AIR HYGIENE FOUNDATION FALL MEETING

Approximately 250 persons, including industrial leaders, technical specialists, governmental officials, physicians, and engineers, attended the Fall meeting of the Air Hygiene Foundation at Mellon Institute, Pittsburgh, Pa., on November 30, 1937. The assembly heard reports by the Foundation's Medical, Engineering, and Legal Committees on recent advances toward the control of occupational disease and on current developments in the field of industrial health.

H. B. Meller, Managing Director, announced that the Foundation has arranged for scientific investigations at the Saranac Laboratory, the University of Pennsylvania, and the Harvard School of Public Health. He said that more than 190 companies are now affiliated with the organization, a nonprofit, industry-wide movement, supporting coördinated research to combat air-borne industrial disease.

Social Values

Willard T. Chevalier, New York, N. Y., in a nontechnical address to executives, said the meeting indicated industry's recognition of "social values as a very definite concern of its stewardship.

"It is necessary for industry to think not only of how much it costs to get a day's work out of a worker, but also how long a useful life will that worker have, what kind of health will he enjoy, what kind of consumer will he make for the goods and services produced by other industries.

"Look beyond today's cost sheets," he urged, asserting that the assumption of greater social responsibility on the part of industry, toward the worker and toward the community, is the best antidote for trends toward collectivism and community interference in business.

Colonel Chevalier, Vice-President of the McGraw-Hill Publishing Company, recalled that after the passage of the Workmen's Compensation Laws, industry set out to eliminate accidents. Safety engineering, a new branch of science, was developed. The accident rate was sharply reduced. Similar forceful cooperation and united action was advocated by other speakers as the effective way to combat occupational diseases now being made compensable in many states.

New York Code

Philip Drinker of Harvard University, Chairman of the Foundation's Preventive Engineering Committee, reported that "one of the most significant developments in the field of occupational hygiene during the past year has been the adoption of the New York State Code governing dustiness in rock drilling.

"This code divides all rock formations into two classes: class I, those with less than 10% free silica, by weight, and class II, those with more than 10% free silica. If drilling is done in class I rock, dust counts must be below 100 million per cubic foot, and if the rock falls in class II, below 10 million particles.

"This means, in effect, that dry drilling can be used only with local exhausts and adequate air cleaning. It happens, also, that wet drilling without ventilation will not achieve adequate air cleanliness in the case of the high quartz or class II rock.

"At this writing, it seems likely that other states will copy this code almost verbatim. After all: New York adopted it as the result of extensive investigation and hearings, and it is unlikely that other states will assemble better information on which to base their codes. It is probable that substantially this same code will be adopted for dust exposures of all kinds. If so, it will mean that the upper limit of dustiness in any kind of work and in any kind of dust will be 100 million particles per cubic foot."

Medical Report

A. J. Lanza, Chairman of the Foundation's Medical Committee, stated that a great deal of work is being done and that there is a clearer understanding of the problems of industrial hygiene.

"Various tests are coming to the fore in the effort to determine the presence of possible occupational illnesses. Briefly, there has been developed a fairly accurate test to determine whether the individual is being exposed to dangerous quantities of benzol, known as the 'urine sulfate test.' Skin tests for allergic reactions among workers exposed to various substances are being developed more and more. Blood tests, particularly those of the nature which depend upon the differential counts of blood corpuscles, are becoming more and more important and more widely used. Research work is still being done in the effort to develop means of detecting the degree of impairment in pulmonary dust diseases, an important phase, of course, of the compensation question.

"A group of hazards that has been attracting a great deal of attention, particularly in the last year, is that large number of chemical substances that are grouped under the name of solvents. The Massachusetts Department of Labor and Industry, I understand, is about to develop a rather comprehensive list of permissible concentrations in the atmosphere of working places of these various substances that are grouped loosely under the head of solvents.

"So this question is a live one. It is growing in importance because the manufacture of chemicals in this country is on the increase and has been ever since the war conditions put an end to the importation of German chemicals and developed the chemical industry in this country."

Discussing the effects of various dusts upon the health of workmen, Dr. Lanza said there is evidence that combinations of dusts "act differently from any of those dusts when inhaled by themselves." That opens quite a field for speculation. The same thing has been observed, for instance, with gases.

Hydrogen-Sulfide Danger and Cancer

M. R. Mayers, of the New York Division of Industrial Hygiene, for instance, has shown that carbon monoxide when inhaled in combination with hydrogen sulfide is more dangerous than either carbon monoxide or hydrogen sulfide when inhaled alone.

"There is also a growing interest in the subject of cancer as a possible result or as possibly being associated with industrial hazards. With respect to dust inhalation, all the evidence is negative; that there is no particular relationship between the inhalation of dust and the incidence of cancer. Other forms of irritants, such as gases, fumes, etc., may have some such effect. That topic is a live one and is being investigated, as is also the possibility that fun-

angerous particle sizes between the limits

ly tolerate a continuous exposure to pure
les (less than 10 microns) per cubic foot
studies have failed to reveal evidence of
ncentration regardless of extent of the

hazard we first must determine the per-
consideration. One procedure commonly
tions from samples of settled dust. That
edges or wherever you can find enough to
ion of the content of actual atmospheric
d at or near the breathing levels in the
re testing a dust, you want samples of the
or and dust bag is an excellent device for
ermining the full silica content of a dust
methods. The chemical method may be
lts.
ent of the dust it then becomes necessary
f particles of 10 microns and under per
l here that trapping and counting of dust
ique of the U. S. Public Health Service.
e accepted, comparative data in the United
is technique. It would be obviously
ts made under dark field illumina-
[redacted]. The 3-million particle concentra-
a count. There are dust counting devices
ecks to see if there is any wide fluctuation
the initial, basic determination follow the
ervice.

ns supposing you find that five per cent of
u you have a concentration of 200 million
al assumption would be that you exceeded
zard would be present. This may or may
d of dust present with the silica particles.
appeared to be a dangerous silica exposure
30 or 35 million particles per cubic foot
nce gave no evidence that the silica was
s. Microscopic examination showed that
etely coated with clay. Investigators have
influence and probably inhibits the action

dusts into three general divisions. First,
y carried away and disposed of without
nert, that is dust which remains inactive
reaction; and third, proliferative, such as
and causes trouble. It is definitely known
dust react differently, one type modifying
, we have calcium which apparently exerts
fect of pure silica when the two are intro-
e X-ray pictures of the lungs of individuals
ica and those exposed to mixtures of silica
ent characteristics. Always, however, the

free silica is the harmful ingredient. If free silica is not present even extremely high concentrations of dust will not produce silicosis or any other damaging lung condition. There has been a tendency to call a concentration of 200 million particles of non-siliceous dust under 10 microns per cubic foot of air dangerous to health. This concentration has not been proved to be a hazard by clinical and experimental evidence and therefore there is no justification for its control on medical grounds. Any attempt to do so is to imply a health hazard and thus to create an unwarranted fear on the part of those who may be exposed.

If I may be permitted to refer to the types of dust with which I am most familiar with actual experience, let me point out that in very careful and scientific studies in the cement industry we have been unable to find the slightest iota of evidence that long exposure to high concentrations of cement dust has caused any type or kind of lung damage or damage to the respiratory tract.

It may be interesting in passing to briefly enumerate the things that the cement industry has done in an honest effort to determine whether or not cement plant dust was or is in any way harmful. Dust counts and dust analyses have been made in many mills in various locations. The workers in these mills have undergone a rigid physical examination with stereoscopic chest X-rays. In the mills thus far studied 70 per cent of the employes are over 30 years of age and 33 per cent of the total of all employes examined have been employed in the cement industry more than 15 years with individual periods of service ranging up to 45 years. It is inconceivable to believe on the basis of these clinical and X-ray findings that any possible health hazard could exist without being discovered. Yet in the face of this evidence and in the face of evidence from similar surveys of other industries, there are those who still maintain that dust per se is harmful. The investigations were carried on by an outside agency. The industry had nothing to do with the findings.

In addition to making studies on the composition and concentration of dusts and of the physical condition of employes, the cement industry tabulated death rates of cement workers from records of sick benefit associations and group insurance. As tuberculosis is the most dependable indice of a hazardous dust exposure it is one of the important things to remember in any consideration of a dust problem. Tuberculosis is a revealing indicator of hazardous dust. It was naturally gratifying to find that the tuberculosis death rate of cement workers was much lower than that of the general population and of other industrial groups. As a further check on the various findings a careful tabulation has been made of absenteeism causes and the morbidity rates show no abnormalities. In other words, we started from scratch. We made dust counts and analyses of dusts, made physical examinations to see if there were any physical deviations or abnormalties, made interpretations from stereoscopic X-rays, and after that we were not satisfied and took the absentee reports throughout the industry to see if any abnormal rate of any type of illness existed and to see if any health hazard was overlooked.

I would be glad to give detailed information on procedure and findings to anyone interested but my main purpose in mentioning this work has been to indicate how unfair it is to accuse dust of being damaging without attempting to get the facts and incidentally without knowing the facts.

No discussion of the dust problem would be complete without some mention of the erroneous conception of silicosis as a disabling disease. Search the medical records and you will have difficulty in finding a reference to death caused by pure uncomplicated silicosis. The layman, and to be sure many of our medical brethren, accept the fact that silicosis as demonstrated by X-ray is disabling and usually results fatally. The effect of this conception is to strike fear into the heart of every worker who may have simple uncomplicated silicosis, whereas in reality there is no reason why he should not work out his normal span of life. All of this scare about

silicosis has had an unfortunate social effect. When you imply because a man has silicosis and it is disabling and it is some insidious disease that is going to kill him, he is all washed up, and it is a pity, gentlemen, but it is true that the workers have been kidded into thinking they were disabled, and if they believed they were disabled and it was advertised they were disabled it would make it very, very difficult for them to get gainful employment. In almost every instance silicosis becomes disabling only when tuberculous infection is present. I should say in practically every instance it is impossible to find any incapacity or disability unless tuberculosis is present in the lung. Knowing this fact, it is safe to say that absolute protection can be given to the old employes who may in the past have been exposed to high concentrations of free silica by removing from employment those who have tuberculosis. No one can have a quarrel with that proposition. If he has active tuberculosis certainly he would not want to continue working and jeopardize his chances of curing himself, and then there is the danger of mingling and mixing with the other men. He should be removed because he is a sick man, and if he is removed it is for his own and the good of his associates. It is quite likely that if tuberculosis is stamped out the problem of occupational disability from dust will be solved. The silicotic not infected with tuberculosis should be kept on the job and the employer should be protected against unwarranted and unjust claims brought on the basis of an X-ray picture.

This is not to say that dust control measures are unnecessary in many locations. Where dangerous concentrations of free silica or asbestos dust exist in the working environment, methods of dust removal and elimination should be provided. I mean to say if you can eliminate tuberculosis you have very little danger, or practically no danger of disability from dust in the air. That is no reason why you shouldn't clean up dust, and there is every justification in the world for cleaning up silica dust. It would be impossible to attempt to recommend, even if I were capable of doing it, specific measures of dust control for the wide variety of operations and conditions in industry. However, the matter of good housekeeping cannot be stressed too strongly. It is surprising how much dust can be eliminated and how much more pleasant the working place can be made by simple measures and by regular and consistent clean-up. It is unnecessary, perhaps, to point out that a vacuum cleaning system is very effective in removing dust collections from beams and ledges and from the floor. Every employer has his own problems to work out. If he suspects a dangerous dust concentration he should study the possibility of substituting non-hazardous for hazardous materials. Frequently he can isolate particularly dusty operations without a great deal of revision. Often simple improvements can be made in the ventilation system which will keep the dust down to safe levels. The possibility of using local exhaust systems should not be overlooked and in this connection let me refer you to a recent publication of the American Standards Association entitled, "Design and Operation of Exhaust Systems." Certainly any exhaust system should be carefully tested for adequacy and efficiency. It should have frequent inspection and should be regularly rechecked to make certain that it is doing the job it is intended to do. I recommend that highly to any of you interested in finding out the best process for eliminating dust at its source. It is quite recent, I think within the last couple of months. I have a copy with me if anybody would like to see it, put out by the American Standards Association, 29 West 39th Street, New York City.

I have skipped over a number of different things and realize full well that this discussion has left many important things unsaid about the dust problem, and I fear that I have mentioned things that should be interpreted in more detail. We could go on all night telling about the medical aspects of dust diseases, the engineering

problems of dust contr
arbitrary in spots and

1. The dust-health

2. All dusts are n

3. Free silica is t
silica does not mean tha

4. Admixtures of

5. There is a differ
complicated silicosis is
thing to fear and to be a

6. Eliminating the
of lung disability caused

7. Silicosis can be
justification for forcing
hazardous to health.

8. To determine a
composition of the dust
suspicious confirmatory
X-ray findings. In other
can be sure.

In closing I would li
of course, importance of
is only a picture just like
and it is possible for the
use stereoscopic X-ray pic

MR. J. J. MASON, Fis
emery dust? The men e

MR. BUSHNELL: I
doubt if that is harmful.
matter to apply a local ex
to control, it would seem
sure about emery dust, bu
on record without being s

MR. MOORE, Fisher B
tell us what you have do
controlling this dust probl
you tell me what you hav

MR. BUSHNELL: I
hazardous and therefore n
worked periods up to forty
ogy or health hazard in the
keeping that is not to be
housekeeping campaigns.
are in the business of ma
the process of manufactur
the working environment.
comfort. We do not have
determine whether we did
men but we do not have a
in their ordinary routine
would logically be the hea
case a bag splits and in a

problems of dust control and the medico-legal problem. I have chosen to be rather arbitrary in spots and now present my conclusions:

1. The dust-health problem in industry has been greatly over-rated.
2. All dusts are not harmful to health.
3. Free silica is the only causative agent of silicosis but the presence of free silica does not mean that a silicosis hazard exists.
4. Admixtures of certain dusts modify the action of free silica on the lungs.
5. There is a difference between "medical" silicosis and disabling silicosis. Uncomplicated silicosis is seldom if ever actually disabling. Silico-tuberculosis is the thing to fear and to be avoided.
6. Eliminating the cases of active T. B. will go far toward solving the problem of lung disability caused by dust.
7. Silicosis can be entirely controlled by dust control measures but there is no justification for forcing control measures on operations unless the dust is really hazardous to health.
8. To determine a hazardous exposure it is necessary to determine the mineral composition of the dust and the concentration and particle size range. If this is suspicious confirmatory evidence should be obtained from physical examination and X-ray findings. In other words, you have to check one against the other before you can be sure.

In closing I would like to emphasize the importance of X-ray interpretations, and of course, importance of proper technique in taking X-rays. After all, an X-ray is only a picture just like any other photograph. The lights and shades play tricks, and it is possible for the pictures to be distorted. In all studies we have tried to use stereoscopic X-ray pictures, double pictures which give a third dimension.

MR. J. J. MASON, Fisher Body, Cleveland: Mr. Speaker, could you tell us about emery dust? The men complain about that.

MR. BUSHNELL: I must beg off as far as actual knowledge is concerned. I doubt if that is harmful. I am not sure, but it would seem it would be a simple matter to apply a local exhaust on a wheel and control that dust. If it is impossible to control, it would seem to require that the employee use a respirator. I am not sure about emery dust, but I don't think it is harmful. I don't want to put myself on record without being sure.

MR. MOCAR, Fisher Body, Cleveland: I listened to your talk. You failed to tell us what you have done in the industry to protect your men. You speak about controlling this dust problem at its source, which is a very good thing, but could you tell me what you have done in the way of protecting your men?

MR. BUSHNELL: I thought I made it clear that cement plant dust is non hazardous and therefore no protection is needed. We have examined men who have worked periods up to forty-five years and haven't been able to find a trace of pathology or health hazard in the industry. However, as a matter of cleanliness and housekeeping that is not to be associated with the medical problem, we have carried on housekeeping campaigns. If any of you are in the cement business you know we are in the business of making dust. All the way through the operation dust is in the process of manufacture but this does not mean that excessive dust is present in the working environment. Respirators are used occasionally as a matter of personal comfort. We do not have a health hazard. We have made careful investigations to determine whether we did have, and if we did, we would take steps to protect the men but we do not have a health hazard, and the men do not need to wear respirators in their ordinary routine operations. In the packing department where the dust would logically be the heaviest we have local exhaust systems to carry the dust in case a bag splits and in a few of the mills they have dust collectors throughout the

gus diseases of the lungs, perhaps, are more common than we have supposed."

Mixed and Protector Dusts

Leroy U. Gardner, of the Medical Committee, discussed the research he is undertaking for the Foundation at the Saranac Laboratory on "mixed" dusts and "protector" dusts. He said, "The evidence now available makes it seem improbable that a silica hazard is defined solely by the number and size of the silica particles in industrial atmosphere. The other components of a dust modify its action. Some may inhibit, others retard, and perhaps some will be found to prevent its injurious effects. Because these possibilities are recognized, it becomes difficult to set up definite standards of permissible dustiness in industrial atmospheres.

"Not enough is known about the action of protector substances to warrant the recommendation that they be employed to prevent silicosis in industry. Our aim should be to reduce existing dust concentrations rather than to increase them by adding more dust. I would strongly oppose the recommendation that protector dusts be used to attempt to prevent silicosis at the present time. But I do believe that we should attempt to discover more about their action. Some, like gypsum, seem to combine with the silica in the atmosphere, forming clumps which are too heavy to remain suspended in air and too large to pass the barriers of the nose and upper respiratory tract. With such information at hand it may be possible to apply the knowledge in a practical manner."

X-Ray Studies

S. Reid Warren, Jr., of the Moore School of Electrical Engineering, University of Pennsylvania, described the investigation which the Foundation is sponsoring at that institution on improving roentgenographic (X-ray) technique for industrial applications. The medical profession emphasizes the necessity for X-ray films and their proper interpretation in the diagnosis of dust diseases of the lungs. Dr. Warren described the progress in this direction and outlined the work still necessary to make this technique a standardized tool.

The projects of the Saranac Laboratory and the University of Pennsylvania constitute the continuation and advancement of fundamental work which has been accomplished at these institutions in the past.

Drilling

D. Harrington, a member of the Foundation's Board of Trustees and Chief of the Health and Safety Branch, U. S. Bureau of Mines, summed up "the whole matter of drilling" as follows:

"Dry drilling is, of course, very much more of a dust producer than wet drilling, probably in the ratio of 6, 8, or possibly 10 to 1. Wet drilling produces some dust. . . . . But if reasonable precautions are taken with wet drilling, and suitable precautions are also taken as to the ventilation, wetting the muck pile, time at which the blasting is done, and precautions which are taken after going back to the face after blasting, we feel, in fact we know, that under the present day conditions mines can be so conducted. . . . . that there need be no particular harm to workers in these places as far as dust diseases are concerned."

Legal Data

A. C. Hirth, Chairman, reviewed the work of the Legal Committee to date. He explained that the Foundation's legal surveys digest more than 400 separate occupational disease cases. Summaries are given of the laws of the various states as to occupational disease, along with the interpretations placed upon these laws.

T. C. Waters, Chairman of the Maryland Occupational Disease Commission and a member of the Legal Committee, reviewed a forthcoming critical analysis of compensation legislation which he has compiled for the Foundation and which will be issued in the near future. He stated that "during the past year, occupational disease amendments to existing Workmen's Compensation Laws have been enacted in six states: Delaware, Indiana, Michigan, Pennsylvania, Ohio, and Washington. Today there are 21 states whose laws provide compensation for occupational diseases. State commissions have been appointed for the purpose of studying and recommending compensation in eight other states: Alabama, Arizona, Georgia, Kansas, Maine, Maryland, New Mexico, and Oregon. . . . In the course of the next few years all the industrial states probably will have enacted laws for this purpose."

More than 100 companies were represented at the meeting. The Proceedings, containing the detailed report, are available (without cost).

GLASS CLOTH WALL PAPER IS LATEST "WRINKLE"

New York Architect Pioneering in New Idea—Low-Cost Fireproof Fabric Can Be Hung by Paperhangers

Andrew J. Thomas, New York City architect, is pioneering in a fascinating application of Fiberglas cloth as now being produced by the discoverers of today's method to manufacture glass in fibrous form.

Examining a new type of cloth created recently by the Fiberglas division of the Owens-Illinois Glass Company, Mr. Thomas became intensely interested in its possibilities as wall paper.

Aware of the trend to "canvass" walls in modern buildings, that is, to paste woven cloth onto walls instead of ordinary wall paper, the Owens-Illinois research men began a series of experiments for Architect Thomas.

The practice of clothing walls grew out of a desire to cover plaster cracks that are revealed under the surface of wall paper, and to take advantage of the interesting texture and decorative possibilities.

Mr. Thomas was enthusiastic over the possibilities of glass cloth for such purposes because of the lustrous quality, reflection of light for increased illumination, and the fireproof qualities of such fabric.

Tests proved to Mr. Thomas that he could use Fiberglas cloth advantageously on walls of stair wells and other usu-