is not only to try to reduce occupational absenteeism. Our job is to work with other health organizations in our economy to reduce the nonoccupational causes of absenteeism.

Obviously, such an undertaking requires a vast expenditure of funds. Statistics on this point are not readily available. But in a survey made in 1951 by the National Association of Manufacturers, it is interesting to note that almost 1,600 companies spent many millions a year on health services.

Multiply this figure by the thousands of other companies not surveyed and I am sure you will agree with me that modern industry is doing its best to promote the well-being of its employees.

We in industry realize that as good citizens it is part of our obligation to society to help improve the health of the nation as well as the community. Obviously it is also good business, for healthier employees mean less absenteeism and more productivity.

Johns-Manville, of course, is but one of many companies that has established health and safety programs.

In the thirty-two years that I have been with Johns-Manville, I have observed the increasing interest in and the progress made by our company in the field of occupational health. And our records show that as long ago as 1895 we established a clinic with a doctor serving part time at our Asbestos Mine in Quebec.

### One Company's Program

Today our program is typical of those in American industry. I mention it only because naturally I am more familiar with it. Johns-Manville's program includes a physical examination when employed; continuing preventive health measures and periodic examinations; control of occupational hazards; immediate on-the-job medical care; safety precautions; accident and health insurance; hospitalization; group life insurance; vacations; a pension plan; and plant staffs of medical, industrial hygiene and safety personnel coordinated by a headquarters health department.

In past years Johns-Manville has sponsored independent research on various raw materials and finished products at private research institutions throughout the country. For example, the Industrial Hy-

giene Foundation is currently investigating the properties of one of our newer products.

All of these features of our program are based on keeping the employee in good mental and physical health. They enable him to be more useful to himself, his family, his company and his community.

### Responsibility to the Consuming Public

As with the rest of industry, we are also aware of our responsibilities to the consuming public. Today, the products of industry are designed to promote the health and comfort of the public. Industry is constantly striving to bring about more pleasant living through improved products at better values to the consumer. Moreover, every effort is made nowadays to protect the consumer with safer products and better methods of handling them.

Years ago industrial research was unconcerned about problems of health and safety that might be involved in a product. When the product was developed, it was put on the market. Today our industrial research organizations probe into every health hazard. And every safeguard is insisted upon before the product is marketed to the consumer.

A number of companies have established research organizations and laboratories for the sole purpose of eliminating health hazards that might injure the consumer. Some companies have granted fellowships for this specific purpose.

And industry has inspired, to a very great extent, the movement to label properly certain types of products that might harm the consumer if he were not forewarned.

### Health and Safety Outgrowth of Free Enterprise System

All of these things not only help the individual employee and consumer, but the community at large. Modern plants, in which nuisances and health hazards are reduced to a minimum, are the order of the day. And in their construction, every consideration is given to healthful and safe working conditions.

Now how has this come about?

In my opinion, it is the natural result of the free enterprise system directed by enlightened men of modern management who are aware of the fact that employees are first of all human beings, not mere commodities to be exploited. Under our system, modern management has had the freedom to progress. It has not been shackled by the totalitarian state or dictator.

And modern management has been able to finance these costly projects through the profits of the free enterprise system.

As a result, industry has not only established its own health and safety programs. It has also fostered independent research in occupational health and has benefited through the by-products of this research.

All of these efforts are reflected in lower turnover, less absenteeism, and reduced production costs. At the same time, the employee's health is better, his morale is higher. He and his family live longer and more happily.

But despite our amazing progress, there is still a great deal to be done. Many problems have hardly been touched. Some are too big, too baffling, and too complex for one company to finance or to study. All of them however have a direct bearing on the nation's health.

A tremendous job lies ahead of us.

We must solve the tragic riddles of cancer, cerebral palsy, muscular dystrophy, alcoholism. The common cold still exacts an astronomical toll of absenteeism in industry. We have much to learn about mental health and rehabilitation. And in a nerve-wracked world, we must redouble our efforts to further improve working conditions through noise abatement, the use of appropriate color schemes and other devices to promote the well-being of the industrial employee.

### Continued Cooperation Needed

I have merely mentioned a few problems that cry out for a solution. These problems call for further cooperation of management, labor and the government, all working together right down to the man at the machine.

For we all realize that no asset is more vital to a nation than the health of its people. It affects a nation's happiness, its social welfare, its industrial productivity, its moral fibre, its future growth and its prosperity.

There is no doubt in my mind that the job, no matter how gigantic it may seem, can be done. And it can be done within the spirit and the framework of free and enlightened enterprise.

## GRADUATE EDUCATION FOR INDUSTRY'S PROFESSIONAL PERSONNEL

J. ROSCOE MILLER, M.D.

President, Northwestern University

Graduate education for industry's professional personnel involves two developments, historically speaking, of relatively recent origin. These developments are the great and constantly growing need of business and industry for persons with advanced training and a related increase in the number of university programs designed in part to meet this need.

I stress that these programs are designed, or should be designed, only in part to meet present needs. The relationship between today's industrial needs and today's graduate training should not be a sort of one-to-one basis with each course fitting, like a cog in a machine, into its matching need. Such an arrangement, I believe, could lead us in a direction quite opposite to the one we think we are traveling. Let me forewarn you therefore that I shall concern myself here not with advancing programs for particular courses for industry's professional personnel but with a discussion of certain considerations which are basic to any successful attempt to draw up such programs.

### Social Structure of Business and Industry Changing

To begin, let us focus our attention on the general situation which has brought about—among a few other notable events in history—my appearance here to address you on this particular topic. I refer to the industrial and commercial revolution that has occurred, that is occurring every day. Thanks perhaps to the use made of them by some of the more flamboyant publicists and advertising copywriters of our day, our present stock of adjectives and adverbs seems wholly inadequate to characterize this revolution and its consequences in the lives of individuals and nations.

The words no longer measure up to the accomplishments. The miracle has become a commonplace. Observe how quickly we settle down, after a brief flurry of excitement, to accepting with no further ado such marvels as television and supersonic flight. It seems we are losing the very capacity to marvel under the impact of a new marvel following quickly upon the heels of one to which we have barely been introduced. The possibilities of the peaceful uses of nuclear energy are no sooner dimly perceived than we begin to reassess solar energy, and we greet each with comparative equanimity. Space satellites,

gone a step farther by introducing a labeling code. This is for the further breakdown of chemicals into smaller lots and again it lists the toxic materials and the antidotes. That is as far, I believe, as one can go.

**MODERATOR DORSETT:** One more question. "What are the qualifications for an expert in industrial hygiene engineering?" That is a good one. Mr. Hemeon.

**MR. HEMEON:** I will say that it all depends on what your definition of expert is. I think the lawyers present can tell us what it means when it comes to compensation hearings. There is also the definition involving degree. Certainly there are a very great number of men who are not known who have published or appeared on programs who have as good a knowledge of certain subjects as men who are labeled as experts. I think it turns on your definition of the term.

**MR. WATERS:** On behalf of the Engineering and Legal Committees, I wish to thank you members for the interest that you have shown in this particular session, and on our behalf, I would like to thank the Moderator and the participants in the panel for the excellent presentation that they have made of the subjects which we have been discussing.

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# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**

**FEBRUARY, 1956**

**(Vol. 20, No. 2)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE ··· PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly news letter issued to industrial concerns having membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industries for the advancement of healthful working conditions.

Volume 18

February, 1956

No. 2

## TWO NEW EXECUTIVE STAFF MEMBERS OF MELLON INSTITUTE

General Matthew B. Ridgway, Chairman of Mellon Institute's Board of Trustees and the Chief Administrative Officer, has announced the appointment of Dr. H. L. Anthony III as a Director of Research and of Dr. G. A. Webb as a Director of Engineering. Both appointees, who took office on February 1, have served on Fellowships of the Institute and are familiar with the operating principles of the organization.

Dr. Anthony, a member of Mellon Institute since 1939, is well known professionally for his achievements in and management of metallurgical research and engineering. He is an authority in metalworking, particularly in pressure vessel technology, including drawing operations, bending, welding, and galvanizing.

Dr. Webb returns to Mellon Institute from the National Bureau of Standards, chemical division of Nopco's Company. He has held several Fellowships at Mellon Institute during the past few years. Dr. Webb has had a successful career as a research scientist in the field of chemical engineering, particularly in the area of chemical processes in the production of synthetic materials.

Metal Pollution, October 1955

"Basic Considerations in Evaluating Health Hazards of Airborne Materials and Their Remedies," October 1955

"Decomposition Products Introduce Hazards to Health," October 1955

I-H-F

in the capillary surface. In the evaluation of large numbers of cases, although not in individual cases, there is a certain parallel between the radiographic changes and the severity of functional disturbances. The examination of lung function, especially by work tests, gives an objective criterion for assessment of incapacity, so that remedies may be applied, varying from removal from exposure to inhalation therapy and cardiac treatment, according to the stage of silicosis. In countries where silicosis is compensable as a disease, the system leads to late diagnosis depending on x-ray examination, when severe functional disturbances have already occurred. In Switzerland silicosis is compensable, not as a disease, but only through resulting incapacity for work; this leads to early diagnosis and exclusion of the patients from exposure. In early diagnosis the investigation of respiratory function is highly important. Hence the aim is to distinguish the limits of disturbances of function due to silicosis from those due to accompanying diseases. The basis of all research on respiratory function is spirometry and analysis of the gases in the arterial blood. The technique used in the investigations is described. A classification is given of the different disturbances of lung function and these are discussed very thoroughly. Assessment of capacity for work is made on the results of functional tests. Limiting criteria for this assessment are given. A study of 46 silicotic workers showed that, after at least four years' freedom from dust exposure, radiographic appearances had not changed for the worse in more than half of the patients, and in about half lung function and capacity for work were either improved or maintained. -- Cond. from Bull. Hyg.

- 248 Investigations on Breathing Capacity in Silicosis by Means of Oximetry During Work. E. Sartorelli and Eleonora Giorgi. *Med. lavoro* 45, 600-607 (Nov. 1954). Italian.

The procedure used in oximetry is described and results in 30 persons, normal and silicotic, are presented. In all the seven cases with silicosis in various forms, anoxemia appeared for lighter work-loads than in normal cases of the same age. The onset of severe anoxemia was noted even during light work-loads in two cases of nodular silicosis with severe emphysema and chronic cor pulmonale. Oximetry during work, as proved by the results obtained, is a method of undoubted practical utility for the study of the respiratory function. Compared with other methods by which the behavior of blood oxygen saturation is studied only indirectly, oximetry during work presents the following advantages: (1) the appearance of anoxemia is recorded directly; (2) the research is very rapid; and (3) the examination is better tolerated by the patients, because during work they are allowed to breathe freely without the use of a mouthpiece or a mask.

-- Cond. from English summary (Bull. Hyg.)

- 249 The Reaction of Middlebrook-Dubos in Silicosis and Silicotuberculosis among Coal Miners. J. Prignon. *Arch. belges med. sociale, hyg.* 13, 17-25 (Jan. 1955). French.

The reaction of Middlebrook-Dubos is concerned with the agglutination of red cells sensitized with tuberculin, by serum dilutions of 1 in 16 or more. Certain modifications, fully explained, were used in a study of 82 silicotic coal miners, of whom 18 were tuberculous, and 16 with tuberculosis without pneumoconiosis. Positivity of the reaction was found to depend upon the presence of tuberculosis rather than silicosis. The low proportion of positive reactions in advanced silicosis does not support the widely accepted claim that the passage from isolated nodules to more advanced confluent silicosis depends upon a superimposed tuberculous infection. The reaction may thus contribute evidence in the differential diagnosis between miliary tuberculosis and micronodular silicosis. -- Cond. from Bull. Hyg.

- 250 Carcinoma of the Lung in Asbestosis: Report of Two Additional Cases. K. H. Lynch and H. R. Pratt-Thomas. *Southern Med. J.* 48, 365-368 (June 1955).

The evidence of correlation between the occurrence of asbestosis and of lung cancer is collected. No such correlation has been found with other forms of pneumoconiosis like silicosis and anthracosis, or pulmonary tuberculosis. The pathology of asbestosis is abnormal; it seems to be due to traumatism between large particles of asbestos, too large to penetrate into the alveoli, and the pulmonary tissues, while other pneumoconioses present reactions between minute particles and the living tissues. Further, no efforts to induce lung cancers in animals exposed to asbestos dust have been successful. Nevertheless, the statistical evidence is strong. Two additional cases of lung cancer associated with

asbestosis are reported. In both cases x-ray examination showed the diffuse granular infiltration over both lungs characteristic of asbestosis and the lungs after death exhibited the fibrosis distinctive of asbestosis; but both patients succumbed to bronchogenic carcinoma. The appearances of the lesions are illustrated. The authors have seen four cancer cases in 49 autopsies of asbestos, 8.2%, compared with 0.7 to 2.4% in autopsies taken at random.

-- Bull. Hyg.

- 251 Asbestosis and Pulmonary Carcinoma in an Asbestos Spinner. Notes on the Induction of Lung Cancer by Asbestos Fibers. G. Romboia. Med. lavoro 46, 242-250 (Apr. 1955). Italian.

The first case of pulmonary carcinoma occurring in Italy in a subject affected by slight asbestosis is described. The diagnosis formulated in life was confirmed by autopsy, the gross and microscopic findings of which are briefly reported. The present clinical, pathological, and statistical knowledge on the capacity of asbestos to cause tumors is summarized. Statistical data are abundant, but experimental studies are few and not concordant. The author believes that a study should be made to determine how the capacity of the different types of asbestos to cause tumors differs according to their chemical composition.

-- Cond. from English summary (Bull. Hyg.)

- 252 Peritoneal Tissue Reactions Produced by Various Kinds of Carbon and Coal Dusts in the Rat. H. Sakabe and T. Chi. Bull. Inst. Public Health (Japan) 4, 18-22 (June 1955).

Peritoneal reactions in rats produced by various carbon and coal dusts were studied. The results showed that the natural and artificial graphites free from silica produced a fibrosis or granuloma on the peritoneum of rats, although far more feeble than the tissue reactions produced by quartz dusts. The more the graphitization of carbon dust progressed, the more the resulting tissue reaction became severe. The tissue reactions by graphite dusts were variable according to the type of graphite. Carbon black could not be assumed to be completely inert except types of large spherical carbon black. Potency of coal dusts for tissue reactions may lie somewhere between natural graphite and carbon black, but a difference of tissue reactions among various coal dusts was not demonstrated in this study.

-- Public Health Eng. Absts.

- 253 The Effect of Various Forms of Alumina on the Lungs of Rats. E. J. King, C. V. Harrison, G. P. Mohanty, and G. Nagelschmidt. J. Pathol. Bacteriol. 69, 81-93 (1955).

When introduced into the lungs of rats, powdered hydrated alumina and aluminum phosphate of small particle size produced reticulin nodules. In the case of alumina, the nodules developed into areas of dense collagenous fibrosis. There was a slow dissolution of aluminum hydroxide into the surrounding tissues as shown by aurine staining of sections. The amount of alumina found in the lungs was less in the animals which survived longest. Condensed fumes from a corundum furnace, which consisted approximately of half finely divided alumina and half silica, produced a much less severe fibrosis, but there was a notable exudative reaction in the lungs and several animals died during the course of the experiment. This dust was partially eliminated from the lungs of animals during the 12 months of the experiment. The doses of dust used to produce these results are mostly in excess of those which have been used in the prophylaxis of human silicosis.-- Chem. Absts.

- 254 Baker's Rhinitis and Asthma. C. Pestalozzi and U. W. Schnyder. Schweiz. med. Wochschr. 85, 496-501 (May 21, 1955). German.

A study was made of the prevalence, symptomatology, course, sensitization, and spontaneous desensitization and the family disposition in baker's rhinitis and asthma. Of 159 bakers in Zurich, 42 had allergic symptoms of the respiratory tract; 36 had rhinitis only and six also had bronchial asthma. Skin tests with flour extracts gave positive reactions in 24 of the rhinitis cases. The rhinitis is apparently due to a flour allergy, but other factors must be considered the cause of the asthma.

-- Cond. from Bull. Hyg.



# *Industrial Hygiene Digest*

**INDUSTRIAL HEALTH NEWS**

**LITERATURE ABSTRACTS**

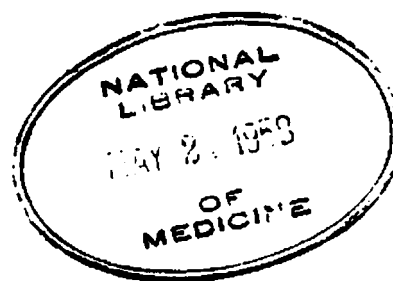
**MEDICAL**

**ENGINEERING**

**CHEMICAL**

**TOXICOLOGICAL**

**LEGAL . . . decisions and trends**



**JUNE, 1957**  
**(Vol. 21, No. 6)**

**INDUSTRIAL HYGIENE FOUNDATION**

**MELLON INSTITUTE**

**4400 FIFTH AVENUE • PITTSBURGH 13, PA.**



# FOUNDATION FACTS

Foundation Facts is a monthly bulletin sent free to industrial hygienists holding membership in Industrial Hygiene Foundation. The Foundation is a nonprofit association of industrial hygienists for the advancement of industrial working conditions.

Volume 19

June, 1957

No. 6

## I-H-F STAFF MEMBERS PARTICIPATE IN MEDICAL MEETING

Participating in the 23rd Annual Meeting of the American College of Chest Physicians held in New York from May 29 to June 2 were two members of the Foundation's staff. Dr. Paul Gross presented a paper on "The Topographic Distribution of Mineral Dust in Pneumoconiotic Lungs." Dr. Daniel C. Braun participated in a round table discussion on "Occupational Diseases of the Lungs."

Dr. Braun also attended a meeting of the Committee on Cardiovascular Disease of the Section on Rehabilitation and a meeting of the Joint Meeting of the Committee, Committees and Sections of the College while attending the meeting.

## NEW REPORT AVAILABLE

This may be obtained from the Industrial Hygiene Foundation, 1000 Broadway, New York 19, N.Y. or from the American College of Chest Physicians, 1000 Broadway, New York 19, N.Y.

The Industrial Hygiene Foundation is a nonprofit association of industrial hygienists for the advancement of industrial working conditions. Announcements of the topics and speakers.

the light microscope. Incidentally, it seemed that a particle with sharp angles, such as a quartz particle, could easily pierce the layer. It was limited on both the air-space side and the connective tissue side by an osmium-staining cell membrane; a basal membrane was not found. The partition between the blood and the air space consisted of seven layers. In places where the capillaries were not in immediate apposition to the alveolar wall the cellular tissue space was filled with connective tissue fibrils, lattice threads, elastic fibers, and connective tissue cells. Various cells, detached from the alveolar walls, and septal cells were found, but a definite decision could not be reached on their origin. -- Cond. from Bull. Hyg.

- 757 Silicosis. 11. Effect of Sex Hormones on the Amount of Silicon Excreted into Urine. M. Aume. Nagasaki Igakkai Zassi 31, 381-385 (1956).

Urinary excretion of silicon before and after castration was investigated. In the case of male rabbits silicon increased after castration while in the case of females it decreased. Silicon returned to the normal level after the administration of male hormone or follicular hormone. Corpus luteum hormone showed no effect. -- Chem. Absts.

- 758 Silicosis. 12. Influence of Thyroid Hormone on the Amount of Silicon Excreted in the Urine of Rabbits. R. Kakita. Nagasaki Igakkai Zassi 31, 438-445 (1956).

Thyroidectomy increased the urinary excretion of silicon by 2 to 3 times, and silicon returned to normal level after the administration of thyroid hormone. Injection of methylthiouracil to normal rabbits increased silicon slightly. Diiodotyrosine and anterior hypophyseal hormone showed no effect. -- Chem. Absts.

- 759 The Neutralization of Silica Toxicity in Vitro. J. Marks. Brit. J. Ind. Med. 14, 81-84 (Apr. 1957).

Phagocytic cells were protected in vitro against the toxic effect of silica dust by compound 48/80, a histamine-releasing agent formed from p-methoxy-phenylethyl-methylamine. The health of the cells was studied by direct microscopy and by measurement of their glucose consumption and dehydrogenase activity. The mode of action of compound 48/80 is not known but may depend on a reduction in silica solubility. A slight protective action was also exhibited by certain alkylmono-amines and polymyxin B. -- Author's summary

- 760 Pulmonary Fibrosis and Giant-Cell Reaction with Altered Elastic Tissue. Endogenous "Pneumoconiosis". R. L. Walford and L. Kaplan. Arch. Pathol. 63, 75-90 (Jan. 1957).

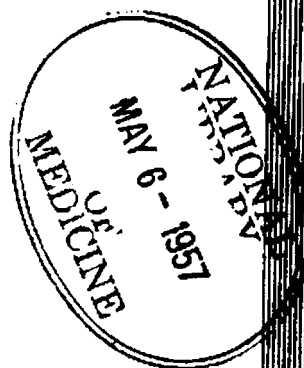
The clinicopathologic findings in 12 autopsied cases of a peculiar pulmonary elastica disease are presented and discussed. It is concluded that injured pulmonary elastic tissue may act as a foreign body or sequestrum and produce a progressive "pneumoconiosis". -- Cond. from authors' summary

- 761 Asbestosis with Pleural Calcification among Insulation Workers. J. Frost, J. Georg, and P. F. Møller. Danish Med. Bull. 3, 202-204 (Nov. 1956).

In Denmark only a few persons manipulate insulation products including asbestos, kieselguhr, magnesia, glass wool, and rock wool. The first two have been regarded as fibrogenic to the lungs when their dust is inhaled. In order to ascertain any occupational risk in the work 31 workers with more than 20 years' exposure, of 52 years average age, were carefully examined clinically and by x-ray. Abnormalities were found in the surprising number of 22. A total of nine exhibited fine mottling indicative of pulmonary asbestosis. In 19 patients pleural changes were seen, which were due to adhesions and extensive thickening with calcification. The abnormalities in the pleura were so widespread in some instances as to obliterate other pathological changes. The calcification is unusual and may be ascribed to combined exposure to calcium and magnesium in the presence of fibrogenic asbestos dust. Sample analyses of the kieselguhr in use did not reveal the presence of alpha-quartz. The finding of pronounced bilateral pleural changes in the present series definitely points to an occupational origin. -- Cond. from Bull. Hyg.



**21st**  
**ANNUAL MEETING**  
**INDUSTRIAL**  
**HYGIENE**  
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*Transactions Bulletin No. 30*

**INDUSTRIAL HYGIENE FOUNDATION OF AMERICA**  
**MELLON INSTITUTE**  
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*Twenty-first*  
**ANNUAL MEETING**  
of  
**INDUSTRIAL HYGIENE FOUNDATION  
OF AMERICA**

HELD AT  
MELLON INSTITUTE  
PITTSBURGH, PA.

NOVEMBER 14 AND 15, 1956

MANAGEMENT, MEDICAL, LEGAL,  
CHEMICAL-TOXICOLOGICAL,  
ENGINEERING, AND JOINT TECHNICAL  
CONFERENCES

**INDUSTRIAL HYGIENE FOUNDATION**

*An Association of Industries for Advancing  
Industrial Health and Improving  
Working Conditions*

FOUNDED IN 1915

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Participating in Legal Conference were, left to right: Chairman, Theodore Hetzler, Jr., National Association of Mutual Casualty Companies; Andrew Kalmykow, Assistant Manager, Casualty Department, Association of Casualty and Surety Companies; and Leonard C. Johnson, Executive Secretary, New Jersey Manufacturers Association.

## REVIEW OF OCCUPATIONAL DISEASE LEGISLATION—1956

ANDREW KALMYKOW

Assistant Manager, Casualty Department  
Association of Casualty and Surety Companies

I have often heard this remark — why is it that after more than 40 years of experience there is so much workmen's compensation legislation—so many problems for which the right answer apparently has yet to be found? Some may have felt this to be a reflection on the operation of the system. Personally I feel that is a healthy sign. There is always room for improvement in any field. Certainly we have had courts, not for years, but for centuries. Yet, revision of court systems and court procedures are receiving major attention in a number of jurisdictions. I would look with doubt upon anyone who announced that he is possessed of such wisdom that he could produce the correct solution to all questions in the field of workmen's compensation.

While change does not of itself necessarily mean improvement, it usually is an effort in that direction. Possibly, therefore, we should not be unduly disturbed by the continued volume of legislative activity in workmen's compensation. This year, as usual, there were several important occupational disease enactments—this despite the fact that it is an "off-legislative year," so called. Only 12 states were in full regular session. Since neither Mississippi nor Wyoming were among these, there were no completely new occupational disease laws. These are the only two states which do not provide some form of compensation for such diseases. In Montana there is a state pension system for silicosis.

### Extensive Revisions in Pennsylvania and Kentucky

Pennsylvania and Kentucky made extensive revisions of their occupational disease provisions. These are probably the two most important enactments of the year in this field. I touched upon the Pennsylvania law last year, when it was still pending before the legislature, because of the probability of its enactment. Since it has now become law, somewhat broader treatment seems warranted. Most of the amendments are similar to those made by a separate bill affecting the Workmen's Compensation Act proper. These dealt largely with benefit increases and procedural changes. For example, compensation has been increased to a maximum of \$37.50 a week. Medical bene-

fits have been increased to a mandatory period of six months. Additional medical care may be ordered by the Board, if it is established that further care will result in restoring the disabled employee's earning power to a substantial degree. This latter provision is, I believe, designed to further the employee's rehabilitation and would seem to be an important qualification. Such review by the board of the necessity for medical care should be helpful. In addition a hearing period has been provided in the case of scheduled permanent partial disabilities. Moreover, the time limit for making of claims has been extended from one year to sixteen months. Changes have also been made in the provisions relating to modification of agreements and awards.

As far as occupational diseases specifically are concerned, the most important change, of course, is the provision for broad occupational disease coverage. To the list of compensable diseases is added the following language: "All other occupational diseases (1) to which the claimant is exposed by reason of his employment; and (2) which are peculiar to the industry or occupation; and (3) which are not common to the general population." It is further provided that "for the purposes of this clause, partial loss of hearing due to noise shall not be considered an occupational disease." The requirement that the disease must be peculiar to the employment or occupation and not common to the general population should be helpful in preventing awards for ordinary diseases of life. However, even though this language is found in the definition, attempts will no doubt be made to obtain compensation for such conditions. The first cases to reach the highest court should be of particular importance in determining the scope of these provisions. Courts, on occasion, have reached some unexpected results despite what appeared to be clear language in the law. I recall one case where the law defined injury to mean "only violence to the physical structure of the body." The court held that violently meant harmfully, however gently.<sup>1</sup> I am inclined to think that in this instance there was violence, but the violence was to the English language.

The provision excluding partial loss of hearing should also prove helpful. Broad occupational disease coverage might well invite claims for loss of hearing due to noise. However, it is the cases of partial loss of hearing that have caused the main difficulty. In these cases the claimant continues his regular occupation without loss of earnings and yet is entitled to substantial payment of compensation. While the permanent partial disability schedule in Pennsylvania refers only to cases of total loss of hearing [Section 306 (e)], it is a good thing that

the law on this point has been clarified. We should all keep in mind in this connection the experience of New York and Wisconsin.

In silicosis and asbestosis cases maximum compensation has been increased from \$7,500 to \$10,000, and some changes made in time limitations. Injuries due to war have been specifically excluded. Let us hope that such provisions will never have to be invoked. In the present state of unsettled world conditions, however, clarification of the law on this point at least removes one possible source of anxiety.

I had the privilege of being a member of the group that gave consideration to these proposals prior to the actual preparation of the bill. Since many different viewpoints were represented in that group, of necessity, the result was one in the nature of a compromise. One might easily point to provisions that might have been modified or omitted or provisions that could have been but were not incorporated. However, if my recollection serves me correctly legislative history of workmen's compensation in Pennsylvania has, on occasion, been something in the nature of swings of a pendulum, from one extreme to the other. This is an effort to pursue a more moderate course. I could cite many provisions which were discussed but rejected as being too controversial. Granting a reasonable amount of good will on each side, an exchange of viewpoint usually produces better results than a knock-down fight.

Even though broad occupational disease coverage was provided in Pennsylvania, the legislature also enacted a specific amendment to the schedule of compensable diseases itself. Tuberculosis previously limited to nursing in hospitals and sanatoria is now compensable also when contracted in auxiliary services involving exposure to such disease.

### Amendments Enacted in Kentucky

Extensive amendments were also enacted in Kentucky. Broad occupational disease coverage is here also now provided under a definition similar to that in Illinois. Previously the law had covered only injuries or death due to noxious gases of smoke in mines or the inhalation of any kind of gas. These provisions are retained. The elective silicosis provisions, however, have been repealed. This disease is now included under the new language. Question may arise, however as to whether these new provisions apply to injuries "due to any kind of gas." Many occupational diseases are due to exposure to gases. It would seem that the new provisions should be applicable to such cases. Nevertheless, litigation on the point may well arise.

Among the new provisions is a requirement that notice must be given of the first distinct manifestation in the form of symptoms

<sup>1</sup> Downey v. Kansas City Gas Co., Mo., 1936, 92 S.W. 580.



Industrial Air Cleaning was the theme of the Engineering Conference. Program participants were, left to right: Robert T. Pring, Technical Director, Dust and Fume Control Division, Wheelabrator Corporation; Dr. Leslie Silverman and Dr. Philip Drinker, Harvard University School of Public Health; Arthur C. Stern, Robert A. Taft Sanitary Engineering Center, U.S. Public Health Service; William B. Harris, Health and Safety Laboratory, U.S. Atomic Energy Commission; and John M. Kane, Manager, Dust Control Products, American Air Filter Company.

## PUBLIC HEALTH SERVICE ENGINEERING PROGRAM ON AIR POLLUTION CONTROL

ARTHUR C. STERN

Chief, Community Air Pollution Program  
Robert A. Taft Sanitary Engineering Center  
United States Public Health Service

The Community Air Pollution Program of the Public Health Service is divided into two major segments, medical and nonmedical. The medical program is administered by physicians in the Division of Special Health Services, whereas the nonmedical program is administered by engineers in the Division of Sanitary Engineering Services. Because of this, we think of the entire nonmedical portion of the program as the "Public Health Service Engineering Program on Air Pollution Control."

At the time of the passage and implementation of the Federal Air Pollution Research and Technical Assistance Act (Public Law 159—84th Congress) in the summer of 1955, provision was made not to limit the program to personnel and facilities within the Service, but to utilize those outside the Service to carry a major portion of the program load. At present, approximately 45 per cent of the engineering program is in the Public Health Service, whereas 55 per cent is in universities, research institutes, state and local air pollution control agencies, and other agencies of the Federal Government, namely: Weather Bureau, Bureau of Mines, Bureau of Standards, and Department of Agriculture.

### Training Personnel

This division of effort is most apparent in our program for training persons in the special skills needed for work in air pollution. On the one hand, the Public Health Service has this year at the Robert A. Taft Sanitary Engineering Center in Cincinnati undertaken seven short-term training courses in the chemical, physical, meteorological, engineering, and administrative fundamentals of air pollution. (Last year, 287 persons attended five such three-day to two-week courses.) On the other hand, university schools of engineering or public health are being assisted in providing one- or two-year graduate courses leading to advanced degrees in air pollution by both direct PHS grant-in-aid support for such courses, and PHS fellowship funds to allow students to take them. The division of training support is about 45 per cent for the short courses and 55 per cent for university course and student support.



Answering questions on health problems involved in the manufacture, sale and use of toxic materials at Joint Technical Conference were leading authorities on various aspects. Panel participants are, left to right: Dr. L. C. McGee, Medical Director, Hercules Powder Company; Dr. P. W. Bachman, Vice President and Director of Research and Development, Koppers Company, Inc.; H. S. Baile, Deputy General Manager and General Counsel of General Accident, Fire and Life Assurance Corporation, Ltd.; C. R. Oviatt, Legal Department, Union Carbide and Carbon Corporation; Dr. John A. Zapp, Jr., Director, Haskell Laboratory for Toxicology and Industrial Medicine, E. I. du Pont de Nemours & Company, Inc.; Theodore Hatch, University of Pittsburgh Graduate School of Public Health, and Research Adviser to the Foundation; and V. P. Ahearn, Executive Secretary, National Industrial Sand Association.

## HEALTH PROBLEMS INVOLVED IN THE MANUFACTURE, SALE, AND USE OF TOXIC MATERIALS

A Panel Discussion

MODERATOR:

**V. P. AHEARN**

Executive Secretary,  
National Industrial Sand Association

PARTICIPANTS:

**P. W. BACHMAN, Ph.D.**

Vice President & Director of Research & Development,  
Koppers Company, Inc.

**H. S. BAILE**

Deputy General Manager and General Counsel,  
General Accident, Fire and Life Assurance Corporation, Ltd.

**THEODORE HATCH**

University of Pittsburgh Graduate School of Public Health; and  
Research Adviser, Industrial Hygiene Foundation

**L. C. MCGEE, M.D.**

Medical Director,  
Hercules Powder Company

**C. R. OVIATT**

Legal Department,  
Union Carbide and Carbon Corporation

**JOHN A. ZAPP, JR., Ph.D.**

Director, Haskell Laboratory for Toxicology and Industrial Medicine,  
E. I. du Pont de Nemours & Company, Inc.

MODERATOR V. P. AHEARN: I would like to tell you something about the procedures for the operation of this panel. A list of questions has been prepared on the subject before us today, and copies will be distributed to the audience. Two members of the panel in most cases have been asked to be prepared to be called upon. That doesn't mean that other panel members are not supposed to participate. I want to make it clear that panel recognition is not necessary by the Moderator for contributions by members of the panel whose names do not appear at the left-hand side of the question. Each participant is supposed to add to the contributions made by the other members of the panel whenever in his judgment there are additional

contributions to be made. The panel participants met this morning to look over the questions and to discuss the program.

After the recess, at 3:30, we propose to give priority to questions asked from the floor rather than to the written-out questions. We hope that there will be floor discussion even if we haven't answered all the written questions, because we want to establish the town hall atmosphere and to give each of you an opportunity to ask a question, to make a contribution, to challenge a member of the panel, or do anything else that your democratic instinct suggests you do.

The first question which I am going to ask the panel is: "How does one define 'health problems'? What is meant by 'toxic material'?" I am going to ask Dr. McGee to answer that question.

DR. MCGEE: In a broad sense, one might say that any deviation from optimum physical, mental, and social well-being is a health problem. That definition of health as the optimum state of mental, physical and social adjustment has been battled about for a number of years. I believe for the purpose of this afternoon's contribution, however, the health problems involved should be limited to those deviations from optimum health which occur as a result of an exposure in manufacturing, sale and use of something which is called "toxic material."

As the title is stated, of course, any deviation in health of a worker would react on his work in output, and so forth, in a broad sense. But I believe the meaning here is in a more limited sense of those deviations from the optimum physical, mental, and social adjustments which result from the contact with this thing called "toxic material."

Passing then to the second part of the question, "What is toxic material?" we are in trouble immediately. I find very few people, outside of those who are concerned with deleterious substances as they affect man, who have a concept of the large range in degree and character of toxicity. It is a word which means what anybody wants it to mean.

Unfortunately, to substitute for "toxic," "poisonous," "deleterious" or what have you, gets us no place. It so happens that everything with which man is in contact can be troublesome and "toxic" if he gets too much. Those things that we consider essential to life, including food, vitamins, minerals, and water, can be "toxic" to man. I believe Dr. Henry Smyth, Jr., defined "toxic" simply as a matter of too much. If we keep that in mind, we will realize then that we cannot circumscribe a certain group of materials and say these are toxic, others are not toxic. I must admit, and possibly Dr. Zapp can

help us here, that, for purposes of orientation, we must have some arbitrary definition of what is toxic.

DR. ZAPP: I can only express my agreement with the remarks that Dr. McGee has made. The term "toxic material" is subject to very many interpretations by different people. The great difficulty that we have in talking about them and in drawing up laws and procedures to govern the use of toxic material revolves about the definition of toxic material.

Dr. McGee was quoting to you just a few moments ago from the report of the Council of Toxicology of The American Medical Association, in which are reviewed the various definitions of poison. (The Council found that there was no uniformity.) As a matter of fact, it states that there is no uniformity of legal or scientific opinion as to what constitutes a poison.

And then, since a precise definition that would fit all circumstances is not possible, the Committee felt that any substance that when improperly used may produce harm by chemical action, should be provided with an appropriate cautionary label or statement, et cetera. So, here, we have not only difficulty in defining what we mean by toxic material, but also a concern on the part of this group for warning of the consequences of misuse. I think what we really mean to talk about this afternoon is more properly defined as hazards, that is, the probability that an injury will occur in the manufacture, sale, or use of these materials.

MODERATOR AHEARN: Thank you very much, Dr. Zapp. Now, I move on to the second question, unless at this stage a member of the panel wishes to add something to what these two gentlemen have already said.

You football men will notice I am playing a seven-man lineup on this platform. I am going to ask my right tackle, Dr. Bachman, this question: "Do you think there is any basic difference in safety as applied to people in research and development in comparison with people involved in regular production operations?"

DR. BACHMAN: I think this question in the first place refers to an approach to safety. In that respect, I will try to pass an opinion.

I think there is a considerable difference in the safety that one encounters in the laboratory and that which one encounters in the plant. In a plant in the regular production operation, it is possible for the engineers to break a process down into many component parts and study these parts from the point of view of safety; the different operations can be adequately safeguarded. I think there is not very

much difficulty in this, and it is rather rarely that we have accidents of any significant nature in processes that are continually operating in a repetitive manner. I think that is rather easy to control, and it is more feasible to train the operators in safety measures.

Now, in contrast with that is a research laboratory. The men in the laboratory are frequently working in unexplored and unknown areas. They may or may not, and probably will not, know the toxicological or hazardous explosive properties of the materials with which they are working or of the materials which might be formed as a result of their researches. So, here, you have only a few of the general rules of safety that apply. I think a great deal of it in the case of the research man depends entirely upon him. I think his approach to it must be one of safety consciousness. I think he has to really live safely and to be effective this has to be a part of his background, a part of his disposition.

MODERATOR AHEARN: Thank you, Dr. Bachman. Now, Mr. Hatch.

MR. HATCH: I certainly agree with everything he said except the second point, attitude. Certainly, it is true that the people who are doing the basic research and development work should incorporate into their day-to-day thinking the needs with respect to safety to a greater degree than people out on the production line. However, it has been my experience, and I am sure many of the rest of us here have had the same experience, that very often we find it just the other way around. The man who is doing research is so wrapped up in his research objective that he is inclined not to give very much consideration to these other matters.

I can recall visiting laboratories where, for example, they were using such a well-known agent as benzol and were slopping it around like water. At the same time, they might be quite concerned over the toxicity of the new and exciting material that they are developing. So, I am sure it is important to make sure that in the course of research and development, these questions are constantly raised, but I don't think we can rightly assume that the research people are always going to raise them.

MODERATOR AHEARN: Thank you, Ted. I want to remind the panel that other contributions are always welcomed.

MR. BAILE: May I interject one comment? The very distinction that both gentlemen have made between the research operation and production operation suggests the desirability of a slightly different approach to the safety program with respect to operation. In

the production operation, you are dealing with guarding against the individual, isolated accidents in the course of production, whereas, in the research operation, you are concerned with the catastrophe problem. Therefore, your program in that respect should be designed to provide for the type of action required in the event those catastrophes occur.

MODERATOR AHEARN: Thank you very much, Mr. Baile. The next question gives us a chance to break out our legal talent up here. "Does not the obligation of the insured under a Products Liability Policy, particularly his agreement not to settle with a claimant nor to admit liability, interfere with a manufacturer's relations with his customers and with the public?"

Mr. Baile, you can be the first one to answer that question.

MR. BAILE: I believe the simple answer to the question is that it should not. I think at the same time you have to recognize that there is an apprehension on the part of some people that it does. In order that it shall not interfere with customer and public relations, I think it is of utmost importance that there be understanding on the part of both the insurer and the insured, and also that there be the utmost cooperation between the two.

The basic understanding that has to exist is to recognize the distinction between customer complaints on one hand and claims on the other. Customer complaints must be a concern of the insured, the manufacturer himself. He must be free to deal with customer complaints as you deal in business relations, without necessarily being concerned with the legal basis of the claim or the legal possibilities that might arise out of your action.

On the other hand, it is most important on the part of the insurer to recognize that the insured must be free to act in that way; that he must be free to deal with a customer in order that he will have a satisfied customer. Since that is the interest of the manufacturer, he can't restrain that action in order to protect his legal position. The interest of the insurer and the insured must be recognized as an identical interest. They are not two parties; they are one party serving one aspect of the insured's business, which is his relation to the customers insofar as they are affected by his products.

I hope I don't sound idealistic speaking as an insurance man on that subject, because I think it is the actual practice of every company of standing to operate in the handling of products liability claims in precisely that way. If it is done that way, then there is no interference with the company's relations with the public, the customers.

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MODERATOR AHEARN: Thank you, Dr. Zapp, will you comment?

DR. ZAPP: Well, I can't speak on this topic as a lawyer or as an insurance man.

It does seem to me that there are two separate concepts involved in this question. One concerns the mechanism of settling claims which presume that there has been an injury for which the plaintiff seeks to recover damages. The other part concerns the relations of the manufacturer with his customers and with the public.

Now, it seems to me that the manufacturer has a very definite responsibility to his customers and to the public, and that is to point out to them how his product can be used with safety. Nothing can interfere with that responsibility on the part of the manufacturer. If, however, a claim arises which suggests either that the manufacturer's statements were inadequate or in error, then you have this question of deciding about liability, which I feel is a separate matter.

MODERATOR AHEARN: Thank you, Dr. Zapp. The next question is, "What information respecting physical and chemical properties and toxicological properties of the material does the industrial hygienist need in order to develop the hazard control program?" Mr. Hatch.

MR. HATCH: The answer to this question is very easy. You get all that is available. There is one very important aspect of this question as to what information concerning physical and chemical and toxicological properties that the industrial hygienist needs. The implication is that there is information with respect to the toxicological properties of the substance obviously essential to an understanding of the hazard. That doesn't tell the whole story, however. There must be added to this question; what information does he need also with respect to the way in which the process operates in which this toxic substance is to be used? It is important for us to keep in mind that there is a very real difference in toxicity and hazard. Here is where the physical and chemical properties as well as the toxicological properties come in.

We know, for example, that two substances may be equally toxic but quite different in respect to hazard. Thus, it should be the industrial hygienist's responsibility to accumulate all the information that is available, and it should be his responsibility to digest this information and determine to what extent more information is needed, because he can't limit his responsibility by simply saying that only so much is known about the substance and, therefore, decisions have to

be based upon this limited data. He must see to it that the necessary additional information is obtained.

MODERATOR AHEARN: Dr. McGee.

DR. MCGEE: Accepting the suggestions that Ted Hatch has given, I wonder if he would admit there is a practical shortcut which is useful in human exposures to some materials. I refer to the fact that if you have an explosive hazard at a concentration in air well below that causing a definite, clear-cut, biological effect, it is a simple and good operating rule to take the lowest concentration needed as a guide. You may disregard certain properties which are evident only at levels above that level which can be tolerated for reasons of safety.

MODERATOR AHEARN: Thank you very much, Dr. McGee. There are two questions on the list which bear essentially on the same points and we will therefore discuss them jointly. They are:

1. "What is the liability of a manufacturer of a toxic chemical who sells it in bulk for packaging and resale by the purchaser under his own name or brand in the event of an injury to an ultimate consumer?" and,

2. "What liability does a company have for its product if an adequate warning label is placed on the container but the ultimate consumer either does not read the warning label or does not follow its instructions?"

I am going to call on Mr. Oviatt first.

MR. OVIATT: If the manufacturer adequately warns a reseller of the toxic nature of the material either on the label or otherwise and of the care that should be used in handling it, he is not liable if the reseller fails to put such warning on the package when he repackages it and sells it to the public. Of course, if a manufacturer should find out in any one of numerous ways that the reseller is failing to put the notice or the warning or any material part thereof on the packages, then he should call the reseller's attention to it. If the reseller persists in disregarding those warnings, then I believe that he should stop selling it to him for his own safety.

Of course, what should go on a label depends greatly on the class of trade to which any product is sold, the knowledge of the people who are going to use it, the chemical knowledge and results that might come from mishandling. So, you can't say a label has to bear thus and so for the entire general public. And that would also control to a certain extent, what should go on a label to a reseller. It is what knowledge he may have of the chemicals sold and what he should advise his purchasers as to the method of use.

MODERATOR AHEARN: Thank you very much, Mr. Oviatt. Mr. Baile.

MR. BAILE: I think in answering the first of the two questions, you have to make a distinction between chemicals which are toxic as a normal attribute of the chemical itself on the one hand, and on the other hand the chemical which is toxic as a result of some danger-creating defect that exists in the chemical which would normally be harmless.

Now, I think Mr. Oviatt's answer is primarily directed to the first class where you are dealing with the chemical which is naturally toxic. Under those circumstances, when the purchaser is given full knowledge of the toxic character of it and the dangers that are inherent, or the purchaser, without your telling him, has that knowledge, I don't think there is any liability on the part of the manufacturer.

However, where the toxic character of the chemical is created by some defect in the manufacturing process, then I think there is liability on the part of the manufacturer.

I don't think we are going to permit manufacturers to insulate their own carelessness in the manufacture of their product against consumers by the intervention of a middle man.

MR. OVIATT: Mr. Baile, after all, the question was what is the liability of the manufacturer of a toxic chemical. Now a chemical is either toxic or not toxic, is that right?

MR. BAILE: Not according to my friend at the beginning of the meeting.

MR. OVIATT: If a chemical becomes toxic because of the defect, that isn't the subject of our meeting today, is it? I thought we are just speaking of materials that are inherently toxic without any defect producing toxicity.

MODERATOR AHEARN: I believe it would be helpful to the audience, Mr. Baile, if we had more pointed discussion of the second half of this question, because it seems to me it is a question which most people in this audience are very much interested in. Will you point your remarks specifically to that question?

MR. BAILE: As Mr. Oviatt pointed out, the basic consideration in imposing liability upon a manufacturer of a chemical, which in its nature is toxic, is the obligation that is imposed upon him to disseminate the knowledge that he has of the dangers to the purchaser. Now, his only method of doing that in most instances is through labeling

the product with an appropriate warning, stating prohibitions against particular use and providing an antidote in the event harm is encountered. Having done that, there is not much more he can do.

If, therefore, he meets that requirement--puts an adequate warning on his product--the unwillingness of an ultimate user to take advantage of the knowledge that has been made available to him, either refusing to read it or failing to understand that which is clearly understandable does not create a liability. On the contrary, it constitutes on the part of the consumer, the party injured, a fault which would bar any right of recovery that he should have against a manufacturer.

MR. OVIATT: On the other hand, what you are really saying is that the manufacturer does not have to police his customers.

MR. BAILE: I think that is a fair statement.

MODERATOR AHEARN: I believe the audience appreciated that additional contribution from both of you.

By the way, I forgot to say in opening this meeting that at the request of the panel, I want to make it clear that the members of the panel are speaking only for themselves as individuals and are not to be regarded as committing their companies in any way. I think we may assume that they and their companies are fairly close together.

We will go on to the next question now: "In what way can the producer of a toxic substance aid in securing its safe use by education, research, and development of control measures?" Mr. Hatch.

MR. HATCH: We agreed in a preliminary panel meeting this morning that this question answers itself. The point is, how can we get the producer to recognize and accept his responsibility?

We have many examples in which the manufacturers of toxic substances have recognized and assumed responsibility in this respect, even to the extent of requiring the customer to show evidence in advance that he has made adequate provisions for the safe handling of the material before they will supply it to him.

I recall when I was with the New York Labor Department that one company which was producing and distributing a highly toxic material required every potential customer in New York to get the approval of the State for their proposed control. In the case of another toxic substance one of our large chemical companies has set up an elaborate program of education of the ultimate consumer of the material, in recognition of the very important fact that, without adequate safety measures, serious difficulties were bound to result.

I would like to turn to the last item: the development of control

measures. There is a particular responsibility and opportunity here on the part of the producer because, as I said earlier, the hazard can be magnified or minimized for a given toxic material by the manner in which the process equipment operates. It is the responsibility of the producer of such materials to take part in the development of safe-process equipment so that he will be in a position to advise his customer on the kind of equipment in which he is to use this toxic material.

MODERATOR AHEARN: Thank you, Ted. Dr. Bachman.

DR. BACHMAN: I can only add to Mr. Hatch's remarks by calling attention to an action one company is taking. They bring in the customer's employees who are going to use this material and give the employees of the customer a course in the handling of it. Now this, I think, is an excellent approach when you get to extremely hazardous conditions. I don't know of anything that you can do beyond that.

MODERATOR AHEARN: Now we come to two questions which the panel believes should be grouped together also: "What procedures should be followed to determine whether any of the plant personnel are abnormally sensitive to toxic materials. In conjunction with that: "How is a health problem to be anticipated? Recognized? Proved?" Dr. McGee.

DR. MCGEE: In general, there are certain principles which some of us feel should be followed.

In the first place, we must know as much as we can about the biological action of the material concerned. We like to know how it can affect the animal with which we are primarily concerned. There may be a species variation, such as the rabbit story Ted Hatch mentioned. The full story of biological action involves some understanding of the molecular structure; action at a cellular level; the details of the chemical, metabolic and other changes brought about in the body, to the extent that our research methods and our understanding of metabolism of the body allows us to define those things.

Secondly, from the standpoint of man, the worker, it is quite essential that we know who in the plant has a deviation from his optimum state of health, when, where and why. We are not able to recognize or anticipate a health problem unless we know what to look for, and actually do look periodically at this crucial and continuing experiment in which the worker is involved. To accomplish that, we must know what his situation healthwise is when he starts to work (before exposure) and at intervals thereafter.

I think a large number of organizations, in order to be careful

when using a new material, examine the worker at rather frequent intervals until they define for themselves:

1. That the average person does well under the circumstances and the control situation that exists at the plant; and
2. That in a sufficient experience they have not demonstrated an unusual sensitivity.

I refer not only to the entire group of allergies, but to some of the idiosyncrasies which are not too well understood.

A part of this recognition of a hazard involves other than basic knowledge, orientation and thinking about it day by day. A responsible individual reviews some of the possibilities which may be overlooked and checks and double checks to see if they are actually occurring. If you don't look, I will assure you that the experience of most of us is that you can miss them until they force themselves on you. By looking carefully for an untoward reaction you may find it earlier than otherwise.

MODERATOR AHEARN: Thank you. Now, Dr. Bachman.

DR. BACHMAN: Once again I am in a position of backup man with very little to say on the subject, because I think Dr. McGee has pretty much said what can be said. I do note that the point at which most of the conditions arise or appear is at the start of a new plant. I think it is only by following the points as made by Dr. McGee that one can discover or uncover the abnormal sensitivity of a person. The only thing that I know of that could be done is to remove the man from the action and pray that he doesn't get worse.

MODERATOR AHEARN: Thank you, Dr. Bachman. Mr. Hatch.

MR. HATCH: I would like to add to what Dr. McGee said. In addition to the continuing observations on the men for the purpose of identifying a problem area, it is equally essential that there be parallel studies on exposure. The ultimate purpose is to compare the one with the other. So don't forget that it is the two together, the man and the environment, that have to be studied continuously in order to reveal significant relationships.

With mechanization and automation the maintenance people in a plant become more and more important. There are more of them in proportion to production men and difficult problems arise with respect to them because their exposures are so varied and uncertain. Thus, systematic and continuing studies are even more important.

DR. ZAPP: I should like to comment on a suggestion that is frequently made; that is, why can't we detect the abnormally sensi-

tive individual by some sort of screening test? For dermatitis, for example, why not a patch test before he is put into contact with the suspected material on his job?

Generally speaking, we do not recommend this procedure. I believe one of the biggest scale attempts at this sort of thing was the testing of volunteers with mustard gas at the beginning of World War II. A great many were tested in an effort to determine individual variations in sensitivity. One consequence of this program was that some of the men were sensitized to mustard gas and therefore reacted abnormally whenever they came in contact with small concentrations. So, it is not a practical procedure to weed out the hypersensitive by a preliminary testing program if we are dealing with a sensitizer.

The other comment is that we can anticipate certain types of difficulty. For example, suppose we are dealing with a chemical that produces kidney injury. It would not be wise to expose a man who has only one kidney; he might very well be abnormally sensitive. And that brings up the importance of an adequate, preplacement medical examination and a classification of a man as fit or unfit for a certain type of exposure.

DR. McGEE: May I add one thing which I think is important? It is the absolute necessity of a critical attitude in tying down the diagnosis. I know of a few areas where it is more important to cross-examine a diagnosis and prove it to the extent that it is possible to prove it than in occupational disease. The very act of having a high index of suspicion when supervising an operation with a potential hazard sometimes leads to false diagnoses that can be troublesome.

I am reminded of the incident of the plant physician who was aware that a chemical could be a sensitizer of the skin and lead to a dermatitis. He showed me a case of a very stubborn dermatitis, stubborn because the man had been removed from the exposure for six months and still had the skin lesions. I was visiting the plant at the time. I had a hunch of a different diagnosis when I saw the man's lesions, partly because I was not expecting contact dermatitis, as was the plant physician who lives with the problem every day. I asked the patient if there were members of his family who had similar skin trouble. There were two members who had similar complaints. The diagnosis proved to be scabies for all three of the patients.

MODERATOR AHEARN: Thank you very much. We will go on to the next question. "Does the usual Products Liability Policy cover any and all liability that may be imposed upon a manufacturer for damages resulting from the use of his product?"

MR. BAILE: I think the answer to that question is obviously no.

First of all, it does not cover any liability in excess of limits that are provided in the policy. Second, it does not cover the liability that might be imposed upon a manufacturer for damage to the product itself. That liability is excluded in the normal policy. Third, most product liability policies are written on what is called "accident basis." They cover liability imposed upon the manufacturer for damages arising out of the use of a product, caused by accident. Accident is used there in the sense of some event which is identifiable in point of time and place of occurrence, as distinguished from adverse effects which are cumulative over a long period of time or over a great amount of space. For that reason, it is very important, and particularly when you are considering the exposure of a manufacturer to a liability resulting from toxic effects of the products, that you keep in mind that a policy which is written on the usual accident basis is not a satisfactory policy for your purposes. In that instance, you should be certain that your policy is written on what insurance men choose to call "occurrence basis," as distinguished from an "accident basis."

I think in one other instance the fact that it is on an accident basis is important, because that also is designed to exclude any coverage of the results of business decisions that might be made. It is pretty difficult to illustrate that in a case of products. I think it is more apparent in the case of general liability policies. You take the road contractor who has two methods of tearing up an area. One method is a little cheaper for him, but it involves exposing surrounding properties to damage by shaking or noise or something like that. The other method, which might cost him a little bit more money, would avoid that. With that knowledge, he proceeds to follow the less expensive method. That is a business decision the company has made.

MR. T. C. WATERS: May I ask one question as to that? Why do not insurance carriers write policies on a broader basis so they get beyond the concept of accidents?

MR. BAILE: I think to answer that question you have to start out with the premise that the insurance company, if it could, would be very happy to write policies on a completely broad basis. They would be very happy to insure the total liability of industry. To do that, of course, we would have to receive the total income of each company individually, which you would be unwilling to pay by way of premium. Therefore, it is the question of balancing the risk that you have been exposed to against what you are willing to pay for, not necessarily willing, but what you can reasonably pay for.

So it is a question of isolating those hazards which are most common to industry generally and covering them, and excluding the

specific hazards of a particular company or industry which are subjected to a much greater hazard than any other part of that industry or any other industry.

The second answer to the question, however, from the standpoint of products liability, is that the insurance industry in general will write the policy on an occurrence basis. What they are going to want to know in a particular industry is what are the hazards to which that company is exposed? And they will try to measure the rate that they charge in the light of those hazards. But, as an additional point, for the company that is exposed by virtue of the nature of its product to damage arising out of the toxic effects, it is most important that they should have their policies written on the occurrence basis. I think in the main it will be an insurable risk on an occurrence basis.

MODERATOR AHEARN: Dr. McGee.

DR. MCGEE: I disclaim any knowledge of product liability policies. As a physician, I would hope that no device or arbitrary factors would ever lessen the desirability and need for a manufacturer to know those things about his products which are reasonable and which he should determine prior to their use.

MODERATOR AHEARN: Thank you very much. The next question is: "Inasmuch as your industrial experience has been quite broad, what, based upon that experience, do you think constitutes the average corporate philosophy concerning management's responsibility for the safety and protection of its employees?" Dr. Bachman.

DR. BACHMAN: I think this is rather an interesting question, and, of course, can only be answered on the basis of one's own experience; and I think in arriving at any statement or any thought concerning what the average corporate philosophy is today, one must review what has happened over the course of one's lifetime. The general approach to safety 30 years ago was quite different from what it is today. The companies that were mostly interested in the safety of their men were, in a large measure, those companies where you had sort of a paternalistic feeling between the owners of the company and towards their men. I don't think there was much of a concerted effort for safety. Some, perhaps, but not too great.

Then as time went on and we grew, we have had a change in economic and sociological conditions. I think we have had management people, as a whole, become much more socially conscious towards their fellow man and conscious of their obligations to him over this 30-year period. That has created a great deal of difference in the approach to developing safety measures for employees.

In addition, I think managements over the years have recognized that safety is economically sound for a number of reasons. It has a very definite monetary value when you consider our competitive economy. Processes have grown more and more complicated; new products have appeared. This has caused the management to spend more money in order to build plants which inevitably have become complicated.

With the plants becoming more complicated and the production increasing, it has been very desirable for the management to see that they obtain the highest quality of work and the most skilled workers that they can. The skilled worker became a very intricate cog in the production wheel, and it was certainly most desirable to protect him in the best possible manner, to look out for his health and be sure that he worked safely. The loss through accidents or through some fatality would be serious, and, actually, mean a lot in dollars in production time and production effort. I think this social consciousness and these other two factors have gone a long way in improving our approach to better and safer working conditions. Furthermore, money has been saved, and this has been well recommended in the savings in the workmen's compensation fees.

Again, I think another factor that makes it worthwhile for management to have a very favorable attitude towards safety is that it increases and improves the morale of their workers, and I know in our organization we have a saying, "A safe plant is rather a happy plant." And usually, if you have a happy plant, you have your least difficulties and you get your best work.

From my own experience, I would say that whereas in bygone years when one approached expenditures for safety purposes, the question might be raised, "Is this necessary?", the attitude taken today by most corporate managements is, "Will this do good? If it is likely to do good, then put it in." I think this is rather characteristic in my experience.

MODERATOR AHEARN: Thank you very much. Mr. Oviatt.

MR. OVIATT: Dr. Bachman has pretty well covered the subject. I don't know that all those who were safety conscious 25 or 30 years ago were paternalistic, but there has been a definite change in philosophy. Twenty-five or thirty years ago there were small infirmaries that companies established with part-time medical personnel, and they sat back waiting for accidents to happen.

Now they try to prevent accidents. They go to great lengths and spend great sums of money to prevent accidents, and I think this is true of most of the large corporations. Every year large sums of

money are spent on fully-equipped hospitals in the plants and in the office buildings. They have periodical examinations made of their employees. They have safety programs and training programs for the supervisors in the plants.

All in all, industrial medicine has become a large part of the medical profession and a very important cog in an industrial organization. I know from experience that the presidents of some of the divisions of large corporations put up trophies to be competed for by the plants to see who can have the least lost-time accidents over a period.

While the accident statistics may not bear out the statements that have been made, nevertheless, there is that consciousness and a striving all the time for bettering their record; and I think the records over-all are being bettered every year. As long as employers are conscious of this safety and what it will gain, not only in a monetary way, but in a happy, well-knit organization, they are not going to let up just because they have arrived at some degree of safety. I feel that is the philosophy today.

MODERATOR AHEARN: Thank you. Now we will move on to another question: "Have there been recently substantial changes in the law respecting the liability of a manufacturer to one injured by his product?"

MR. BAILE: That term "recently" is a relative term. If I would treat it as meaning in this century, I would say yes, there have been what you might call substantial changes, a change in concept and a change in application of principle.

Prior to 1916, generally in this country, you would have heard the rule stated that a manufacturer has no liability for injuries resulting from the use of his product beyond persons who are in direct contractual relations with him. In 1916, by the famous decision of Justice Cardozo, that principle was finally broken down and in lieu of it was adopted the rule: if a manufacturer would recognize that a defectively made product of his involved an unreasonable risk of harm to remote users or persons in the vicinity of remote users, that then he was under duty to make it carefully and from that has grown the general principle now, that manufacturers are, in the main, liable for defects in their products or for hazards against which they can guard, even to those persons who have no contractual relationship with them.

Probably more important than that has been the change in the application of that rule. Needless to say, in any claim by remote users against a manufacturer, the problem of causation is a serious one. A

manufacturer may make his product at one place and it may travel through many hands over much territory and during a long period of time before it becomes a factor in somebody's injury. The problem is then to determine whether or not some activity on the part of the manufacturer was the cause of that injury. In the main, in the past years our courts required rather specific proof of casual relationship. If there has been a major change of our law, it is the tendency of our courts—and I am one of those who thinks it is a very undesirable and unfortunate tendency—to accept what I call hypothetical or questionable proof of relationship between cause and injury. I think those two main changes that have occurred have been very substantial changes and have greatly broadened the scope of the liability of the manufacturer.

MR. OVIATT: I have very little to add. The concepts of non-contractual relationship has been broadened the last few years. I think the courts are inclined to stretch that doctrine perhaps sometimes a little too far, but that old doctrine of *McPherson vs. Buick Company* has opened a new thought on this question of liability, which I think is all right as long as they don't take it too far.

MODERATOR AHEARN: Thank you very much. Now, we will go on to the next question: "What are the possibilities of changing process equipment or methods of manufacture or use of a toxic material in order to reduce the potential hazard?"

MR. HATCH: I should like to speak at great length on this point, but we don't have the time. It is a very important point. There are great possibilities for changing a situation from one of great danger to one of relatively little danger through the proper design or choice of process equipment. I don't know of anything more frustrating than to work on a plant problem and to realize, while wrestling with it, that it should never have existed in the first place. Somebody along the line failed to give proper attention to the selection of the right kind of equipment so as to avoid the problem. I feel that the industrial hygienists who, up to now, have been largely concerned with hazard control though application of ventilation and other such secondary measures must, in the future, give greater consideration to redesign of the process equipment itself for purposes of hazard control.

There are endless numbers of examples of the creation of an unnecessary problem because of the failure of designers of process equipment to incorporate into their initial thinking questions of hazard and to accept from the outset a responsibility to minimize the poten-

tial hazard which is on a par with the responsibility they assume for the operation of the process itself.

DR. ZAPP: I would certainly agree with everything that Ted Hatch has said. I notice that this question really concerns three things: possibilities of changing process equipment, methods of manufacture, and use of toxic material.

I am sure that we could think of examples of all three. Ted has spoken of changing process equipment of one sort or the other. Then, the manufacturer may sometimes be able to substitute a less toxic material. As far as the hazard of use is concerned, I can think of some examples. I think it is almost a truism that we can control any toxic hazard if we are willing to go to the trouble to do it. Now, sometimes economics is a decisive factor there. That is, if you have to take extensive measures to control a hazard, it may not be economically feasible to do it.

MODERATOR AHEARN: Thank you, Dr. Zapp. Next question: "Can one distinguish between health impairment resulting from effects of handling toxic material and that resulting from fear (anxiety states) of effects from handling such materials?" Dr. McGee.

DR. McGEE: I think the answer is "yes" for certain materials and "no" for others. If a satisfactory differential diagnosis is to be made, there are two requirements. First, there must be some objective test which is specific for the effects of the material. By that I mean, by reliable chemical analysis. Second, there must be the ability to rule out a similar effect from anything else with which the worker may have come in contact inside or outside the plant. In other words, we must be able to say that a specific health impairment resulted from the material in question and under circumstances where we can rule out other possible factors producing that end result.

An example is the anticholinesterase effects of certain phosphorus-containing insecticides. You have an objective test, in most instances you have the opportunity to rule out other exposures which could alter significantly the level of cholinesterase in the blood:

There is another field, however, of materials whose effects are signs and symptoms which are rather vague. I feel the clinician cannot be sure whether such illness is a result of actual exposure to a material which is known to give such vague symptoms in the early stages. Butterflies in the stomach, problems of sleeping, malaise and the like are symptoms found frequently in the man who has an anxiety state. Sometimes the recognition that the exposure is insufficient to produce the diseased state gives us a reasonably good clue that an anxiety is responsible.

I think all the physicians present here will recall in their experiences examples of epidemics of anxiety in groups of people because one or more workers felt that he had developed illness from a particular exposure. He talked about it and others soon felt they had the same symptoms. In some instances we have sufficient control of the environment to know exactly what were the possibilities of exposure and to say that it is impossible, under the amount of exposure for the episode to be a bona fide exposure with resulting illness. Therefore, the entire thing must be on a psychosomatic basis.

MODERATOR AHEARN: Now, we will go to another question: "How adequate are animal experiments as a means of predicting toxicity for human beings?"

DR. ZAPP: If we are trying to predict effects on the human being, then the human being himself would be the ideal experimental animal. We can't use man as an experimental animal, and, therefore, we must accept other species as an imperfect substitute.

Now, perhaps the soundest basis for predicting the effects on man from the effects on animals is that our internal anatomy and physiology are rather similar. If we are dealing with a chemical that produces liver damage in dogs and other animals, then we can be fairly sure that it will produce liver damage in man. We cannot be too sure about the quantitative relationship. There are differences in species of susceptibility.

Now, with all that, with the recognition that animal experimentation is an imperfect substitute, I think we can look with some satisfaction at results that we have obtained in predicting effects on man through animal experiments over the past 100 years. We have certainly learned a lot from the animals, and we have, with the use of perhaps arbitrary factors of safety, been guided by those results in setting up criteria for safe practices with respect to man.

By and large, we have been successful. There are exceptions. There are materials that affect man in ways that we cannot reproduce in any experimental animal, but they are, fortunately, rather rare.

MR. HATCH: I like the emphasis Dr. Zapp put on the quantitative aspects. For obvious reasons, it is not possible to translate the findings on animals for direct application to man.

How adequate are animal experiments? In some cases they are highly adequate and in some other cases they haven't been adequate. Certainly, none of us want to go away from here with the idea that the experimental animal can give us all the answers, but they have given us information of enormous value. So, there is no question that the animal plays an important part in the study of toxic agents.

MODERATOR AHEARN: We have arrived at the moment when we would welcome questions or statements from the floor. If anyone has a question to ask about any phase of the discussion of the panel, I would welcome his getting up and giving his name and asking his question or making his suggestion.

DR. ANNA M. BAETJER, Johns-Hopkins University: I know that the time is very limited, and we have not had time to cover all the questions. I would particularly like the panel to discuss two phases: one, the three questions that deal with the labeling laws and the importance of these; and two, how can the consumer determine the composition of toxic materials sold under trade names?

MODERATOR AHEARN: As a matter of fact, we had grouped those three together. Dr. McGee, will you take off on those questions?

DR. MCGEE: How can consumers determine the composition of toxic materials sold under trade names? Sometimes it is almost impossible to do so. From the standpoint of a practicing physician treating acute poisoning, such information comes in too late for him to help his patient. His problem is that of taking a trade name and trying to find out what it means. He gets a chemical identity as the first step, and he still doesn't know what the material is in a pharmacologic sense. He has to have that material classified in a pharmacologic or toxicologic sense for the information to be of any help to him. If he doesn't know something of the biologic properties of the material, if he doesn't know the site of action, he will have no basis for intelligent therapy. Too frequently, in our present setup, that information comes to him a little late to be in the best interests of the patient. The labels are not big enough to contain all of this information which might be required by the physician. There are in some packages inserts of descriptive material which can be of use to him in some instances.

I think, frankly, we must improve techniques for getting the information that is required to the customer, and in turn, to his physician where there has been an accident and resulting illness. Poison control information centers may help.

MODERATOR AHEARN: Thank you very much. Dr. Bachman, you are a chemical engineer. I believe everybody would like to hear your specific answers to the question of whether a manufacturer of toxic materials can be compelled to follow labeling restrictions and cautions as recommended by the Manufacturing Chemists' Association. Also, we would like to have your comments on the current status of efforts by a number of organizations, such as the Manu-

facturing Chemists' Association, to develop adequate labeling and to standardize labeling.

DR. BACHMAN: I don't believe the Manufacturing Chemists' Association has any authority. My answer to that is no, I don't believe manufacturers can be compelled to follow the recommendations of the Manufacturing Chemists' Association. On the other hand, I think it is highly desirable that they cooperate to the maximum degree possible, and I think the great majority of the manufacturers do attempt to do this because most of them are members of the Manufacturing Chemists' Association.

Now, as to the current status of these efforts, that is perhaps one of the most active committees in the Manufacturing Chemists' Association. In many cases, it has formulated codes and labels to be used, which I believe are being used.

Of course, I think the crux of the whole question here is for such organizations as the Manufacturing Chemists' Association, The American Medical Association, and the chemical specialty people to get together and try to formulate a coordinated policy on labeling. We are always going to have difficulties if you have several approaches to labeling. I think we must have a unified approach or, if it is broken down into compartments, these compartments must all originate from the same source. That is, they must originate from the same authority, be that authority one that results because people work together or one that is enforced by virtue of government action.

MODERATOR AHEARN: There are a number of associations, including the Manufacturing Chemists' Association, busy in this field. I believe the American Medical Association is equally active.

It seems to me, Dr. Zapp, I should ask you to devote yourself specifically to the question, "How can consumers determine the composition of toxic materials sold under trade names?"

DR. ZAPP: Before I answer that, Mr. Ahearn, I would like to make one comment on the current status of the work of these various associations. The Manufacturing Chemists' Association, through their Precautionary Committee, the Chemical Specialties Manufacturing Association, and the American Medical Association have agreed that they will work together towards wording of some uniform labeling law or at least a set of principles that will guide these various associations. The U.S.M.A. group is now meeting in Philadelphia on this very same subject. That is the current status as far as I know.

With respect to Question 21, I think that all three of the agencies I have just mentioned, the Manufacturing Chemists' Association,

C.S.M.A., and A.M.A. agree that there should be more information on product labels than there is at the present time. I believe with respect to the industrial uses of chemicals, that industry is fairly well satisfied with M.C.A.'s principles of labeling as expressed in its *Manual of Warning Labels*, with which I presume all of you are familiar. However, when it comes to the consumer, and particularly the user of small packages of cleaning powder or toothpaste or cement or what have you, it is agreed that there should be more information on the label so that the user will have some idea of the active ingredients and some idea of the hazards involved in an accidental exposure to material.

One of the most frequent inquiries I suppose that we get in the du Pont Company is, what happens if a child swallows a little du Pont cement? It was never intended for that purpose, of course, but the question is, what happens? Fortunately, the answer to that is, "practically nothing, don't worry about it"; but that's the thing that the person needs to be reassured about. The physicians, on the other hand, would like to see on the label the kind of information that would enable them to treat cases of accidental exposure. Now, with all the good will in the world on the part of these organizations, there are still many practical difficulties involved in formulating a set of labeling principles that will do the job to everyone's satisfaction.

The householder really wants to know how to keep out of trouble and avoid calling the M.D.'s. And so it goes.

Now, I think that something is going to be done, and out of all this activity there will be more product information on the labels. Meanwhile, we have the resources that Dr. McGee told us about, the poison control centers. There are one or two compilations that give us a good deal of information about the trade name products, and Dr. Hodge of the University of Rochester is coming out with an encyclopedia which will give more information of that type. But, ultimately, the manufacturer is the best source of information if you need it. In most of these cases where information is needed in a hurry, I think it can be best obtained by getting in touch with the manufacturer or his branch office.

**MODERATOR AHEARN:** Thank you, Dr. Zapp. Mr. Baile, I believe to complete the discussion, you ought to answer this question: "Are present labeling laws adequate with respect to requiring warning and preventive measures as to toxic qualities?"

**MR. BAILE:** I think there we first have to define the sense in which we are using the term adequate. If we use the word in the sense that compliance assures immunity from liability for the manu-

facturer, our answer would be one thing; and on the other hand, if we mean by adequate in the sense of sufficient requirements and enforcement to protect the public from injury, I think there is a different answer.

From the first standpoint, labeling laws as such do not give immunity from liability to a manufacturer by mere compliance with the labeling law. The common law itself imposes a duty upon the manufacturer to bring to the attention of the users of his product and people who are in the vicinity of its use, the dangers which are inherent in its use or may flow from it. He must comply with that standard.

Considering it from the second standpoint—of the adequacy of the laws to protect the public from injury—I think we have to say that the laws as such are inadequate. I am also one of those who has the view that the laws will always be inadequate, because I think there is necessarily a lag between technology and its development, and the ability of legislators to act.

For that reason, I have always felt that effective labeling legislation should be broad and general in its terms and depend for effectiveness upon detailed and limited regulations issued pursuant to that broad general statute. I think when this is done, we are then able to more quickly adopt regulations to changing conditions and to more effectively enable industry to comply, because they can be more specific and thus more clearly understood.

As you know, the number of labeling statutes that exist today are bad. Even the person who confines his attention to that subject and nothing else, and there are few people who do, not only has three or four federal statutes with which he must deal, but there are some 28 separate state statutes, and then there is a multitude of local ordinances that have other effects upon us. They have many advantages from the standpoint of imposing criminal liability. In all instances, however, they are not effective in enabling authorities to take out of the market the products that do not meet the requirements of those statutes, and needless to say, the only way that you can really effectively prevent harm from substances that are improperly in the market is to exclude them from the market by confiscation.

Mr. Ahearn, I would say by way of summary that, yes, our labeling laws are inadequate. They need to be changed and I am hopeful they will be.

**MR. WATERS:** I think the audience would be interested in the question of whether industries should tell their employees that the material they are handling is toxic or carcinogenic.

MODERATOR AHEARN: I think we decided to group that question with the question, "Should information on the presence of toxic exposures in industry, obtained by health departments, be given to labor unions and employees or only to management?" Dr. McGee.

DR. MCGEE: In answer to the first question, I have found no way to conduct a program which will get the cooperation of the employees without giving them the reasons for it. These people are entitled to it.

I think the only successful programs that I have observed elsewhere, outside of our organization, are those in which the employee has some knowledge of why he follows certain operating procedures regardless of what the end effect is of the material or the end effect might be in the materials that he handles. Therefore, I would say that we must give the employee that knowledge so that he can understand and use it in coming to a conclusion as to why he must do certain things to protect himself. I think the same statements apply to organized groups and safety committees and union leaders.

MODERATOR AHEARN: You draw no distinction as to information made available?

DR. MCGEE: That's right.

FLOOR SPEAKER: It is required in Ohio to tell the employees of the toxic material in the department and it is required to repeat it to them monthly.

MODERATOR AHEARN: Thank you very much.

MANFRED BOWDITCH, Lead Industries Association: I think there were two important matters not covered in the discussion of labeling. First of all, Dr. McGee said that very frequently the nature of the toxic substances gets to the doctor too late. I wonder if he is aware of the fact that the American Academy of Pediatrics has now established over 30 poison control centers from coast to coast. There are 15 in the State of Florida alone. All of them are manned by telephone 24 hours a day. All are in charge of a physician, and at a meeting only day before yesterday it was agreed that the Public Health Service will be asked to take over the national direction of these centers and see that current information is supplied to all of them. I really think that this is of importance. With regard to the matter of warning labels, there is a body of laws known as the Pharmacy Laws, which were designed to protect the public in purchases over drug store counters. In a court in one of the southern states recently, one of these laws was interpreted to cover a shipment of litharge in industry and an award of \$18,000 was made on that

basis, and at the present time I understand that further suits amounting to \$80,000 are before the courts. I am told that only about half a dozen of the states have adequate exemptions to prevent such misinterpretations. Only about three weeks ago I discussed this with representatives of the Manufacturing Chemists' Association, and it is my understanding that they will take steps to try to bring proper exemptions into the laws of the other states.

MR. T. J. LANIGAN, General Electric Company: I would like to hear discussion on the question: "How is it best possible to maintain a continuing safety awareness among employees engaged in hazardous occupations involving the use of toxic materials?"

MR. HATCH: To have an effective safety program the people who are attempting to do this must maintain among themselves an awareness of safety needs that is stronger than the safety awareness of the employees. I have no particular procedure to suggest since I have had no special experience in developing and maintaining such awareness. I do know from experience, however, that there is great risk if such awareness is not maintained and developed on the part of everybody concerned. We have all seen good programs break down because of lack of maintenance of awareness.

MODERATOR AHEARN: Dr. Zapp, would you comment?

DR. ZAPP: I will only add to what Ted Hatch has said. I think the promotion of the continual awareness of the safety program among employees is a responsibility of supervision. Supervisors will only do it if they know that higher management wants them to do it. Now, when safety policy is set at the top level of company management and is passed on down through the various supervisory channels to the employees, then I believe the program can be maintained adequately, and the employees will have a continuing awareness of the program. If the foreman goes around an area without wearing a mask where a mask is required or without wearing safety glasses in an area where safety glasses are required, obviously, by his example, he is going to undermine the whole program. If, on the other hand, he goes in with a mask on or goes in with safety glasses on and insists that others do likewise, he has a good chance of enforcing the rules and maintaining the continued awareness that this question speaks of.

MODERATOR AHEARN: Thank you, Mr. Baile, you are the general counsel of an insurance company. It seems to me you are the panelist to answer these two questions: "What methods are available to insurance carriers to assist their insureds in the protection of employees and the purchasing public from the hazards of toxic ma-

terials?" and, "What methods are available to insurance carriers to assist small industries in the detection and control of hazardous conditions?"

MR. BAILE: I think those questions are primarily directed to the insurance carriers' place in contributing towards the reduction of accidents in industry, either among the employees or in users of the product or in third parties who might be otherwise affected by the activity of the employees of an industry. I think that it can probably come under eight points:

First is the function that Dr. Zapp has already mentioned, that is, through the sale of the insurance there is brought to the attention of top management the importance of the safety program. It has a very direct influence on the amount of costs, a very substantial item in the cost of any industry. By bringing that to bear on the top management, you get the influence which Dr. Zapp suggested, which is so necessary, of that philosophy going down through the various echelons of the company.

Also, I think it is that very force that brought about the changes in the philosophy of industry that we referred to earlier. I think the safety awareness of industry has been, to a great extent, brought about by the influence of the salesmanship, if you will, of the insurance industry. But in a more practical sense, the insurance industry contributes through its engineering facilities and its suggestions and participation in the development of safety programs in any industry. This consists of arranging and conducting safety meetings, distributing the proper type of literature, and the proper type of postings. Secondly, by its own engineering, it supplements the safety program of a company in ascertaining where the hazards in that industry exists. And in doing so, it approaches it, I think, with a greater objectivity, because it is uninfluenced by those unconscious influences which company people are subject to, such as the costs of changing a process, the reduction in time, or the increase in time which some change of process to incorporate a safety factor would involve.

Another way in which they can contribute is in the preparation of a catastrophe plan for specific hazards. Insurance carriers can aid in the development of drills so that companies are prepared in the event those catastrophes occur.

Another manner in which they aid is in the supplying of information for the preparation and distribution of safety material. The insurance industry acquires the collective knowledge of many industries and can bring that knowledge to the aid of a particular company.

The insurance carrier also aids in the preparation of purchasing

agent manuals, which is a method of coordinating the receipt of toxic materials into a plant, so that knowledge comes to the attention of the production personnel of the nature of the product that is being brought in, in order that proper safety precautions can be taken.

Finally, I think the contribution that the insurance carrier can make is to maintain the awareness of safety. I think the great difficulty that occurs in many industries is that you develop a program to avoid accidents and prevent accidents. It has a peak, and then it tends to slacken off. Every once in awhile it needs to be rejuvenated. I think the fact that the engineers of the insurance carrier and its staff come in regularly and constantly bring safety to the attention of the people at the production level helps establish the habit of safety and it is that habit which in the long run will prevent many accidents.

MODERATOR AHEARN: On that same point, will you elaborate on methods available to insurance carriers to assist small industries?

MR. BAILE: I might say this: I think there is a distinction that should be drawn there. In some industries, because of their size, they are able to employ the technical talent which is required in effecting a sound safety program; whereas in other industries, because of the small number of employees they are not able to have people who will specialize in those particular problems. In that instance, the insurance carriers become another arm of the company and supply it with technical talent which it doesn't have available within its own personnel.

MR. OVIATT: Mr. Baile, isn't it true that the insurance companies look to the larger manufacturers many times to get information on these toxic materials, on the processes that are used and the safety devices that may be necessary?

MR. BAILE: Very much so.

MR. OVIATT: And then they can impart that knowledge to the smaller companies that are not in a position to hire these highly trained experts?

MR. BAILE: I would say that is definitely true.

MR. OVIATT: There is also another way—I think you will bear me out on this—that insurance companies have been helpful. That is in making counts—fume counts, petrographic analyses, and so forth. They go into the plants to make these and make their recommendations.

MR. BAILE: Yes, that is right.

MR. OVIATT: I would like to add just one word if I may to the earlier question on efforts to develop adequate labeling and to standardize labeling. Those on the panel who spoke to that question failed, I think, to mention the fact that the Manufacturing Chemists' Association at present has a law, a proposed federal law for labeling and for the far more important matter of confiscation. You can have criminal statutes all over the place, but throwing a man in jail or fining him \$10,000 will not save the life of someone using a chemical that is not properly labeled. I think this confiscation feature is all-important. This new law that M.C.A. proposes does take care of that adequately as to the defining of what a poison is and setting forth tests for determining a poison.

Now, what will become of that law, no one knows. That is the present status of the M.C.A.'s efforts.

MODERATOR AHEARN: Thank you.

DR. BACHMAN: I would like to comment in reference to earlier questions. To maintain safety awareness you must say that a company has to tell its employees what the nature of the materials is which they are handling, whether they are toxic or carcinogenic, because you can never have a safety program unless you give the people working with toxic or carcinogenic materials such information. I don't think that was adequately emphasized before.

I think as far as the question of the most economical and best way a small plant can get help on problems of toxicity and industrial hygiene, the obvious answer is a good consultant. I don't know if there is enough consulting work done in a continuous manner with the different smaller companies.

DR. THOMAS L. SHIPMAN, Los Alamos Scientific Laboratory: I would like to have this question discussed: "If a manufacturer conforms to the highest standards of an industry in the manufacture of his product, will that be a complete defense in an action against him for injuries resulting from his product?" In placing this question before the panel, I would like to remind them of the experience of some of the electrical product manufacturers and their difficulties with beryllium.

MODERATOR AHEARN: Mr. Oviatt, let me ask you to answer that question.

MR. OVIATT: I think that can be categorically answered as "no." There have been cases where a court has held that even though the standards of the industry have been followed, the highest standards, that under the circumstances those standards weren't high

enough. Each individual manufacturer must assess his own product and go beyond, under certain circumstances, the standards set by the industry. That is so even though labeling laws are followed.

MODERATOR AHEARN: Mr. Baile, would you care to add something to that answer?

MR. BAILE: By way of addition: The responsibility of the manufacturer is essentially one to conform with the standard of care that the law imposes. Now, that standard may be imposed either by statute, by judicial decision or by what is probably a pretty vague standard, namely, the standard of care of a reasonable man acting under those circumstances.

Now, in determining whether that third standard has been met, a court or jury should take into consideration what the practices and standards of an industry are, but they are only a measure for the fact-finder to use and are not binding upon them. In other words, the widespread adoption of a particular method or practice will be a test for determining whether or not reasonable care was used. But the courts have said that 12 lay people, who don't know a thing about the business, can say you could have used more care. I can't believe that reasonable care can be any more than an industry would use, because I don't think industry would ever adopt, as a widespread practice, a careless practice if there were a safe one. The court seems to think that 12 jurors can say they can.

I might say, whenever I have been confronted with that problem, I have always remembered the one judge who said the only reasonable man he ever knew was his wife's first husband.

MR. SCHWENZFEIR, JR., Brush Beryllium Company: I would like to have the expression of the panel on the distinction in labeling procedure between what is required for a retail product and what is required for industrial products. It has been inferred that it is not particularly important to exercise greater care in labeling if the product is to be handled in commercial use, though it may be in retail.

It is implied in another question that the manufacturer of the toxic material can pass the responsibility on to the corporate purchaser, who, in turn, passes the hazard on to his employer. I wonder if that is really correct.

MR. BAILE: If I understand your question, it is this: Whether a manufacturer has a duty with respect to giving warnings as to the attributes of the product to the ultimate consumers where he sells, let's say, to a middle purchaser who repackages it--or something like that?

MR. SCHWENZFEIR, JR.: No, intermittent handler is another production concern, like this bulk packaging that was in one of the earlier questions of the program.

MR. BAILE: Your question, then, concerns the liability of the manufacturer who distributes in bulk to people who handle that product in transportation and who are employees of the purchaser who use it in some manufacturing process?

MR. SCHWENZFEIR, JR.: Right.

MR. BAILE: I would say by way of answering that, first of all, I.C.C. regulations, of course, control to a large degree the requirements of labeling in transportation. Now, they are designed primarily for the protection of employees who are handling it in transportation, and, of course, conformance with that is required and if there is a lack of conformance and injury results to employees of carriers who are transporting it, liability would be imposed.

From the standpoint of the employees of the purchaser of the product, the problem there, as I see it, is this: The law imposes upon the manufacturer the obligation to give warning, reasonably calculated to call to the attention of the users or potential users of the product the hazards that are apparent in that product.

Now, notice, it is a duty of reasonableness that is imposed upon them. It would be an utter impossibility for the manufacturer of carbon tetrachloride, let's say, to go to every employee in every manufacturing plant that uses that and inform them as to the hazards that are involved in the use of it. So, the law recognizes, under those circumstances, that if the manufacturer brings to the attention of the purchaser whose employees are going to use it, the hazards of that product, or if the purchaser without having it brought to his attention is aware of the hazards of that product, then there is no obligation on the part of the manufacturer to inform them, because the law never requires a man to do a vain act. You don't have to tell somebody the dangers in a product when he already knows them. Then the law imposes upon that employer the duty of providing his employees with a safe place to work and of passing on knowledge of hazards to the employees so the employee can take such action and exercise such care as is necessary for his own protection.

Does that answer the question or am I still missing it.

MR. SCHWENZFEIR, JR.: That's it. Thank you.

MODERATOR AHEARN: Now, is there another question from the floor?

MR. W. W. HODGE, Koppers Company, Inc.: I would like to hear discussion on the question of how industry can best work with governmental groups in order to be certain that regulations for the control of hazardous materials are proper and reasonable.

MODERATOR AHEARN: Mr. Hatch, we had assigned you to answer that question.

MR. HATCH: I am not certain what the framer of this question had in mind—obviously, there are many different answers to it.

Industry, presumably, does have a large volume of information that can be best utilized by working with governmental agencies in order that the proper regulations be formulated. I have in mind one very specific way in which industry is working with an official agency to make sure of proper regulations, and that is in the State of New York, where under the procedures for developing or regulating codes for industry, it is required that an advisory committee be formulated, including representatives from the industries directly involved, those who supply equipment to be used in industry, representatives from labor unions, and so on.

Now, I think the important point here is this: in the very framing of this procedure, recognition is given to the fact that the problem pertaining to the use of a particular toxic substance in one particular industry may be different from the problem that arises in the use of that same toxic substance in some other industry, and that to be reasonable regulations must recognize this. Regulations developed from this point of view are distinguished, for example, from a general regulation which consists principally of a list of permissible concentrations. Take carbon monoxide, for example; adequate regulations for control of this hazardous gas should be different from regulations governing its control in steel mills.

This is recognized in the New York procedure, and provisions are made for the active participation in formulation of industry codes by those people from the industries who do have needed information and experience. Obviously, to be objective, it must be agreed by all those who do participate that the purpose is to come out with a regulation which will, in fact, prevent ill health or accidents.

We had in this room not long ago a public meeting which had the same purpose here in Pennsylvania. Prior to the official adoption of regulations pertaining to a certain industrial hazard, people from the industries who could bring important information and experience to bear on the problem were invited to attend and contribute suggestions which would make the final code more effective. I believe that the industries that do have this information should welcome and, indeed,

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