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All Ohio Safety Congress

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THE INDUSTRIAL COMMISSION OF OHIO

and the direct management of

THE DIVISION OF SAFETY AND HYGIENE

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of

The Industrial Commission of Ohio

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Columbus, Ohio

May 10, 11, 12

1938

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1938

LIST OF HONORARY VICE-PRESIDENTS

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Thos. J. Donnelly, Secretary, Ohio Federation of Labor, Columbus, Ohio.

Thos. J. Duffy, former Chairman, Industrial Commission of Ohio, Columbus, Ohio.

Judge Lee E. Skeel, President, Cleveland Safety Council, Cleveland, Ohio.

Frank A. Purnell, President, The Youngstown Sheet and Tube Company, Youngstown, Ohio.

Charles R. Hook, President, The American Rolling Mill Company, Middletown, O.

Major Norman A. Imrie, President, Columbus Safety Council, Columbus, Ohio.

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S. P. Bush, Columbus, Ohio.

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Charles L. Keller, Vice President, The Richardson Company, Lockland, Ohio.

J. A. Voss, Vice President in charge of Industrial Relations, Republic Steel Corporation, Youngstown, Ohio.

E. M. Bland, President, Zanesville Industrial Safety Council, Zanesville, Ohio.

George W. Smith, Jr., Vice President, White Motor Company, Cleveland, Ohio.

C. E. Torrey, General Manager, Ohio Power Company, Canton, Ohio.

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Harry Ehrich, President, Marion Safety Council, Marion, Ohio.

D. S. Luntz, President, Scrap Iron and Steel Institute, Canton, Ohio.

C. A. Helser, President, Newark Safety Council, Newark, Ohio.

Earl Troll, President, Mansfield Safety Council, Mansfield, Ohio.

*D. M. Cronin, President, Cronin China Co., Minerva, Ohio.

*Deceased

COMMITTEES

Arrangements

Chairman: Thos. P. Kearns, Superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio, Columbus, Ohio.
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Ernest Augustus, Safety Director, Mead Corp., Chillicothe, Ohio.
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Homer J. Weeks, Manager, Safety, Sanitation & Welfare, American Steel & Wire Co., Cleveland, Ohio.
S. F. Whitesel, Franklin Board & Paper Co., Franklin, Ohio.
O. W. Wiswell, Executive Secretary, Ohio Coal Conference, Inc., Columbus, Ohio.
Frederick D. Witmer, Jr., Ohio Hydrate & Supply Co., Woodville, Ohio.
Joseph H. Zucker, Cleveland Plain Dealer, Cleveland, Ohio.

Program

Chairman: Carl L. Smith, Managing Director, Cleveland Safety Council.

Exhibits

Chairman: Buell W. Nutt, President, Safety Equipment Service Company, Cleveland, Ohio.

Entertainment

Chairman: H. G. Ehret, Safety Director, Division of Factory and Building and Inspection, Department of Industrial Relations of Ohio.

Publicity

Chairman: H. M. Paul, Supervisor of Printing and Publications, Division of Safety and Hygiene, Industrial Commission of Ohio.

Reception

Chairman: A. L. Rose, Assistant Superintendent, Division of Safety and Hygiene, Industrial Commission of Ohio.

Registration

Chairman: C. C. Beasor, Statistician, Division of Safety and Hygiene, Industrial Commission of Ohio.

Industrial Commission Booths 4 and 5 In Safety Exhibit

BUREAU OF INFORMATION ON SAFETY, COMPENSATION AND CLAIMS SAFETY

Chairman: George P. Meehan, Mechanical Engineer.

Staff of the Division of Safety and Hygiene of the Industrial Commission of Ohio

C. G. Barth.....Safety Engineer
H. P. Heyne.....Safety Engineer
Mackin Kelly.....Safety Engineer
P. B. Martens.....Safety Engineer
R. M. Anderson.....Safety Engineer
George P. Meehan.....Structural Engineer
Lewis C. Lewis.....Mechanical Engineer
D. M. Ryan.....Mining Engineer
H. L. Sain.....Mining Engineer
W. E. Obetz.....Special Representative
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James Fluker.....Examiner (Professional)
Ode J. Grubb.....Special Investigator
R. C. Jones.....Special Investigator
James P. Scanlon.....Special Investigator
Sidney Smith.....Special Investigator
A. R. Taubman.....Special Investigator
Ben T. Godfrey.....Special Investigator

COMPENSATION

Robt. W. Nott, Supervisor of Information, Industrial Commission of Ohio.

REGISTRATION DESK

Assembly Room, Ball Room Floor

Registration Cards, Badges, Programs of Congress, Tickets for Dinner on Tuesday, May 10, and other interesting matter may be obtained at this desk.

No Charge for Registration

Everyone attending the Congress is requested to register.

All meetings will begin on time as scheduled. Please be prompt in your attendance.

GENERAL SESSION

Tuesday, May 10, 9:30 A. M.

KNISLEY'S ORCHESTRA

GROUP SINGING

H. G. EHRET, Baritone
MARIE ARMS, Pianist

ANNUAL CONGRESS BANQUET

Tuesday, May 10, 6:30 P. M.

CHARLES BENNETT'S ORCHESTRA

DORAINE RENARD, Soprano
H. G. EHRET, Baritone
MARIE ARMS, Accompanist

GENERAL SESSIONS

Wednesday, May 11, 2:00 P. M.

Thursday, May 12, 9:30 A. M. and 2:00 P. M.

COSMOPOLITAN QUARTET

GILBERT H. HAMILTON, First Tenor
L. T. ROBBINS, Second Tenor
DR. E. R. SHILLING, Baritone
G. L. COFFINBERRY, Basso

GROUP SINGING

SAFETY EXHIBIT

HOTEL LOBBY AND BALL ROOM FLOOR

Open from 9 A. M. to 9 P. M.

Full of Interest and Instruction to Everyone Interested in Industrial Safety and Health

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Devices of all descriptions for the prevention of industrial accidents and diseases.

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FIRE PREVENTION
ACCIDENT CHARTS AND STATISTICS
SAFETY LITERATURE

Every Industrial Manager should see this Exhibit. A Notable Display of Accident, Fire and Health Protection Equipment and Supplies.

EXHIBITORS

Ninth All Ohio Safety Congress
Deshler-Wallick Hotel
Columbus, Ohio
May 10, 11, 12, 1938

Porter Cable Machine Co., Syracuse, New York.
Safway Steel Scaffold of Ohio, Fostoria, Ohio.
C. H. Dockson Co., Detroit, Mich.
The Kimball Safety Products Co., Cleveland, Ohio.
The Industrial Commission of Ohio, Division of Safety and Hygiene.
Safety Engineering Magazine, Division of Alfred M. Best Co., Inc., New York, N. Y.
Chicago Eye Shield Co., Chicago, Ill.
The Geo. L. Williams Co., Cleveland, Ohio.
M. E. Cunningham Co., Pittsburgh, Pa.
The Strauss Co., Pittsburgh, Pa.
Willson Products, Inc., Reading, Pa.
Acme Safety Products Co., Akron, Ohio.
Safety First Shoe Co., Holliston, Mass.
Mine Safety Appliances Co., Pittsburgh, Pa.
American Optical Co., Cleveland, Ohio.
Burroughs Wellcome & Co., Inc., New York, N. Y.
Harry L. Morgan Co., Columbus, Ohio.
Pulmosan Safety Equipment Corp., Brooklyn, N. Y.
Industrial Gloves Co., Danville, Ill.
Davis Emergency Equipment Co., Inc., New York, N. Y.
The Safety Clothing Co., Cleveland, Ohio.
Wiesman Mfg. Co., Dayton, Ohio.
W. S. Schuyler Mfg. Co., Springfield, Ohio.
Safety Equipment Service Co., Cleveland, Ohio.
Elliott Service Co., New York, N. Y.
The Governor's Safety Coordinating Bureau, Columbus, Ohio.
Melflex Products Co., Akron, Ohio.
Panther-Panco Co., Chelsea, Mass.
H. W. Peters Co., Columbus, Ohio.
The M. F. Murdock Co., Akron, Ohio.
Pyrene Mfg. Co., Chicago, Ill.
Bauer Mfg. Co., Wooster, Ohio.
Lehigh Safety Shoe Co., Allentown, Pa.
Safeguard Electric Co., Inc., Brooklyn, N. Y.
Brown Shoe Co., St. Louis, Mo.
Burroughs Adding Machine Co., Detroit, Mich.
The Positive Safety Mfg. Co., Cleveland, Ohio.
Surty Mfg. Co., Chicago, Ill.
The Fyr-Fyter Co., Dayton, Ohio.
Keystone View Co., Meadville, Pa.
Flohr Mfg. Co., Buffalo, N. Y.
H. Childs & Co., Inc., Pittsburgh, Pa.
The Dayton Safety Ladder Co., Cincinnati, Ohio.
Chas. B. Timmons, Middletown, Ohio.
Shepherd Safety Shoe Corp., Chicago, Ill.
ClerSite Co., New York, N. Y.
Sugar Beet Products Co., Saginaw, Mich.
A. Schrader's Son, Brooklyn, N. Y.
International Shoe Co., St. Louis, Mo.
Columbus Glove Mfg. Co., Columbus, Ohio.
Guardian Chemicals, Inc., Columbus, Ohio.
Youngstown Safety Supply Co., Youngstown, Ohio.
Williams & Co., Inc., Pittsburgh, Pa.
Metropolitan Life Insurance Co., New York, N. Y.
The Surety Rubber Co., Carrollton, Ohio.
Standard Safety Equipment Co., Chicago, Ill.
Thos. W. Ruff & Co., Columbus, Ohio

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TUESDAY, MAY 10

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LAUNDRIES AND DRY CLEANERS

PULP AND PAPER

PETROLEUM

NEWSPAPERS AND PRINTERS

INDUSTRIAL AND COMMERCIAL MOTOR VEHICLE OPERATION

CERAMICS

EMPLOYEE PUBLICATIONS

TUESDAY, MAY 10

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THURSDAY, MAY 12
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GENERAL SESSION

Supervision Safety Improvement Section

GENERAL SESSION

Tuesday, May 10, 9:30 A. M.

Chairman: THOMAS M. GREGORY,
Chairman, Industrial Commission of Ohio.

The first General Session of the Ninth All-Ohio Safety Congress was called to order at ten o'clock, in the Ballroom, by Hon. Thomas M. Gregory, Chairman of the Industrial Commission of Ohio.

CHAIRMAN GREGORY: Ladies and Gentlemen, money is supposed to be sort of a cold quantity, but our State Treasurer, Mr. Knisley, through a number of his boys, has apparently put melody into the subject. We are indebted to them for their courtesy and entertainment. We want to thank them for coming and letting us have the privilege of enjoying their music as we are assembling here. We are also very grateful for their generous cooperation and their contribution in connection with the session which now opens. Some have said that I was to be your soloist today. Being democratically inclined, I propose that you sing the solo to me. Now, let us all stand and sing "America."

"AMERICA"

By the Congress; led by Mr. H. G. Ehret; Marie Arms, accompanist.

CHAIRMAN GREGORY: We will now have the invocation by Rev. Father Joseph W. Lappan, Assistant Pastor of St. Mary's Church, Columbus, Ohio.

INVOCATION

REV. FATHER JOSEPH W. LAPPAN,
Assistant Pastor, St. Mary's Roman Catholic Church, Columbus, Ohio.

If we but look, O Heavenly Father, back to the ages when life on this sphere began, we find everything beautiful, lovely and all Thy wisdom colored with the simplicity of the early life. The world was not so complicated as it is today. Men had less on their minds than they have today. But, O God, in Thine Infinite wisdom, Thou hast ordered all things beautifully and sweetly, and as time went on and the problems of life began to multiply, men began to gather together in conventions to devise ways and means of meeting the situation then and there. Men recognized Thine Infinite wisdom and they knew without Thee they could do nothing. So it has from time immemorial been the custom of mankind in all his deliberations to begin by calling upon Thee, by begging Thee, O God of Wisdom and Might and Prudence, to sit in with them on their deliberations, to enlighten them, that they might say and do the correct thing, relying on the promise that Thou hast given to them, "I will give Thee a mouth and wisdom, that none dare gainsay." And so it is today, as it was in that early day, we, about to assemble, about to enter into convention, seeking ways and means of preserving that life which Thou hast so generously given unto us, call upon Thee today to sit in with us in our deliberations, to aid us, that we might find ways and means of meeting the problem of today, that we might find ways and means of protecting life and limb, of protecting that great gift of life that Thou has given unto us. It is true, O God, today we must look out for ourselves, we must be careful, because in this day and age of machinery, of the

Briese has been detained and has not yet arrived. Perhaps he will arrive later in time to speak to us tonight.

However, I am very happy to inform you that I have been able to persuade a very good friend of mine to talk to you tonight, Sir Howard Cunningham Greene, of London, England. Sir Howard is a close personal friend of Ramsey MacDonald, Anthony Eden and many prominent people in England. He has only been over here a very few weeks. I feel certain that he will have something of very great interest to say to us tonight. So it is with great pleasure that I present to you Sir Howard Cunningham Greene of London, England. (Applause.)

ADDRESS

ARTHUR F. BRIESE,
Chicago, Illinois.

Arthur F. Briese of Chicago, Illinois, then gave a very humorous and convincing impersonation of "Sir Howard Cunningham Greene," after which he removed his mustache and put on his "good old American spectacles" and introduced himself.

ADJOURNMENT.

The Annual Congress Banquet Session of the Ninth All Ohio Safety Congress then adjourned.

FOUNDRIES

OFFICERS FOR 1938-1939

Chairman: J. M. McCLOY, James B. Clow & Sons, Newcomerstown, Ohio.
Vice-Chairman: GEORGE H. MCCONAHY, American Steel Foundries, Alliance, O.
Secretary: RAY O'CONNELL, The Ohio Steel Foundry Co., Springfield, Ohio.

This session of the Foundry Section of the All-Ohio Safety Congress called to order at nine o'clock, by James R. Byrum, American Rolling Mill Co., Middletown, Ohio.

CHAIRMAN BYRUM: Men, I wonder if you will kindly come up and have the meeting here. You are so scattered out I don't think it is nearly as comfortable. Just come on up and let's have a get-together meeting here.

(Audience comes forward.)

CHAIRMAN BYRUM: I wonder if George H. McConahy is in the meeting.

Answer from audience, "He is here."

CHAIRMAN BYRUM: Mr. Ralph Rose here? Does he happen to be in the audience, or Mr. A. H. Anthony? Do either of these men happen to be here?

Men, I want to say "Good morning" and it certainly is a pleasure to see so many men out this early in the morning at a Safety Congress. We somehow or other have the happy faculty of hooking the night and morning so closely together, it is a little difficult to separate the two sometimes. I appreciate very much the number of you men that have honored us with your presence today.

When arranging for this sectional meeting, I thought I would try to get out just as many people as we possibly could. I struck off a letter and had my stenographer mail it to two hundred sixty-seven managers of foundries in the State of Ohio representing practically all of the foundries which had fifteen or more employees. That is as much as I knew I could do because I haven't a very large acquaintance with the foundrymen due to the fact that my particular interests are not largely foundry interests. We have only a small foundry but we have a large steel plant.

I didn't happen to have the personal appeal to make to personal friends in the foundry section. This response is gratifying.

In building the program we wanted to be as practical as possible; we wanted to discuss the things you are interested in and give you an opportunity to express yourselves at the proper time. In other words we wanted to have a meeting with you up here and nothing would please us better than to have a meeting out there. We realize that regardless of how much preparation a teacher may make the real benefit is coming from the discussion he gets from the men out in front. The first subject we are going to discuss is one that has been made very important so far as foundries are concerned. I do not need to tell you men that you have a dust problem because anybody that has been in a foundry or approaches a foundry knows dust is present in foundries. I haven't any brief to offer for the quantity or the analysis of the dust contained in any operation in any plant and it doesn't make a great deal of difference to you nor to me whether there is one, two, five, or twenty per cent silicon content in the dust in our factories and foundries. The thing that you and I are interested in is the fact that we have dust and when you have dust you have a problem that has become quite complicated, unfortunately, with a lot of evidence of

the fact that dust is becoming more and more a problem. There wasn't enough of us able to see this and make the proper preparation when the law was enacted making dust an occupational disease in this state. Then we became aware of the fact that we have a problem as old as the foundry, that became a robust youth over night. So with the dust problem before us and with the problem of what is going to happen in the future we must sit up and take notice of it.

In the annual report, I noticed from the statistics which have been published by our Industrial Commission, there is one little item. It shows occupational diseases forty-four cases in 1937 in the foundry section in the State of Ohio; forty-four cases reported; three of those resulted in fatalities. I am not here to say they were from silicosis. I don't know. The thing that you and I are interested in is, what is the report of 1938 going to show? Are we going to have forty-four cases of occupational disease or are we going to have four hundred? Who knows? I don't. I happened to meet a foundryman in another part of the State a couple of weeks ago. He told me that we have had some cases recently. We just haven't made the advance in dust control, whatever we have expected we know we have done. Maybe you and I will be faced with the same problem most any time. This thing we do know, that regardless of how well founded we may be in our minds and satisfied that we have done everything we know how to make the condition so far as dust is concerned in our plant the best we know, when we have a case that comes down to a jury of workmen you have lost your case. It doesn't matter, as I say, whether the silicon content of the dust is out of proportion. The fact is that you have dust and that will be the deciding factor and the fact that the man died and his doctor said he had silicosis is sufficient for them, regardless of whether or not you can produce any kind of evidence which may prove quite to the contrary. Your case is gone. I have a little story I would like to tell you and then we will go on. This is supposed to be a fact.

In Chicago recently there was a case of silicosis before a judge and it appears that there had been some pictures of the chest taken, and for some unknown reason, the chest pictures disappeared. When the attorney for the plaintiff addressed the court he mentioned the fact that these pictures had disappeared and they were very important to his case. He happened to notice that the attorney for the defense was looking over some pictures, X-ray pictures, at his desk. He suspected those were the photographs of the chest of his client which had disappeared out of the records. He insisted that these photographs be offered in evidence. So the judge turned to the attorney for the defense and he said, "You have heard the request." He said, "What do you think about it?" He said, "All I can say is this that the X-ray photographs I had in my possession have absolutely no bearing whatever on this case." Immediately the attorney for the plaintiff said, "Your Honor, I insist that these photographs be offered and put in evidence." The judge said, "What do you say?" He said, "If he insists, okay with me." So they offered the X-ray photographs of this chest in evidence. The attorney for the plaintiff got his doctor on the stand. He said, "Doctor, do you recognize this as a photograph of the chest of my client?" The doctor said, "I do." He says, "Does this chest show any indication of silicotic condition?" The doctor said, "It most certainly does." The attorney said. "It is your witness," to the attorney for the defense. The attorney for the defense said, "I would like to call my doctor on the stand." He had his physician come up. He says, "Doctor, do you recall taking this particular photograph, this X-ray photograph?" He said, "I do." The attorney said, "When?" "Yesterday." "Would you mind telling the court whose chest this is a photograph of?" The doctor said, "Not at all. It is a photograph of your own chest."

You can imagine the embarrassment of the lawyer and doctor under those circumstances and I am told that the judge asked these men to get out of his court

and to never come into that court again with another case as he wouldn't listen to them. That is just a sample, fellows, of what you are up against on silicosis. You are up against a tough proposition. We are all up against a tough proposition and if we treat it lightly, we are making a big mistake. In looking for a speaker to discuss dust, I contacted our State Department. They recommended one of their Chemical Engineers. The gentleman I have the pleasure to present at this time is Mr. C. B. Young, Chemical Engineer of the Bureau of Occupational Diseases, State Department of Health of this city. He will discuss, "Dust Control." Mr. Young. (Applause.)

DUST CONTROL IN THE FOUNDRY

MR. C. B. YOUNG,
Chemical Engineer, Bureau of Occupational Diseases, State Department of Health, Columbus, Ohio.

Mr. Chairman, members of the Foundries Section and gentlemen. I am not going to attempt to tell anyone this morning how to control dust in a foundry in a technical way. I will discuss the broad aspects of the case and if you have any interests in controlling dust you will find your own way to do it. After all, it is an individual proposition, more or less. So many conditions govern or decide the way it shall be controlled.

The inclusion of silicosis as the twenty-second occupational disease in the list of occupational diseases compensable under the Workmen's Compensation Law of Ohio, was a milestone reached in April, 1937. This, as far as the law pertaining to silicosis is concerned, may be more a destination, but for industry it marks only a milestone in a continuing campaign to preserve the fitness of the industrial worker.

The existence of occupational diseases was known and recognized by the ancients. The first written description of various industrial diseases was made by an Italian in 1700, but little of anything was done toward prevention until the beginning of the present century.

In 1886 the production of gold was begun in the Transvaal in South Africa. A gold-bearing conglomerate containing about 85% free silica is embedded in a quartz rock which contains about 96% free silica. Mining and production operations necessarily release silica dust. At one time 26% of the European miners were found to have silicosis. The situation became so serious that it appeared that the silica dust hazards had to be controlled or mining abandoned. As a result the English authorities initiated dust control measures through medical studies and engineering methods. From South Africa the study was extended to the tin mines of Cornwall, England, and the hard rock and coal mines of Australia. Studies of this disease of occupation and the preventive measures applied to control it, marked the beginning of a new era, wherein the state and employers recognize the importance of protecting workers against hazards of disease of occupation. By the application of dust control measures the silicosis hazard in South Africa gold mines has been reduced enormously. The great majority of cases now appearing are in those who were subjected to the old conditions before dust control measures had become general. It is claimed that no new miner who has entered the industry since the year 1923 has as yet contracted silicosis.

The development of a number of cases of silicosis in the excavation of a tunnel at Gauley's Bridge, W. Va., in 1931-32 received much general publicity and doubtless more than any other single accident, made this country occupational disease conscious.

Legislation providing for compensation of accidents has generally preceded compensation for occupational diseases by some considerable time, and this is a natural

condition. The result of accidents, sudden and obvious, and the disablement that occurs, is only too evident. Occupational disease on the other hand may develop slowly and too often is only known or attributed to its occupational origin after disablement, sometimes permanent, occurs.

When the Ohio legislature in 1913 created its Industrial Commission and placed the life, safety and health of its workmen in its hands, it also directed the then Ohio State Board of Health to make a survey of industrial health hazards. The survey extended over a two-year period and reached 1,046 plants, employing about 240,000 workers. (1)

In the same year the occupational disease reporting law was passed requiring physicians of the state to report to the State Director of Health all cases believed to be of occupational origin and another law requiring manufacturers of certain lead compounds to make monthly physical examination of workers in such plants, and to record the results of the examination so as to be available to the State Health Department. In 1921, an act pertaining to the Workmen's Compensation Law provided compensation for 15 specific occupational afflictions, and since that time seven additional have been added, making a total of 22 specified compensable occupational diseases.

From July 1, 1927, to July 1, 1937, the Industrial Commission provided its occupational disease insurance fund from a uniform premium from all insurers of one cent per $100.00 pay roll. This rate was more than sufficient to meet all compensation payments and medical costs for occupational disease claims. In July, 1937, the premium was raised to 2 cents per $100.00 pay roll in anticipation of the possibility of increased occupational disease compensation claims, incident to the inclusion of silicosis in the schedule of compensable occupational diseases. In 1925 premiums were assessed according to the occupational health hazards involved in the different risks. This so increased clerical work in keeping the records that the commission returned to the method of spreading the premiums as percentage of pay roll over all industries alike. This principle of an even percentage of premium is not in keeping with the merit system as in the premium payments for industrial accidents, where low accident experience reflects credit and high accident rates bring assessment in premiums. While, therefore, there is a financial incentive to an employer to maintain conditions to bring about a low accident experience, no such direct financial advantage in lower insurance premiums results from the maintenance and provision of conditions and equipment that brings a low incidence in occupational diseases. All establishments regardless of whether with a low or high occupational disease hazard or experience pay the same premium percentage on their total payroll. If merit rating is desirable in accident premiums it would be just as desirable in occupational disease premiums. The employers who by proper methods and equipment bring silicosis or other occupational disease hazards into a range of safe concentration should have credit for the accomplishment and not be required to subsidize the premium of competitors who make less or no effort to eliminate their occupational disease hazards.

There are in general two systems of occupational disease coverage, the schedule system in which only disablements resulting from specific diseases as named by law are compensable, and the general coverage system in which disablement resulting from any occupational exposure is compensated.

The Ohio Workmen's Compensation allows compensation for 22 occupational diseases, silicosis the last having been added to the list effective July 31, 1937. Under this act only the occupational diseases specified therein are compensable, it having been held that at common law no recovery could be had on an occupational disease that did not come within the enumeration of occupational diseases specified

in this act. Where Ohio employers have complied with workmen compensation acts employees cannot sue at law for disability due to occupational diseases.

In Wisconsin the Workmen's Compensation Act was made to include the diseases of occupation by the three words, "including occupational diseases." Such a broad inclusion provided for a time at least a very troublesome and somewhat chaotic situation in the administration of occupational disease compensation. The New York state law provides compensation by schedule for 27 compensable occupational diseases and then gives complete occupational disease coverage by providing that compensation shall be paid for disability sustained or death incurred from occupational disease.

Silicon dioxide, a particularly inert compound at ordinary temperature is about the last material that would be suspected of being a systemic poison or acting to cause disease. In fact little today is known as to the reaction of this compond in the lungs and how it sets up fibrosis and causes lung damage when inhaled as a dust.

The foundry presents a number of potential exposures for the causation of silicosis. Large quantities of molding sand are used, varying in composition from a very pure sand to a sand carrying a considerable percentage of clay or loam. However, the large particles representing the greater part of the sand are innocuous, as it is only the finer particles, fine enough to be borne and carried by air currents that can be inhaled and cause harm. In processes where the sand can be kept wet, little or no dust arises, but in shakeout and cleaning operations, dust is necessarily released into the air.

The factors that determine the harmfulness of a dust are its composition, its concentration and particle size, and subjectively time of exposure and individual susceptibility. Other things being equal the ability of a dust to cause silicosis is proportional to its silica content, or more properly its free silica content. In estimating the silicosis producing properties of a dust that contains both free or uncombined silica and silica chemically combined with other elements or minerals as in an ordinary clay or molding sand containing loam or clay binder, the mineralogical composition must be taken into consideration. The composition of pure white sand is close to 100% silicon dioxide (SiO_2), one part silicon, two parts oxygen, which we know as free silica, in distinction for example from the silica in clay chemically combined with alumina as aluminum silicate, the "clay substance" of clays. Only the purest clays are composed entirely or in fact principally of aluminum silicate, or "clay substance," for clays ordinarily carry considerable quantities of free silica.

Ordinary red or reddish molding sand consists of sand bonded by an impure clay, which in addition to its "clay substance" carries considerable free silica as well as other minerals and iron that gives the sand its characteristic color. A considerable quantity of silica sand or lake sand that contains little if any bond, is used for molding, the desired bonding properties being secured by mixing with the sand a suitable proportion of fire clay, which is a clay found under or adjacent to a coal seam and which generally burns to a light or buff shade. The hard silica granules have greater resistance to disintegration than the softer clay bond. The fine particles from the bond either of a natural or fabricated molding sand obviously create when dry more dust than the coarser and harder sand particles. This selective separation continues to be present after the dust is in the air for the higher settling rate of the coarse constituent effects its removal from the air-borne dust, the composition of which both mineralogically and chemically may be quite different from the parent substance. The dust will carry both free silica and combined silica from the breakdown of the clay bond, and free silica from the sand grains. Differential disintegration and selective settlement are the principle factors that determine dust composition.

In both ordinary clay dust and in foundry dust both silica and silicates are present. It has been shown by Hatch and Moke (2) that the air-borne dust from molds and shakeouts from a molding sand containing before use 85% free silica and 13% silicate, showed a decreasing free silica content and increasing silicate content as the particle size of the dust decreased. In the smaller particle size component of the dust, such as that producing the most marked reaction in animals, the percentage by weight of the free silica was found to be from one-half to one twenty-third of the silicate content. They point out that basic foundry operations of sand preparations, molding and shakeout do not crush and break up the sand particles to any considerable extent, and are not true dust-producing operations, only scattering the dust already present in the sand, but that sand chipping and sand blasting are dust-producing processes in that they break down sand particles by impact into fine dust. The higher free silica content found by these workers in the air-borne dust from these operations is due doubtless to the breaking down of the sand grains into fine dust.

Pneumoconiosis, literally "dusted lung" is the general term used to designate tissue change in the lungs resulting from the inhalation of dust. Silicosis is a nodular fibrotic condition of the lungs resulting from the inhalation of silica dust. The damage is believed to be brought about by the chemical reaction of the silica as it becomes soluble in the lungs. The human lung has a much greater capacity than ordinarily required and therefore considerable pathology that blocks the air spaces may exist before any symptoms are noticeable by the person afflicted. In moderate exposure it develops into a disabling form only after a long period of time. The disease is treacherous in that a state of disablement may be approached or even reached before its symptoms are sufficiently noticed to be heeded. Some silicates produce a fine branch fibrosis known as silicatosis, which is a less damaging form than the typical nodular fibrosis of silicosis. Asbestos, a magnesium or calcium magnesium silicate, may cause a severe form of pneumoconiosis known as asbestosis. The word "siliconosis" has been suggested as an appropriate term for lung pathology from the inhalation of dusts carrying any compound of the element silicon. Practically all clays found in Ohio carry in addition to aluminum silicate, the so-called "clay substance" of the clay minerals, considerable quantities of free silica. Pottery and white ware mixes carry free silica from pulverized sand as an ingredient. The presence of accessory materials have been shown to have a mitigating effect on the action of free silica in the lungs. The presence of free silica in any dust acts as an exciting course to produce silicosis, but it must not be concluded from this that the silicosis-producing properties of a dust can be determined from its free silica content alone.

Modifying Effect of Accessory Minerals Associated with Silica

In 1929 Haylurst and others (3) in a report of a study of sandstone workers, state that:

"The matrix or bond holding the quartz granules together, and representing from 3 to 10 per cent of the mass, is of a rather rare mineral called ankerite, composed of carbonates of the earthy metals and iron, of silicates, of kaolin forming substances, and of the sulphides and oxide of iron. Some of the matrix substances mentioned when in sufficient amount, have been shown by others to have a protective influence against the silicotic and the tuberculous processes in the lungs."

In the summary reports of the National Silicosis Congress (4) the effect of composition is discussed as follows:

"It is believed that the effects of other substances associated with silica in atmospheric dusts are sufficiently marked and well-defined to preclude comparison of silica hazards merely on the basis of the amount of free silica in the atmosphere. It

is concluded that atmospheric concentrations of silica, which may have proved incapable of producing silicosis in one industry, will not necessarily be harmless under other conditions. The reverse is equally true. If these premises are as sound as they seem, there can be no universal regulatory standard of permissible dust concentration at the present time. Separate standards must be set for different industrial dusts and processes.

"It is recommended that clinical and engineering studies be carried out as rapidly as possible to establish the necessary scientific data upon which we may base practical and effective regulatory standards.

"The factors necessary to establish a safe concentration of atmospheric dust are the following:

"1. The relative number and size of the free silica and the other particles suspended at breathing levels in the different parts of the industrial atmosphere.

"2. The proportion of the workmen's time actually spent in the various dust concentrations.

"3. The effects of exposure to environment, as revealed by the occupational and medical histories of old employees, by physical examination and by the roentgenological appearances of their lungs.

"From the viewpoint of silicosis prevention, the standard of safe atmospheric dust concentration is the maximum in which persons can spend their entire industrial lives without producing demonstrable evidence of significant reaction in their lungs."

The point that I am trying to emphasize is that a threshold or safe concentration of air-borne dust in foundry air can be determined only by a systematic study of foundry dust concentration correlated with the findings of medical and X-ray examination on a large number of workers in representative foundries.

Incidence of Silicosis in Foundries

McConnell and Fehnell of the Metropolitan Life Insurance Company (5) in a study of 21 selected foundries in Wisconsin, found that of a total of 215 employees of grey iron, steel, malleable and non-ferrous foundries, 64 were diagnosed as first degree silicosis, 3 as second degree, 29 as doubtful, and 119 as negative. They point out that the mortality records of industrial concerns insured under Group Life Insurance contracts of six large American and Canadian insurance companies, show the death rate for respiratory diseases for iron and steel foundry workers to be about two and one-third times that for workers in all industries combined and that more than one-third of all the deaths among foundry workers were caused by some respiratory disease, whereas but little more than one-fifth of the death of workers in other industries were due to these causes. They state further that:

"Mortality statistics both American and foreign, covering a long period of years, agree in recording high death rates for respiratory diseases for foundry workers. These studies, it must be admitted, have been far from complete, giving little indication of the specific processes responsible for the excess mortality from these causes. Nevertheless, the results have been so consistent as to leave little doubt concerning the presence of some condition in the foundrymen's work which operates to produce a high incidence of respiratory affections among them. What few statistics there are on the incidence of disabling sicknesses and of the incidence of physical impairments among these workers, support the findings of the mortality investigations."

The Division of Industrial Hygiene of North Carolina in a study of the foundries of that state recently completed (6), found in 680 foundry workers employed in 24 foundries examined that—

1.5% have silicosis all in the first stage;
8.2% exhibit more than ordinary pulmonary fibrosis.

As a result of this study they recommended that the dust exposure of workers in the various foundry occupations should not exceed 12 millions of particles per cubic foot of air for molding sand preparations and general labor and 20 million for shakeout, grinding, tumbling mill and polishing exposure.

The foundries in North Carolina are small and housed in buildings more open than would be suitable in our colder climate.

About a year ago the Bureau of Occupational Diseases of the Connecticut Health Department completed a ten-month survey of the 154 foundries in the State, during which time they collected and counted about 1,200 dust samples by means of the Kotze Konimeter. W. A. Cook, Chief Industrial Hygienist (7), states the attitude of the department on permissible dust concentrations for foundry exposure as follows:

"In general, foundry dust exposures even for short durations should be kept below 30 million particles per cubic foot of air; dust control measures should be instituted where exposures over appreciable periods are found to be greater than 20 million of particles per cubic foot of air; and every effort should be made to keep prolonged exposures to less than 10 million particles per cubic foot of air. Where it is impracticable or costly to get concentrations down to 10 million particles, it is probable that we will feel it permissible for foundries to ride along with dust exposures as high as 20 million particles over much of the day; and it is quite possible that an attainment of this order will be all that is necessary for the prevention of silicosis in foundries."

The Division of Industrial Hygiene of the New York State Department of Labor has just completed a state-wide study of silicosis in its foundry industry, the results of which are being published in their special Bulletin 197 (Silicosis in the Foundry Industry) now in the hands of printers. The following information concerning this survey is taken from a preliminary report (8) of the survey, from which I quote:

"Approximately 2.7 percent of the 12,000 foundry workers in New York State are affected with silicosis, and of this number about 0.7 percent show signs of tubercular complications.

"Each of the 311 foundries in the State of New York was carefully inspected and of these, 80 were selected for special study. Approximately 4,169 persons, one-third of all foundry workers in the state, were employed in these 80 foundries.

"Of this number 4,066 workers were X-rayed, and a complete occupational history was taken in each case. The kind of work done in the foundry was noted, as well as the total duration of exposure to silica dust—either in the foundry in which the worker was being examined or in other foundries where he had worked previously. In the case of each worker, all of these findings were correlated with the condition found in his lungs as shown by the X-ray picture.

"According to the report, 110 cases of silicosis were discovered in the group of 4,066 persons examined. Of these, 88 or 2.2 percent were in the first stage; 16 or 0.4 percent were second stage; and 6 or 0.1 percent were in third stage silicosis. Of the 110 cases 15 or 0.7 percent showed signs of tuberculosis.

"The engineering investigation covering all of the 311 foundries in the State showed that 32 foundries or 9.7 percent of the total were in good condition as far as the silicosis hazard is concerned; 91 or 27.5 percent in fair condition; 150 or 45.5 percent in poor condition; and 57 or 17.3 percent in bad condition. Great variations were found in the character of the dust problem from one plant to another. The general conclusion was reached that proper plant operation—particularly good housekeeping—rather than additonal mechanical equipment—would seem to be the most important factor in preventing silicosis in this industry."

Theodore Hatch, Associate Dust Control Engineer of the Division of Industrial Hygiene who has been associated with the foundry study in New York, in an article, "Outlines of Measures for Dust Control in Foundries of State" (10), points out that no single solution of the problem of dust control will meet the requirements of every foundry, that "proper plant layout, building construction and the continuous application of the common-sense rules of good housekeeping constitute the major parts of the control program, especially in small jobbing plants, and above all there must be complete understanding and acceptance of the program, beginning with the plant manager and extending down through the whole organization."

Accrued Liability

In Wisconsin, compensation paid for silicosis, after becoming compensable, continued to increase for several years, reaching a high in 1933, since which time payments have decreased. An accrued liability from silicosis existing at the time of the effective date of the act, had to be discharged before dust preventive measures could have their full effect in keeping down silicosis claims.

Forewarned has meant fore-armed to many of Ohio's foundry operators, who have taken the proverbial stitch in time by being diligent in the practice of dust control. Much remains to be done in installing and refining dust preventive and control equipment, but we believe and trust that no particularly large accrued silicosis liability exists.

Hayhurst (9) has given figures that show the number of accident claims in Ohio for the year 1936 to be 202,580 and the number of occupational disease claims 1,376, which is about one occupational disease claim to 150 accident claims. The average accident claim covered by the State Fund costs $66.14 while the average occupations disease claim cost $114.35. For the same year the disbursement for accidental injury was $12,866,740 and that for occupational disease was $149,570, about 1.15% of the total of compensation disbursements.

The physician, the bacteriologist and the biologist, have almost doubled the average life span of man in the last 100 years, largely through surgery and control of epidemics and infectious diseases and reduction of infant mortality. During this same period there has been an industrial revolution that has changed small hand production to machine mass production and developed and brought into use many new processes, new substances and new chemicals. The scientist and industrialist have been so busy, each with his respective important task, that exposures of workers to occupational health hazards incident to employment have been until recently unnoticed and protection neglected. But now industry and the state realize the importance and the duty of protecting the worker in his employment against unhealthful occupational environment as well as against accident and are cooperating to eliminate or control industrial health hazardous exposures. We are facing new conditions in preventive medicine, where prevention lies in the hands of the engineer. It will avail little of practical value if the physician ascertains the existence of disease and the chemist determines the nature and amount of the causal air-borne noxious substance, unless the engineer can find some way for preventing its inhalation by the worker. We look to the engineer to supply the principal preventive means for a great advance in the conservation of human health in industry. (Applause.)

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CHAIRMAN BYRUM: Thank you, Mr. Young. Now, men, I want you to feel perfectly free to ask Mr. Young any questions you have in mind. This is your part of the program and the part from which you should get a lot of good. I would ask that you kindly mention your name and connection, if you care to discuss from the floor or ask any questions. Who will kindly start this interrogation?

MR. D. OLDHAM: I noticed there you stated that the shake out and sand blasting is the worst condition noticed anywhere in the foundry for dust control.

MR. YOUNG: What is the worst condition?

MR. OLDHAM: What is the worst occupational condition in your mind?

MR. YOUNG: Well, I don't know. That would depend, of course, on conditions in the foundry, and probably one foundry would have a worse condition than another. It appears that the best shake out is the hardest to control. I have seen shake out operations which are mechanical shake outs. It seems it is impossible to control the dust because of the large volume and the large area, but the dry sand I would say. Of course half mud is liable to produce more dust and in the shake out operation the sand blasting, of course, is generally controlled. Then there is a break-up and there is a steel shot used a good many places where you don't get sand except from the sand on the casting. You don't get the carborundum or the abrasives, from what I have seen. I want to say we have not made a systematic study of foundries in Ohio. That is one reason I gave you information from other States that have made a study of it and referred to the State of New York which has made the most comprehensive study and our Department has not particularly studied foundries. We have been in existence two years and we have made more lead study than foundry study because we thought there were more instances of occupational disease.

MR. OLDHAM: What I want to determine is whether there is any difference in figures on grinding dust as a type of abrasive wheel. I have never been able to determine the silica condition of the different types of wheels.

MR. YOUNG: Your wheels are no longer composed of silica. The old grindstone was a sandstone but our wheels are carborundum or aluminum-oxide and emery. Although carborundum contains silica it is not of the size that is particularly harmful. We do not think it is. The cutting action of the silica in the lungs. We think it is the solubility. We thought that fifteen years ago but we think silica has a chemical reaction so we don't consider carborundum for emery wheels particularly harmful. Of course all dust concentration becomes harmful after a while. Too much dust we consider harmful as a nuisance. Silica is the part known by the medical world as the one that does the harm.

CHAIRMAN BYRUM: Anybody else have anything to offer along the line that can help the gentlemen?

A. R. GOYNES, Twin Coach Co., Kent, Ohio: I would like to ask Mr. Young a question. Will moisture carry the dust particles?

MR. YOUNG: We think so. We have taken dust down in sandstone lock operations where they grind and finish with water, with a spray of water. We can get considerable dust concentrates. Yes the water particles carry the dust. As it evaporates the dust will be in the atmosphere. So you must be careful about applying water. Since the water evaporates and the dust particles are in the air.

MR. GOYNES: I don't mean that Mr. Young. I mean the painting of buses and precipitation from your spray as it flies through the room itself, of course, in different places, and will that in time cause silicosis?

MR. YOUNG: If that material contains silica it would. If it contains lead, of course, it would cause lead poisoning. As to your spraying carrying the dust, as it evaporates the dust is left in the air. If the dust was carried by water or if it was lead the lead would be there and one would get the lead. If silica, you'd get silicosis in time.

MR. GOYNES: Thank you very much.

CHAIRMAN BYRUM: Any more questions, gentlemen?

MR. WALTER J. BLOOM, Otis Steel Co., Cleveland, Ohio: I would like to ask Mr. Young a question about the Rand-Upson process where samples of cement have been offered as a substitute for sand as holding a minimum of silicates. Just what is the comparison of cement to sand? How does it compare with sand, is there such information available?

MR. YOUNG: We don't have it but it depends on the contents of silica, as calcium silicate and cement dust have not been proven to be harmful especially in comparison with silica. I heard a talk last year by one of the men in the Cement industry in which he gave figures and statistics to show how harmless cement dust is and we must agree, as compared to silica dust, cement is relatively harmless. Limestone dust disappears in the system and does not seem to affect the lungs.

MR. H. JOHNSON, The Hoover Co., North Canton, Ohio: I would like to ask Mr. Young his experience with bakelite in regard to silicosis.

MR. YOUNG: We have had no experience. I do not think bakelite contains silica. It is my opinion that bakelite is resin, and I do not think it contains any silica.

MR. R. J. THOMPSON, of the National Malleable Co.: As one who has had experience in both cement and foundry I would just about as soon breathe foundry as cement dust. Both are rather harmful. I would like to ask Mr. Young what method he recommends for collecting the test sample.

MR. YOUNG: I wanted to dodge that question if I could. (Laughter.) To give you an idea, I want to say the first dust counts were made along between 1900 and 1910 in South Africa. They used a granometer for five cubic centimeters, and grouped the samples. They took hundreds and thousands of samples and the relative counts enabled them to finally consider that hazard there, as I have mentioned in my paper. The principle is pulling the air and impinging it on a plate coated with vaseline or some material that is clear. The standard method and the method that we use is the Impinger method. That is the method that has been developed by the United States Public Health Service and it is valuable because we have used

that method in reports and studies made during the last fifteen or twenty years. With that method they have collected samples and established what we consider the limits or amounts. For that reason that instrument has become valuable. One can say why not take another instrument and have it interpret the counts? That is impossible because the instruments may not collect the particles in the same manner. This is the count on the Impinger and we count with a light or dark field. I want to make it plain that the count of dust particles is not necessarily actual. If you get the same air from time to time and the same light or dark fields you will get a relative index, so the dust count is considered comparatively and even if not accurate, it is valuable; but the trouble with the Impinger, you have to use great precaution. It takes time to collect air pressure to collect the samples, and it should be checked over a period of time. It really takes some one that makes it his business to take care of the instrument and collect it. There is a new instrument put out by the Bausch and Lomb Co. These instruments are valuable for rough and comparative concentration. You can control it that way, but I would say your question has not been answered as to what the best method is. Thank you.

MR. C. L. KOHLER, General Industries, Elyria: I should like to ask Mr. Young a question. I heard the question this morning on bakelite. There are several questions I should like to have answered. What effect does the plastic material have on the lungs? We do know that it has an effect on the skin tissue such as itching and it can become very serious. We have not been able to find out what effect it has on the lungs. Do you suppose it will be possible to get that anywhere?

MR. YOUNG: I have not seen any information or articles. I cannot answer it and I cannot recall any work done on it. There may have been. If anyone of our Department knows of any work; the doctor should know if there has been anything done on that line.

CHAIRMAN BYRUM: Is there anyone who can give us any help on this? Are there any doctors in the audience who can help?

MR. KOHLER: I know, Mr. Chairman, there have been quite a number of chemicals on the market to take care of the condition but we haven't had any trouble as for as lungs are concerned. We want to prevent that if we can. We do not know what might happen in the future. If we can protect ourselves against that it is so much to our benefit.

CHAIRMAN BYRUM: Are there any other questions?

MR. F. K. DONALDSON, the Machined Steel Casting Co., Alliance, Ohio: What methods have been used to determine the chemical composition, in other words, the amount of free silica contained in the dust?

MR. YOUNG: I quoted in this paper some determinations that were made and the method of determining the silica. I would say that no one satisfactory method has been worked out that is quite accurate.

MR. JOHNSON, the Hoover Company, North Canton: I wonder if this question might be in order or answered from the floor, as to what methods there are at this time or have been in the past by the companies represented along the line of periodic physical examination, and how often and whether any examinations are taken periodically of foundry workers, working in sand, especially on the shake-out. The reason I asked that question is that we take an annual examination. I wondered if that is often enough. From our statistics it shows in our work it is often enough. I am wondering if we can get that information.

CHAIRMAN BYRUM: I don't know how many of you men have attended some of the sessions of the Safety Engineers, but I happened to sit in when Doctor Sappington talked a couple of years ago. It is difficult to determine when we should do certain things. I asked him specifically how often it should be between the time a man was exposed to high content silica dust until we could anticipate the man might be incapacitated from work. He said about fifteen years. He said books of tests well authenticated indicated that the man had involved lungs and I asked him, "Do you mean to tell me those men are working?" He said, "Sure, there is no reason in the world why they shouldn't be working, because," he said, "they will continue until something other than silicosis enters the picture." In other words when they become involved with some other disease, but the direct effect of silicosis would not be sufficient to incapacitate them for a considerable number of years. I don't know just what it means, what it is leading to, but we have a problem of dust control in foundries. As far as I can see we must get busy and do something about it. As clean as you can make a foundry, it probably would not be clean enough. I am taking time because I am intensely interested. I don't know how you conduct your shake-outs but we do all of our shake-outs at night. I don't know whether we are rocking ourselves in a cradle that is likely to upset or whether we are lulling ourselves into a sleep from which we will suddenly awaken, we feel like the less men exposed to a hazard of silicosis the better and we conduct the shake-out when the lesser number of men are present in the foundry. Did you ever look at the Drinker's book and see what happens to the dust content of a room over a period of twenty-four hours? You will notice the effects of three or four samples of dust taken at different times after they had known such dust existed and at the end of twenty-four hours you had the kind of dust we talked about as harmful dust. That is where they got their bad samples. We do our shake-out at night and in twelve or fourteen hours we have the bulk of our men on the job and in what kind of an atmosphere? Some day I predict our foundry will be protected in a manner that we can safeguard these known conditions. We will spend more money on the control of dust matter than we will for putting fresh tombstones out in the graveyard, no question about that in my mind at all. That is the constructive way to do it and if we can segregate these things instead of having the atmosphere spreading all over the plant and as it proceeds through the plant becomes more dangerous, we will confine it into a space where we know that it is not going to permeate the atmosphere the bulk of our employees are going to breathe. That will come. It will cost money but over a period of time, we will spend less.

MR. RENTSCHLER of the Hamilton Foundry Co.: We have an Indiana plant and we X-rayed every man. We had a hundred and seventy-eight employees and we had nine with tubercular condition. We got them all out of the foundry. One man came back to work three weeks ago. By taking the rest cure he passed an X-ray examination. One man is in the veterans' hospital at Dayton. He had a condition that has been traced back to his war service. It was surprising to us to find that it took some of the huskiest looking men in the plant. In fact these nine were about our best molders. They had no silicosis but they did have tubercular condition. It seems most unusual to run into a condition like that. We are contemplating some similar plan in our Ohio plant but I don't know how far we will get with it. It is quite informative to run into the condition we have in that plant.

CHAIRMAN BYRUM: Thank you.

MR. YOUNG: In reference to silicosis, that depends on the extent of the exposure. We try to keep the dust concentrates down to where one would not get it. In very high concentrates it might develop quickly.

CHAIRMAN BYRUM: Any other questions, men?

MR. MILLER, of the United Engineering Co., Canton: We have a large foundry,

roll finish entirely, and we have to pull our castings hot and when we pull castings hot they make a lot of dust. I want to ask if there is any known method of overcoming that.

MR. YOUNG: I'm afraid that would be a question for an actual foundryman to answer. Of course the way to control it is to get an exhaust to carry the material away, if it can be applied. The old answer to such questions nearly always there is some mechanical way to carry these dusts away. If there cannot be and during the time it cannot be, then individual respiratory protection should be provided for the individual. Individual respiratory protection is the last measure because of the question of having the men wear masks.

CHAIRMAN BYRUM: Well, have we answered your questions and set your minds at ease on silicosis? If we have, I should like to ask the following gentlemen to act as a nominating committee for the officers of this Section for next year. Mr. Mike Miller of the Tappan Stove Company of Mansfield, Ohio; Elmer Mulvaine, Marion Steam Shovel, Marion, Ohio. I would also ask if Mr. Fred Bennett is here. I don't think he is. If you will get together and select nominees for next year's Congress and report after the next paper I will appreciate it very much. Well, the next subject, men, we are going to discuss is "Safe Practices in the Foundry." We have invited a young man to discuss this subject who is connected with a large foundry up in Cleveland. I am going to ask Mr. Walter J. Bloom, of the Otis Steel Co., of Cleveland, to discuss this subject at this time.

Safe Practices in the Foundry

WALTER J. BLOOM,
Otis Steel Company, Cleveland, Ohio.

Thank you Mr. Byrum and gentlemen. We have gone a long way in Safety Work, patting ourselves on the back from time to time, damning our luck on other occasions, and we have talked about quite a few things but it seems to me that this is the stage of the game it might be well to look back a little bit and consider some of the basic things. "Safe Practices in the Foundry" is the title of my paper, but it is a litle bit of a misnomer. I am not going to go into safe practices very deeply, because the National Safety Council and various organizations have given you good sound definite information on it, and you have your safe practices pamphlets. It is my opinion that most of the outstanding safety records that have been achieved within the foundry industry have been obtained through the application of a few simple, yet fundamental principles. These principles were determined by careful analyses of the relative effectiveness of experimental accident procedures. In the early years of industrial safety work, for example, general improvements in the physical conditions of the foundry and mechanical safeguarding of machinery was expected to eliminate the majority of accidental injuries to workmen. Carelessness was considered to be a factor that might affect the anticipated results somewhat, but its relative importance with regard to the problem as a whole seemed negligible. Subsequent experience however, has indicated that almost the direct opposite of this is true and that the ultimate success or failure of any accident prevention program is largely dependent upon elements originally considered to be of minor significance. In fact, studies of the accident experience of foundries and of industry as a whole, definitely show that not more than 15% of occupational injuries are mechanically preventable.

As a result of these findings, alert foundry operators, *without neglecting the purely mechanical phases of accident prevention,* have adopted various methods of equipping their foremen with means of developing those habits of worker thought

and action which have been somewhat loosely defined as "safe practices." In other cases, management conceded the apparent merit of a program of employe education in safety to be carried on through the foreman but turned to other matters after placing the entire responsibility for the application of the principle in the hands of the safety department and individual foremen.

There is no question I believe, that foremen generally are conscientious, competent fellows willing and anxious to carry out the directions of management to the best of their ability. As an individual he realizes I think, that he must play an extremely important role in the establishment and maintenance of worker interest in accident prevention. It must be obvious however, that any foreman, even with the advice and guidance of a competent safety organization behind him to spur him on, will gradually lose his enthusiasm for safety if management stresses other functions to the exclusion of accident prevention. It follows therefore, that safety is clearly a management responsibility and obligation.

The supervisory personnel is an extension of the arm of management that reaches down to the very roots of accidents and since safety is an integral part of good operating practice the foreman should be given at least as much assistance in it as he is given as a matter of course in production activities.

In the foundry industry, the foreman in almost all departments is a highly skilled mechanic respected for his ability as an artisan as well as for his qualities of leadership. To do his job in safety capably he must also acquire a good working knowledge of effective accident prevention procedure in order to instruct old and new workers in the safest working methods.

The continuous process of safety education necessary to instill safe working habits in the minds of workmen requires a person of enthusiasm, tact, judgment, ability and sincerity, constantly in contact with the worker. This person must of necessity be the workers' foreman.

After his instructions have been given to the men under his supervision the foreman must maintain frequent personal contacts with each individual worker to see that they are carried out and to determine any change that may have occurred in the worker's mental attitude toward safety since his instructions were issued. He must investigate the causes of accidents and near-accidents to be able to assist in recommending procedures to prevent their recurrence. He must be constantly on the alert to detect and remove physical hazards about the plant which might cause accidents in the future and see to the installation of necessary mechanical safeguards in cooperation with the safety department. In addition to his safety job, and in conjunction with it, the foreman must maintain a competent productive working force capable of turning out work comparable with the best in the industry.

One of the most important of all functions of the foreman is the correct interpretation of his company's policy in regard to employe safety, welfare and other relationships. Since the foreman is frequently the only representative of management and person of authority with whom the workers are in direct contact, his attitude is often accepted by them as being the attitude of management.

The chief operating official as the representative of management directly responsible for the smooth operation of the organization must recognize the vital importance of the foreman in regard to these problems. In order to insure correct and proper interpretation of general policy and stimulate the foreman's enthusiasm for safety, he must take an active part in the accident prevention program and do it in a way that will make his interest evident to everyone.

The foreman will do his best job in safety if he is convinced of the interest and has the unqualified support of his superiors in the undertaking. However, there is nothing that will destroy his interest quicker than half-hearted support or unnecessary and unexplained delay in carrying out his safety suggestions. With this thought

INHALATION OF DUST AND CONTROL OF DUST HAZARDS

MR. WILLIAM C. JAMES,
Safety Engineer, Portland Cement Association, Chicago, Ill.

Mr. Chairman, gentlemen:

Confusion still seems to be the dominant keynote outside the research laboratory in this question of occupational "dusty-lung" diseases. Terms such as pneumoconiosis, silicosis, siderosis, chalicosis and even silicatosis are bandied about indiscriminately and often without meaning. Usually, the mere mention of dust in a conversation inspires visions of high mortality, high sickness rates and a long trail of serious hazards.

The term "pneumoconiosis" is often interpreted to mean a disease of the lungs, resulting from dust inhalation. Actually, it means simply "dusty lung." In the early history of lung disease it was thought that all dusts caused the same disease reaction and this term was applied to that disease. Modern research has demonstrated that most dusts are harmless. The term "pneumoconiosis" therefore should assume its primary meaning and when applied to an individual can rightly be interpreted only as indicating that the person has inhaled dust. Dr. Leroy U. Gardner, referring to non-specific pneumoconiosis says, "Such changes have no clinical significance and produce neither symptoms nor interference with working capacity. They are of no more importance than the callouses on the palms of the hands." Any person in any environment may develop this condition. Even office workers in large industrial communities may show X-ray evidence of having inhaled dust, but such evidence is meaningless as far as health is concerned.

Of the various strictly industrial dusts, coal and iron ore are perhaps most spectacular in their appearance in the lung. Early investigators, and by this I mean investigators in the first 16 or 17 centuries of the Christian era, were so impressed by the lung pigmentation of workers in iron ore and coal that they credited these substances with a prominent part in the development of lung disease. Modern research has demonstrated that this coloring of the lung tissue is, in itself, of no significance.

Only two substances are now known to cause a definite lung disease, namely, asbestos and uncombined silica. Research men who have dealt specifically with dust diseases have long recognized that dusts with a low silica content are free from health hazards. Compensation insurance actuaries are also accepting the fact, as is demonstrated by the rates they have set for the cement industry. Cement quarries contain mostly limestone, in which quartz constitutes less than 10% of the total rock formation. In California, cement plants and quarries have been entirely excluded from the occupational disease rate schedule. Indiana and Illinois both have all-inclusive occupational disease laws. In these states, a rate of only five cents has been set for both cement mills and quarry operations. That this rate is based on a known absence of hazard is evident when it is considered that quarries other than cement quarries have been assigned a rate of $1.14 in Indiana and $1.20, which is 24 times the cement rate, in Illinois.

In Michigan, which has a schedule type law, the cement industry's rate is two cents. Other quarries have been assessed at the rate of forty cents in this state. New York State, which has a liberal combined schedule, and all-inclusive law, has set a rate of eleven cents for the cement quarries. Quarries other than cement have been given a rate of $1.07.

Inhalation of free silicon dioxide (usually quartz) in excessive quantities over a long period of time causes the disease, silicosis. You will note particularly that three factors are necessary to the causation of this disease:

1. Free silicon dioxide (usually quartz), in particles less than 10 microns in greatest diameter.
2. Excessive concentration.
3. Long period of exposure.

Particular emphasis should be given to these limiting factors: First, "free silicon dioxide, less than 10 microns in greatest diameter." This means exactly what it says—not calcium carbonates, not iron oxides, not silicates, not even silicon carbide (which is carborundum) but free silicon dioxide. It seems probable that no little confusion has arisen in the minds of plant superintendents and engineers of the time-honored practice by industrial chemists of reporting an analysis in terms of the oxides of the components. For example, a typical reported analysis of Portland cement will show a total silica content of about twenty per cent. Actually, all of this silica is combined in the form of entirely harmless calcium silicates, and it has been conclusively demonstrated that it is utterly impossible to acquire silicosis from exposure to cement dust. It should be mentioned that quartz is not the only form of free silica, though it is apparently the most dangerous and certainly the most common form. The various amorphous forms of the compound, such as flint, tripoli and chert, may also produce the silicotic reaction in the lung, but they are known to be less severe in their effect.

The limiting size of ten microns is also of importance. Particles larger than this do not reach the lungs. Furthermore, the percentage of quartz in a given material will vary greatly with the particle size. A petrographic examination of shale at Saranac Laboratory under Dr. L. U. Gardner's direction, recently revealed 20 per cent quartz. In a special fraction containing only large particles, 40 to 50 per cent quartz was found.

Dr. Gardner writes, "this is obviously due to the fact that quartz is so hard it does not fracture into fine particles." It must, therefore, be emphasized that conclusions as to the hazard existent in a dusty operation cannot be based with confidence on an analysis of the parent rock. Only an analysis of the dust in the breathing zone of the operator will give an accurate picture of conditions.

The second limiting factor is concentration. The exact amount of air-borne quartz that constitutes a dangerous concentration in any particular industry is not easily determined, nor is there as yet any substantial agreement as to what limits of quartz content should be observed.

Dr. A. J. Lanza, Assistant Medical Director of the Metropolitan Life Insurance Company, an outstanding authority on the silicosis problem, gave an excellent summary of what needs to be known about dust concentration in his paper presented before The American Institute of Mining and Metallurgical Engineers, in February, 1937. He said:

"In the present state of our knowledge, it is not possible to establish permissible limits of dustiness for all dusty industries or processes as the variation both in the dust content and in external modifying conditions is so extreme. In mining, however, working conditions are fairly constant and it would be extremely valuable to the industry if the various mining companies that face a silica hazard would establish, with the help of the proper governmental authorities, tentative standards practicable and applicable for their own mines. Some have done so and it is a long step in the right direction."

This recommendation might well be extended to other industries.

The National Silicosis Conference tentatively established a maximum of five million particles per cubic foot as a safe quartz concentration in the case of highly siliceous dusts. This standard is subject to modification as more data are developed by different industries. The National Silicosis Conference report also says, "It is recommended that clinical and engineering studies be carried out as rapidly as pos-

sible to establish the necessary scientific data upon which we may base practical and effective regulatory standards." The report then states that knowledge of three factors is necessary for establishing safe concentration of atmospheric dust:

1. The relative number and size of the free silica and the other particles suspended at breathing levels in the different parts of the industrial atmosphere.

2. The proportion of the workmen's time actually spent in the various dust concentrations.

3. The effects of exposure to environment, as revealed by the occupational and medical histories of old employees, by physical examination and by the roentgenological appearances of their lungs.

Through a knowledge of these three factors, any industry can discover what, if any, hazard it has and what preventive measures are needed. For the past two years, under the direction of Dr. Leroy U. Gardner of the Saranac Laboratory for the Study of Tuberculosis, the cement industry has been making a careful estimate of the health of its workers, according to the plan just outlined. Many of the statements in this paper regarding the effect of mixed or non-siliceous dusts have been based on the findings of these studies.

One of the outstinding conclusions a student of these researches in the cement industry will reach is that concentrations of free silica appreciably higher than the maximum specified by the Silicosis Conference are safe if the silica constitutes a moderate proportion of the total dust. Apparently a mixture of silica with other minerals, if the other minerals are predominant, tends to inhibit the effect of the silica in the lung. It is not yet possible to recommend, without reservation, the dilution of silica with other dusts as a protective measure. It is far better to remove the dust from the atmosphere. Nevertheless, it is significant that in the Portland cement industry, where a high concentration of raw material dust containing up to 10 per cent of free silica is sometimes found, the X-rays and physical examinations reveal no pathological lung condition attributable to dust.

Although no agreement has been reached as to the maximum safe concentration of free silica in the presence of harmless dusts, agreement as to good housekeeping limits is practically unanimous. Industries with a dusty process, even though dusts are harmless, should endeavor to reach a concentration in the neighborhood of 100 million particles per cubic foot of air in the breathing zone of the workers, in the interests of comfort and increased efficiency.

The third factor in the development of silicosis is duration of exposure. The problem of exposure resolves itself into two parts. First, what proportion of the workers' time is actually spent in the dusty atmosphere? It is evident that a hazardous dust will not affect a man unless he is actually exposed to it and will not have as great an effect on a man who is exposed to it one hour a day as on a man continuously exposed.

The United States Public Health Service has developed a formula for calculating the actual exposure in terms of particle hours. They recommend, in Bulletin 217, "The Determination and Control of Industrial Dust," that the particle concentration in any area be multiplied by the number of hours an employee works in that area; that this product be calculated for each hour of the working day and that the total of these products be divided by the number of working hours to give the equivalent of continuous exposure during the day.

For example, a man may spend two hours a day in a concentration of 200 million particles per cubic foot; three hours in a concentration of 10 million particles; one and three-quarter hours in a concentration of 40 million particles and 15 minutes in concentration 1,200 million particles. The man's exposure would be calculated:

Hours per day	Dust Concentration	Particle-hours (millions)
a	b	a and b
2	200	400
3	10	30
2¾	40	110
¼	1010	260
Total Hours 8		800

$$\frac{\text{800 particle hours in millions per cubic foot}}{\text{8 hours}} = \text{100 million particles per cubic foot daily exposure}$$

The application of this formula in a practical problem is apparent. If you find, from a study of concentration and silica content, that in two or three areas in your plant atmospheric dust exceeds safe limits, you will make an analysis of the exposure by the P. H. S. method and attack first that point where employee exposure is the greatest.

How long does it take silicosis to develop? The answer to such a question must be equivocal. Much depends on the physical condition of the worker. A man whose respiratory passages have been damaged so that dust is not readily excluded by the usual protective mechanism, may contract silicosis more readily than a man with normal nasal and bronchial passages. Also a man whose lungs have been damaged by pneumonia or tuberculosis may develop silicosis more quickly. We are probably all familiar with the reverse of this; i. e., that the man with silicosis has much less resistance against tuberculosis than a man with unaffected lungs. This fact, incidentally, suggests one of the outstanding differences between the action of silica and other dusts. Medical authorities state that not only does the silicotic lesion in the lung resemble the lesion in tuberculosis, the silica actually stimulates the activity of tuberculosis and, at the same time, conceals its symptoms until it is far advanced. The seriousness of such a condition may readily be imagined. A tubercular with significant quantities of silica in his lungs may be rapidly getting worse, yet diagnostic symptoms are often lacking. Frequently only a careful X-ray examination can reveal the presence of tuberculosis in a silicotic. Mr. P. N. Bushnell, speaking before the Metals Sections of this Congress last year, emphasized the fact that the real danger from silicosis is not silicosis at all, but tuberculosis. First or even second degree silicosis, uncomplicated by tuberculosis, usually causes relatively slight disability, seldom pronounced enough to interfere with working capacity. No worker should be deprived of an opportunity to earn a living at his regular job just because his X-ray shows some signs of nodulation. The job should be cleaned up by approved engineering methods, of course, but discharge of workers who are perfectly capable, simply because of a non-symptomatic condition which hysterical opinion has magnified out of all proportion, is certainly not the solution of the problem. Inert dusts do not produce the typical nodular lesion, nor do they cause any increased susceptibility to tuberculosis. In the cement industry, for example, only 4% of the X-rays of 1700 employees revealed old tuberculosis lesions and 96% of these lesions were healed or quiescent. Studies of absenteeism over a two-year period, covering the majority of mills in the industry, confirms the X-ray evidence. The mortality rate from tuberculosis of 0.07 per 1000 employees in 1937 is only 8% of the tuberculosis mortality rate of 0.87 per 1000 employed males established by the National Tuberculosis Association in a comprehensive survey in 1930.

The various factors which may influence the length of time required to develop silicosis, if we may recapitulate, are (1) intensity of dust concentration, (2) pro-

portion of free silica in the dust, (3) proportion of working time employees spend in the dusty atmosphere, (4) condition of employee's upper respiratory tract, and (5) condition of employee's lungs.

In any case, it is extremely doubtful that first-stage silicosis will develop in less than seven years, except in the presence of active tuberculosis. Dr. Gardner says that for silicosis to develop in five years, the exposure must be intense. The National Silicosis Conference report, to which we have previously referred, says with admirable skepticism, "There are reports of a few cases of the disease developing in as short a period as one and one-half years. In these instances, the individuals were exposed to excessive concentrations of extremely fine silica in almost a pure state." The report then states that exposures to low concentrations of silica may sometimes continue for thirty years before the condition develops to the stage where it can be called silicosis. In such cases, possibly another 15 or 20 years would be needed before any disability would be noticed. A great majority of the cases have had at least seven years' exposure. Thus it will be seen that silicosis is a very slowly developing disease, which, in the absence of infection, is not especially dangerous. In the presence of infection, however, the picture may be different.

No attempt has been made to separate the two sections of this paper, as indicated by the title, since the discussion of the problem is too intimately bound up with the methods of solving it. There are, however, some details of prevention which, for the sake of completeness, should be mentioned.

It might be worth while to think about the methods of determining dust concentrations. The quick sampling, easy counting devices on the market now probably fill a definite need, but their use is not altogether an unmixed blessing. The standards mentioned in this paper are all based on the United States Public Health Service's impinger technique with light field count. It is a complex technique requiring skill and experience to operate successfully, but it is the standard counting method in the United States and results of short-cut methods have not been shown to be correlative with it. After dust control has been instituted and the impinger technique has shown that concentrations are within safe limits, a simpler technique might be permitted for periodic checks on the efficiency of the control system. But don't be surprised if your counts with the simplified technique soar way above the impinger counts. The dark field illumination will uncover a large number of particles, apparently too small to have any effect, that are screened out by light field methods. The result is similar to the effect of a strong beam of light in a dark room. This difficulty can be overcome to some extent by taking impinger samples and samples by the other technique simultaneously, as soon as dust control equipment is installed, thus getting as much correlation as possible between the two techniques at the beginning.

A general paper of this type is not a suitable place to discuss the relative merits of different types of dust control systems. There are, though, a few principles which can be properly mentioned. Wherever possible, dust should be removed at its source, before it reaches the workroom atmosphere. Methods of accomplishing this vary with the process and should be decided upon by competent engineers after a careful study. In milling processes, closed, dust-tight systems with adequate separators and collectors may be adequate. Water sprays are sometimes effective where they can be used. In the quarry wet drilling is often all that is necessary to bring concentrations down to safe limits. Sometimes more elaborate dust traps are needed, either independently or conjunctly with wet drills.

Some processes are not amenable to control at the source. In such cases employees should be required to use respirators or masks of approved type. All of these methods have their place. The right one for each location must be determined by a thorough engineering survey.

The importance of good housekeeping cannot be too strongly emphasized. Much

of the dust nuisance can be eliminated by systematic routine and thorough clean-up programs. The advantages are obvious. The plant is much better looking and, in addition, the atmospheric dust is reduced.

Medical control is equally important. The only sure way to know that a hazard does not exist is the careful observation of the workers over a period of years. Pre-employment examinations are, of course, also important for proper placement of applicants.

In this paper we have presented some of the salient features of the silicosis problem. We have, first of all, emphasized that only two pneumoconioses are actual diseases, silicosis and asbestosis.

We have pointed out that there are three causative factors of silicosis and all three must be present simultaneously to produce the disease.

1. Uncombined silica in small particles, of which the most dangerous is probably quartz.

2. Sufficiently intense concentrations of the dust to be hazardous. This concentration is set at five million particles (light field count) of quartz less than ten microns in greatest diameter, if the quartz constitutes a high percentage of the material. Studies in the cement industry have demonstrated that, in many cases, appreciably higher concentrations of quartz can be tolerated when inert dusts, as clay or limestone, are intermixed with the silica.

3. Exposure by the employees over a sufficiently long period to high concentrations of silica of the necessary fineness.

The influence of silica on tuberculosis is strong, whereas inert dusts have no effect on this disease. Serious disability from silicosis, especially in the first two stages, usually results from infection, rather than from the uncomplicated disease. If the working environment is adequately clean, a silicotic need not be denied work as long as he is free from infection and is capable of doing his job.

Methods of control of the disease include pre-employment and periodic medical examinations, removal of dust at point of origin, emphasis on good housekeeping and the use of respiratory protective equipment where removal of dust from the atmosphere is not possible.

It should be emphasized that control, especially engineering control, of the silicosis hazard is the phase of the problem that is of greatest importance to those of us who are interested in the practical methods of eradicating the disease.

Dr. A. R. Riddell of the Ontario Department of Health, whose work in the gold fields of Ontario has won for him an international reputation, put the problem squarely up to the engineers when he said: "Silicosis is an occupational disease declining in importance. Its prevention is not a medical problem. As it occurs exclusively through the inhalation of dust containing silica, its prevention depends on the elimination of dusts industrially produced. This is a problem for the industrial engineer. Engineers have met the problem so energetically and with such intelligence that the occurrence of silicosis in many operations now considered hazardous will cease entirely during the next fifteen or twenty years."

(Applause.)

CHAIRMAN WITMER: Has anyone any questions to ask Mr. James? Dr. Obetz, will you please take over the meeting now to discuss this subject?

DR. OBETZ, Medical Director, Industrial Commission: I don't know that I have anything to add or discuss. I would like to have anyone here ask Mr. James any questions that they may have in mind in order that they may fully understand the hazards that are present in the quarry industry.

MR. NIEMAN: I understood the speaker to say something about asbestosis.

MR. JAMES: As I understand it, asbestosis in magnesium silicate—it has been developed that the appearance, as I understand it of a lung affected with asbestosis isn't quite the same as silicosis, but at the same time it has been definitely shown to be a progressive disease in case of magnesium silicate, and that is the only one that has been established as being harmful. Its effect is not as great as silica.

MR. NIEMAN: It struck me particularly, it not being harmful.

MR. JAMES: It is a surprise to a great many people, I believe. Do you care to discuss that any further, Dr. Obetz?

DR. OBETZ: No, I can't, I can't give the reason for it, but I know that it is true.

CHAIRMAN WITMER: Anyone else have any questions at this time? If not we will go on to the next subject which is a round table discussion of our most serious accident hazards. Anyone here going to open the subject in an informal round table discussion? Mr. Adams, do you have anything to say on that subject?

MR. ADAMS: I don't think so.

CHAIRMAN WITMER: Well of course we have been talking all along here about serious things like the handling of dynamite, transportation, and so forth, but from reports sent out by the Industrial Commission I note that the major accident rate and the index to the accident figures for the industry, all three of these industries, lime, cement and quarries, has been in the handling of small tools, and that's true in almost every industry, I think. I know last year the subject of small tools was not discussed very fully and I think that some suggestions along those lines in the prevention of that class of accident should be discussed. Has anyone any comments to make? Dr. Obetz, probably you can give us some of those industrial figures on that.

DR. OBETZ: I am sorry, but Mr. Meehan was to be here and conduct that part of the meeting, he was called to another section. Anyone have any moughts along that line?

MR. RUTHERFORD: I might say that I had missed that in one of the hazards that I had listed there, but in my excitement I overlooked it. We have had some, in talking of small tools, especially in the quarry, from claw bars and mallets, spawls flying off of those striking the men working, and we have eliminated that to a great extent by tool inspection and repair, in other words keep the spike maul so it isn't flattened out and corners breaking off; the same way with the claw bar, where you are driving a claw bar under the head of a spike, you have some trouble there. I think tool inspection goes a long ways in eliminating hand tool injuries.

MR. ADAMS: I might ask one question, if I may. Some of our accident reports read for particle in left eye, or for a particle in right eye. I wonder if we are an exception or whether we are more careless than someone else in the wearing of goggles, or do the rest of the people have the same thing?

MR. L. C. LEWIS, of the Industrial Commission, Division of Safety and Hygiene: I think about every industry I have come in contact with has the same complaint that you have just mentioned, particularly the coal mining industry. They take a pick, strike a piece of coal, piece of steel, the first thing you know something in the eye, and the proper wearing of goggles, that is the proper kind of goggles, naturally would eliminate that condition. There is no question about it. Some mines now are one hundred per cent in the reports of their accidents that they have been sending in to the Industrial Commission; one-fourth or twenty-five per cent of the accidents occurred were from the eye. That one firm has totally eliminated the eye accidents,

that's the Akron Coal Company over in Guernsey County. Now, hand tools, there are quite a number of injuries come from hand tools, and I am glad to hear Mr. Rutherford suggest that proper inspection of tools. I have gone into different plants, and with the hand tools, even the hammer, the hatchet was loose on the handle, men would take it; I have seen the hatchet fly right off when they were trying to drive a nail; I have seen it move sufficiently when they were driving a nail and hold it with their hand, the hammer would hit the wrong nail, consequently it was an injured finger. I think one of the best suggestions that you made is to see that your hand tools are inspected. I have seen crow bars set out in the winter, full of frost, picked up by a man, and to my surprise one day I saw a man, he wanted to take his gloves off, change his gloves, he put the small bar right in his mouth, you know what happened, his tongue was stuck on the bar, he had to wait until it thawed free. I saw another man putting his bar up to his mouth, just that way, moved his cigarette or cigar, whatever it was, and the bar touched; infection set in there, that man was laid up for six weeks just because of an infection that came on his upper lip because of the contact with the frosted steel bar. So if the tools were put in the proper place, kept in the right condition, properly inspected, I think you would eliminate many injuries. Using the goggles, naturally would eliminate the eye trouble, that is at least ninety per cent of it, and I think there should be a rigid enforcement of the proper use of goggles.

CHAIRMAN WITMER: I think Mr. Lewis has very ably answered your question, but I would like to call on Mr. Weber to give you a little more detailed answer with regard to the frequency of that same accident. Mr. Weber, what has been your experience?

MR. F. W. WEBER (Standard Lime & Stone Co., Woodville, Ohio): We have had quite a few accidents, in fact we had our last one about seven years ago, which was a lost eye, and since that we gradually got the men to wear goggles, and of course we tried to make them wear them at first, and we found out during the program that all goggles didn't fit everybody alike, but we finally got the right kind of goggles, and I think we have about four kinds that we use, and they seem to work out very satisfactorily. Some of these goggles are just ordinary large pairs of rim glasses with a shatter-proof glass in it, where they are using the lime, and I don't think we have had any trouble of anybody getting lime in his eye where they wear them. Of course they wouldn't be much good out doors where the wind was blowing a lot, but I must say we have eliminated our eye accidents. Everybody has to wear goggles, even myself, when I get in a bad place I have got to put them on. I have a pair to fit over these glasses, although I wear them lots of places where glasses are permissible. And that also applies to safety shoes, although we haven't got that a hundred per cent, we hope to have before the year is over. Take safety shoes, when they first came out you thought you had to build a pair of shoes and put a piece of iron in the foot and everybody could wear them, but they soon found out different, just like you go in a shop and buy a pair of shoes for Sunday wear, if they didn't fit you didn't take them. That was the same way with safety shoes. We finally got around where we could fit most of the men very nicely now, they have got so many good shoes on the market. The same way with other equipment such as respirators, although we don't use those so much any more. We eliminate our dust as much as we can. We don't say we are a hundred per cent free of dust, but we are a whole lot different than we used to be.

MR. LEWIS: Just one question. You mention about the goggles not being usable outside, if they have the wire gauze protection from the helmet back to the side of the head that will protect all right.

MR. WEBER: The wire gauze is all right, we have men who wear them now. They wear them under their helmet and then they use them for chipping only, they are not much protection for dust, I wouldn't rely on them.

MR. LEWIS: They don't protect from the wind.

MR. WEBER: Not where you have dust around a cement or lime plant.

MR. LEWIS: That question was discussed by a goggle salesman the other day.

MR. WEBER: The reason we use that one kind for the welder, he used to have a burning goggles and welding helmet, and also another pair for chipping, he was not going to stop to put them on so we got this other type which fits on just like a pair of glasses does, and the minute he tips his helmet back those chipping goggles are right on hand, he goes right on with his work.

MR. CORNELIUS, Southwestern Cement Company: We use a sun-right shade on our goggles. It is a transparent material something like celluloid, otherwise no opening there whatever, we find it very effective and helpful under dust conditions.

MR. LEWIS: That protects against the wind dust?

MR. CORNELIUS: Oh yes. They are open around the inside here, but the sides are closed up entirely, that gives a little ventilation around the nose, but it closes up and protects very well against winds blowing dust around like that. We went through a stage a couple of years ago of eye injuries. In one year I think our eye injuries were about seventy-five per cent of our medical cases, foreign particles in the eye. We went through what we call education or the conscious movement, we tried to make all the fellows feel that the eyes were important enough to protect and did everything we could do to make them wear their goggles and follow their helpers, where they had been doing work that there might not be the least requirement for goggles, put them on, there might be a remote chance of having something get in their eye, give themselves the benefit of the doubt and put their goggles on. For the last year and a half or two years our eye cases have been practically nothing. I don't think we had a case last year, a medical case of something in the eye.

MR. LEWIS: And yet prior to the use of goggles it ran as high as seventy per cent.

MR. CORNELIUS: We had goggles at that time, but the fellows didn't use them, but we had to get them to see it, that they absolutely needed the goggles, and we furnished them to them and all they had to do was go to the storeroom and get them and put them on, we made them available at all points where there wouldn't be any excuse that they couldn't get goggles, we eliminated that part of it, then we put it up to them. We got good results from that. So far we have got our eye condition under control.

MR. LEWIS: One statement I would like to make about John Rigby, show you how he went about to enforce the use of goggles in mines. They had been wearing them one hundred per cent. He went away on a coal sales trip with the sales manager, he came back, he saw the goggles piled in the office, 310 pairs of them. The next morning he met the men at the mine. He says, "What is the matter with these goggles?" "We are not going to wear them any more," "Aren't you? All right, it is up to you." They walked over to the gate to go down the shaft, they said, "When are you going to open the gates?" "The gates are not going to be opened not until those goggles are in you men's possession, and you agree to wear them. You men are going to be technical, so am I. Your eyes are getting hurt, not mine. If you haven't got judgment enough to protect your own eyes I don't feel you

have got judgment enough to work for the Akron Coal Company." They went home and the next morning they came back and all the glasses were out of the office before he came. So sometimes it takes discipline to handle the problem.

CHAIRMAN WITMER: Any more comments on this problem of small tools and minor injuries? If not I will call for nominations for chairman for the committee for next year. We have got to nominate a chairman for next years' session sometime, might as well get up and nominate a chairman.

Thereupon Mr. Rutherford was nominated as chairman.

MR. CORNELIUS: I move to close the nomination.

CHAIRMAN WITMER: It is moved by Mr. Cornelius that the nomination is closed. In view of that fact all those in favor of Mr. Rutherford for chairman of next year signify by saying "Aye".

Motion carried.

CHAIRMAN WITMER: Mr. Rutherford has been elected chairman for next year. In past years it has been the experience that the Chairman never acts as chairman, he passes the buck onto the Vice Chairman. Therefore we now hold nominations for the important office, that of Vice Chairman. Do I hear any nominations for Vice Chairman?

MR. RUTHERFORD: I nominate J. R. Weaver.

MR. WEAVER: I believe I will decline to accept that nomination.

CHAIRMAN WITMER: It is still open for nomination. Do I hear any nominations for Vice Chairman?

Thereupon Mr. Cornelius was nominated as Vice Chairman.

MR. WEAVER: I move the nomination be closed and Mr. Cornelius be elected.

Motion seconded and carried.

CHAIRMAN WITMER: Mr. Cornelius elected Vice Chairman. I again express my gratitude to Mr. Rutherford and Mr. James who gave us such wonderful talks here today, and I am sure that we all profited measurably by it. Is there any more business to come before the meeting, or any other remarks?

MR. LEWIS: I would like to say something before the new president takes office. There are quite a number of quarries in Ohio that never send anyone here. I would make a suggestion, it is only a suggestion, I want you to understand that our division of Safety and Hygiene is instructed to help and assist in every way that we possibly can. Mr. Kearns gave me this order, I would suggest that you get a list, your President, Secretary and Vice President get a list of the quarries from the Industrial Commission and write a letter, and if you write a letter we will have it sent out if you wish, mimeographed and sent out from our office to the different quarrymen of the State of Ohio requesting them to get into this section and see if you can't make this one of the real big sections. I compliment you here today, you are bigger here today than you were last year. Now if you go after it right you can get more next year than you have this year.

MR. WEBER: I think so.

MR. LEWIS: Don't you think it would be? In order to get that list from the Industrial Commission and have them type the letter, they wouldn't have to do the work except type the letter.

MR. WEBER: We have a man four miles from us, still we don't see anybody here at these meetings, I have been over to see them, but I can't get them to come unless you drag them in here.

CHAIRMAN WITMER: I might explain that this week the National Lime Convention was held down at Cincinnati and it is still in progress today, in fact at ten o'clock this morning there was a safety meeting down there, and many of the men were attending that convention and stayed down there for the meeting this morning rather than come up here. That's one reason why there are so many of the lime manufacturers there.

MR. LEWIS: Can you tell me if the Alpha Portland Cement Company had representatives down there from Ironton?

CHAIRMAN WITMER: I don't know. If there is no other business the meeting is adjourned.

PETROLEUM

The Petroleum Section of the Ninth All-Ohio Safety Congress was continued at nine o'clock A. M., by Mr. F. R. McLean, Chairman, Socony-Vacuum Oil Company, Detroit, Michigan.

CHAIRMAN MCLEAN: The morning session of the Petroleum Section is called to order, and I would like to welcome the lady and gentlemen to this meeting. It is certainly very pleasing to have such a large group for our second session, in which Marketing problems are of primary interest. We do have topics, however, of equal interest, I think, to those in other departments of the industry.

Before we really get down to business, I want to ask if Sir Howard Cunninghame-Graham is in the room this morning? You know we had rather a disastrous experience, we found our speakers had Sir Howard in disguise here yesterday, and the stories they told were later bandied about the banquet hall and I don't want our speakers to be embarrassed that way today, so I just want to make absolutely certain on that point before we get down to the business of the meeting.

I think those of us who are in the Oil industry are coming to greater and greater appreciation of the meaning of this thing we call Safety, and we have an analogy in our own industry, I believe, which should make it very easy for us to grasp some of the larger and indirect importance of it. We sell lubricants, and we know when we are selling those lubricants, we are selling, not a quart of oil, or a pound of grease, but we are selling trouble-free operation, miles and miles of motor vehicle transportation, hour by hour, year by year, trouble-free operation. If anything goes wrong with the lubrication of the machine, a bearing burns out, a stoppage occurs, there is interruption of service and the enjoyment of transportation facilities, and possibly an accident follows. It indicates that something is wrong with the efficiency and smooth operation of our mechanism, of our organization, and while, as you know, it does not cost a great deal to get a crankcase bearing replaced, the stopping of use is the thing which makes it so expensive, so I feel that accidents are symptoms of bad organization. When an accident occurs, it is not only the fact that the man is off the job for a time, but the entire machinery, the entire organization of which he is a part, is interrupted, and for a time there is a let-down of efficiency, and eventually, just like a burned-out bearing, the injured employee has to be replaced and there is a lot of expense to that.

Investigation by one of the leading insurance companies shows that indirect expenses through stoppage, replacement cost, and so on from accidents are actually four times as expensive as the compensation figures alone would indicate. I think the little analogy with our own industry helps us grasp that point. So in promoting Safety, in fact, what we might call in selling Safety, we are actually selling a commodity that keeps our industry trouble-free and smooth-operating, just as our labors do for the machinery and transportation system of this country.

It is very fitting, I think, that by our first speaker, we are going to have something of the sales viewpoint on Safety presented to us. I feel that it is rather unnecessary to introduce our speaker to this audience for several reasons: in the first place, I am a stranger here myself in Columbus, to a certain extent, just a casual visitor now and then, whereas our speaker was born, some forty years ago, in this town, went to school here, and graduated from Ohio State University in Business Administration. After entering the service of the Pure Oil Company, as an accountant, he became a salesman, visited different parts of their sales organization, in Philadelphia, their Chicago Head Office, and others, and finally became